



# HIV-infected individuals with high coping self-efficacy are less likely to report depressive symptoms: a cross-sectional study from Denmark



L. Rodkjaer<sup>a,\*</sup>, M.A. Chesney<sup>b</sup>, K. Lomborg<sup>c,d</sup>, L. Ostergaard<sup>a</sup>, T. Laursen<sup>a</sup>, M. Sodemann<sup>e,f</sup>

<sup>a</sup> Department of Infectious Diseases, Aarhus University Hospital, Skejby, 8200 Aarhus N., Denmark

<sup>b</sup> University of California, San Francisco, California, USA

<sup>c</sup> The Patient Involvement Research Program, Aarhus University Hospital, Aarhus, Denmark

<sup>d</sup> Department of Public Health, Faculty of Health Sciences, Aarhus University, Aarhus C., Denmark

<sup>e</sup> Department of Infectious Diseases, Odense University Hospital, Odense, Denmark

<sup>f</sup> Clinical Institute, University of Southern Denmark, Odense, Denmark

## ARTICLE INFO

### Article history:

Received 16 August 2013

Received in revised form 4 December 2013

Accepted 7 December 2013

**Corresponding Editor:** Eskild Petersen, Aarhus, Denmark

### Keywords:

HIV  
Depression  
Coping  
Self-efficacy  
Disclosure  
Stress

## SUMMARY

**Objectives:** Having effective ways to cope helps HIV-infected individuals maintain good psychological and physical well-being. This study investigated the relationship between coping self-efficacy levels, as determined by the Coping Self-Efficacy Scale (CSE), HIV status disclosure, and depression in a Danish cohort.

**Methods:** In 2008, the CSE was administered to 304 HIV-infected individuals to measure their confidence in their ability to cope with HIV infection. HIV status disclosure was assessed on a three-point scale: living openly with the disease, partly openly, or secretly. The Beck Depression Inventory (BDI) was used to assess depression prevalence and severity.

**Results:** The CSE score was significantly related to depression (Spearman's rho =  $-0.71$ ; the test of  $H_0$ : BDI and coping, probability  $> t = 0.0001$ ). There was a significant relationship between higher CSE scores and living openly with HIV. The risk of depression was four times higher in HIV-infected individuals who did not disclose their HIV status (i.e. who lived 'secretly'; odds ratio = 4.1) than in individuals who lived openly.

**Conclusion:** Those with low CSE scores were more likely to report living secretly with HIV and to be depressed. Disclosing HIV may constitute a social stressor, and a lack of coping self-efficacy may increase the likelihood of non-disclosure and depression. Interventions that enhance self-efficacy may help in managing the demands of daily life with HIV, increase disclosure, and reduce depression.

© 2014 The Authors. Published by Elsevier Ltd on behalf of International Society for Infectious Diseases. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

## 1. Introduction

HIV has become a chronic disease due to treatments that prolong life and allow a higher quality of life for many people infected with HIV. Nonetheless, HIV remains a stressful and demanding condition. Psychiatric disorders are common among those infected with HIV, and depression is especially

prevalent.<sup>1,2</sup> A diagnosis of HIV infection is typically a traumatic event,<sup>3</sup> and depression compounds the physical and emotional stress associated with HIV infection. Depression is associated with poor adherence to highly active antiretroviral treatment (HAART),<sup>4–6</sup> deterioration in psychosocial functioning, reduced immune response, more rapid progression of HIV, and higher mortality rates.<sup>7–13</sup> Studies have also found that depression is associated with unsafe sex and thus with an increased risk of transmitting or contracting HIV.<sup>14,15</sup> With improved treatments for HIV, more HIV-infected people are surviving longer and having to cope with HIV-related stress, such as disclosure of their HIV-positive status.

Disclosure is a recurring challenge,<sup>16</sup> and disclosing one's HIV status is both an acute and recurring stressor. Disclosure can be viewed both as impacting stress and as part of coping with HIV.

\* Corresponding author.

E-mail address: [lottrodk@rm.dk](mailto:lottrodk@rm.dk) (L. Rodkjaer).

Making the decision to disclose one's status and the act of doing so may be sources of stress for some, while sharing one's positive status may be a coping mechanism for others.

A previous qualitative study investigated Danish individuals infected with HIV with a focus on HIV-related stressors.<sup>17</sup> The study revealed that each HIV-infected individual had to find the right balance in terms of disclosure that best suited his or her current personal situation. Three disclosure strategies were identified: (1) living openly (being open about their HIV status, disclosing their status to others), (2) living partly openly (disclosing their status to more than two people), and (3) living secretly (being closed about their status, disclosing to two people or fewer). Disclosure was an ongoing issue rather than just an issue at the time of diagnosis, and there were turning points or transitions that occurred over the years.<sup>17</sup>

Decisions surrounding disclosure may themselves constitute a form of chronic stress that can have adverse health consequences. Experiencing stressful life events can activate and alter the hypothalamic–pituitary–adrenal axis, resulting in suppression of the immune system.<sup>18</sup> Additionally, physical and psychosocial stress can lead to negative health behaviors such as substance use, overeating, and non-adherence to medical care.<sup>1,18</sup> Stress can be thought of as resulting from an “imbalance between demands and resources”, or as occurring when “pressure exceeds one's perceived ability to cope.”<sup>19</sup>

Coping has been the focus of research in the social sciences for a long time and is considered a complex multidimensional process that is sensitive to the environment (i.e., to environmental demands and resources) and to personality dispositions that influence the appraisal of stress and coping resources.<sup>19</sup> When people achieve a good ‘fit’ between stressful events and their coping strategies, they experience fewer psychological symptoms than when there is a lack of fit. Specifically, beliefs of personal efficacy determine the acquisition of knowledge on which skills are founded<sup>20</sup> and also determine the likelihood that knowledge and skills will be translated into adaptive behaviors. Coping is considered one of the core concepts in health psychology and is strongly associated with the regulation of emotions in response to social and environmental stressors. Coping self-efficacy is rooted in the concept that people need to believe that they can perform a coping behavior in order to effectively engage in adaptive coping behaviors.<sup>21</sup> Those who are high in coping self-efficacy should be better able to engage in adaptive coping behaviors; thus, over time, they may be less vulnerable to stress and better equipped to apply coping skills when difficulties arise. In particular, they would be less likely to resort to maladaptive coping behaviors (i.e., coping that fails to regulate distress or manage the underlying problem), such as cognitive escape and avoidance behaviors (including the use of alcohol or drugs, or avoiding addressing problems).<sup>22–25</sup> The purpose of this study was to investigate the relationship between levels of coping self-efficacy, disclosure of HIV status, and depression in a group of Danish HIV-infected individuals. In particular, this study sought to examine whether higher levels of coping self-efficacy are associated with self-disclosure and with lower levels of depression.

## 2. Methods

### 2.1. Study design and participants

This cross-sectional study investigated the relationship between coping self-efficacy, disclosure of HIV status, and depression. From May to September 2008, a total of 503 individuals infected with HIV were followed at the Department of Infectious Diseases of Aarhus University Hospital and at Odense University Hospital. These two hospitals provide for approximately 25% of the total HIV-infected population in Denmark.

For inclusion, participants had to be diagnosed with HIV infection, be 18 years of age or older, and be able to read and write in Danish in order to be able to complete the coping self-efficacy scale, disclosure, and HIV-related stress measurements and the Beck Depression Inventory II correctly. Participants who could not read or write Danish ( $n = 54$ ) were excluded. A total of 449 participants were enrolled in the study.

A packet was mailed to each participant that included information about the study, a self-report questionnaire, and a prepaid response envelope. The following information was collected: gender, age, educational level, ethnicity, current job, route of HIV infection (i.e., sexual, drug use, transfusion), HIV exposure group (i.e., homosexual, heterosexual, bisexual), depression, coping self-efficacy, disclosure, and HIV-related stress. The development of the questionnaire has been described previously.<sup>15,16</sup>

Of the 449 participants who were eligible for the study, 350 (70%) responded to the questionnaire; 304 completed the Beck Depression Inventory II (BDI) questionnaire,<sup>26</sup> the Coping Self-Efficacy Scale (CSE),<sup>27</sup> and the HIV disclosure questions correctly. The reasons for not responding included not wanting to participate ( $n = 46$ ) and no specific reason ( $n = 53$ ). A total of 304 individuals were included in the study analysis.

All participants gave written informed consent before participation. The study was approved by the Aarhus Health Human Research Ethics Committee and by the Danish Data Protection Agency.

### 2.2. Measurement of depression

The BDI<sup>26</sup> was used to assess the prevalence and severity of depressive symptoms. The BDI has high validity and reliability in measuring depressive symptoms and has acceptable test–retest reliability ( $r = 0.79$ ) in a non-clinical population.

A Danish version of the BDI has been validated and used in a Danish setting.<sup>27</sup> Respondents were required to rate 21 items from 0 to 3 according to how they had felt during the preceding 2 weeks. Each question has a set of at least four possible answer choices, ranging in intensity; for example: (0) I do not feel sad, (1) I feel sad, (2) I am sad all the time and I can't snap out of it, (3) I am so sad or unhappy that I can't stand it. The BDI focuses on both the cognitive–affective symptoms of depression, e.g., pessimism and diminished self-esteem, and on the somatic symptoms of depression, e.g., weight loss. A BDI score  $\geq 14$  is widely accepted as an indication of depression. In this study, the score categories were as follows: 0–13, minimal depression; 14–19, mild depression; 20–28, moderate depression; 29–63, major depression.

### 2.3. Coping Self-Efficacy Scale (CSE) measurement

The CSE<sup>28</sup> provides a means of measuring adaptive or positive coping. This measure focuses on a person's confidence in his or her ability to cope effectively, which, according to self-efficacy theory, is an important prerequisite for changing coping behavior. Higher scores on the CSE are associated with lower levels of perceived stress<sup>21</sup> and with a lower likelihood of relying on a maladaptive form of coping, especially cognitive escape/avoidance.<sup>4</sup> The CSE assesses a person's confidence with respect to carrying out various effective coping behaviors, such as seeking social support and finding solutions to problems, so that the CSE score reflects the individual's confidence regarding his or her ability to effectively cope with or manage problems. CSE is not concerned with the methods one uses to cope, but instead focuses on the perceived capability to engage in behaviors essential to various forms of adaptive coping. CSE was assessed using a 26-item measure of perceived self-efficacy for coping with challenges and threats.

Participants were asked, “When things aren’t going well for you, or when you’re having problems, how confident or certain are you that you can do the following?” They were then asked to use an 11-point scale to rate the extent to which they believe they could perform behaviors important to adaptive coping, such as ‘sort out what can be changed and what cannot be changed,’ ‘break an upsetting problem down into smaller parts,’ ‘look for something good in a negative situation,’ and ‘get emotional support from friends and family.’ Anchor points on the scale were 0, ‘cannot do at all’; 5, ‘moderately certain can do’; and 10, ‘certain can do’.

The CSE was forward- and back-translated from the original language, US English, to Danish. The translation from US English into Danish was performed by a person whose native language is Danish, and a second person whose first language is US English performed the back-translation. After the back-translation, the original and back-translated instruments were compared. Points of divergence were noted and discussed with the HIV team (physicians and nurses in the outpatient clinics), and the Danish version was pilot-tested on 12 individuals infected with HIV. The translation was then corrected to more accurately reflect the intended meaning in the original language. The responses from the pilot test were analyzed for content validity by analyzing if the responses to similar items were consistent and by interviews with participants to see if the items were clear. The final questionnaire was validated in a pilot study with 15 individuals infected with HIV (face validity).

#### 2.4. Disclosure and HIV-related stress measurements

Disclosure of HIV status was measured on a three-point scale: (1) living openly (being open about their HIV status, disclosing their status to others), (2) living partly openly (disclosing their status to more than two people), and (3) living secretly (being closed about their status, disclosing to two people or fewer). The HIV-related stress measure assessed stress that was related to living with HIV infection on a daily basis and was measured using the answers ‘not at all,’ ‘a little,’ ‘somewhat,’ or ‘a lot.’

A previous study of Danish individuals infected with HIV found that feelings that influenced their daily life with HIV, such as ‘guilt,’ ‘shame,’ ‘anxiety,’ ‘concerns,’ ‘stress,’ ‘loneliness,’ ‘HIV influences my whole life,’ ‘constant thoughts about HIV,’ ‘living a double-life with HIV as a secret,’ ‘HIV limits my way of living,’ and ‘stigmatization,’ were significantly associated with higher levels of depression.<sup>6,15</sup>

#### 2.5. Statistical analysis

The statistical analyses were performed with Stata 10 (StataCorp, College Station, TX, USA). All data were double-entered. The primary variable of interest was the depression score, which was based on the BDI. Depression was analyzed as an absolute risk score and as a continuous risk score. We used the Spearman’s rank correlation coefficient to determine the relationship between coping and depression. The test for trend was used for the relationship between HIV status disclosure and depression. The Kruskal–Wallis test was used to test for a relationship between coping and disclosure. We used adjusted (multiple) logistic regression models to determine the relationship between HIV stress and disclosure. Statistical significance was defined as  $p < 0.05$ .

### 3. Results

The characteristics of the 304 HIV-infected individuals in this study showed that they were representative of the larger Danish HIV-infected population ( $n = 3968$  total) in terms of gender, age,

**Table 1**  
Prevalence of depressive symptoms in 304 HIV- infected individuals

Becks Depression Scale II	n	%
Minimal depression (0–13)	204	67
Mild depression (14–19)	29	10
Moderate depression (20–28)	39	13
Major depression (29–63)	32	10

route of infection, and HIV exposure. The study population was also comparable to the Danish HIV-infected population regarding baseline characteristics of the disease.<sup>29</sup> There were symptoms of depression (BDI >14) in 100 individuals (33%), and symptoms of moderate/major depression (BDI ≥ 20) in 71 (23%) individuals (Table 1). The demographic characteristics and depression scores are presented in Table 2. The majority were in the 30–44 years age group (39%) or the 45–59 years age group (41%), and most had a

**Table 2**  
Demographic characteristics and risk of depression in 304 Danish HIV-infected individuals

	Total (N=304)		Depression (BDI score ≥20) <sup>a</sup> (n=71)	
	n	%	n	%
Gender				
Male	227	67	45	20
Female	77	33	26	34
Age, years				
18–29	37	12	4	11
30–44	117	39	23	20
45–59	126	41	37	29
60+	24	8	7	29
Ethnicity				
Caucasian	244	80	47	19
Other ethnicities	59	20	24	40
Unknown	1			
Education				
Primary or elementary school <9 years	89	30	27	30
Primary or elementary school >9 years	215	70	44	20
Further education				
A few years of higher education (1/2 year–2 years)	57	19	14	25
More years of higher education (3–4 years)	144	47	23	17
Completed or almost completed higher education (more than 4 years)	36	12	8	22
No education after secondary school	41	14	14	34
Other	26	9	11	42
Employment				
Employed	148	49	22	15
Receiving unemployment benefits	5	2	2	40
Receiving rehabilitation, social security, sickness or disability support pension	42	14	15	36
Receiving incapacity benefits	83	27	25	30
Other	26	9	7	27
Route of infection				
Sexual	248	81	59	24
Blood transfusion	8	3	1	13
Injection drug use	3	1	1	33
Unknown	45	15	10	22
HIV exposure group				
Homosexual	125	41	23	18
Heterosexual	149	49	37	25
Bisexual	18	6	7	38
Unknown	12	4	4	33

<sup>a</sup> BDI scores: 0–13, minimal depression; 14–19, mild depression; 20–28, moderate depression; 29–63, major depression.

moderate level of higher education (47%). There was almost an equal distribution of homosexual and heterosexual orientations (41% vs. 49%). Symptoms of depression were more pronounced in women and in individuals who identified themselves as being ethnicities other than Caucasian. There was a higher risk of depression among individuals who had <9 years of primary or elementary schooling, no further education, who received unemployment benefits, or who were undergoing rehabilitation or received sickness or disability benefits (Table 2).

Adjusted analysis among demographic factors in Table 2 showed that participants in the age group 45–59 years (odds ratio (OR) 3.4, 95% confidence interval (CI) 1.1–10.4;  $p = 0.029$ ), women (OR 2.6, 95% CI 1.2–3.7;  $p = 0.013$ ), those of ethnicities other than Caucasian (OR 0.34, 95% CI 0.19–0.63;  $p = 0.001$ ), those with <9 years of primary or elementary schooling (OR 1.8, 95% CI 1.02–3.2;  $p = 0.04$ ), those undergoing rehabilitation (OR 3.2, 95% CI 1.5–6.9;  $p = 0.003$ ), and those in receipt of sickness or disability benefits (OR 2.4, 95% CI 1.3–4.7;  $p = 0.007$ ) had a higher risk of depression.

There was a significant inverse relationship between lower coping self-efficacy and a higher depression score (Spearman's  $\rho = -0.71$ ; the test of  $H_0$ : BDI and coping, probability  $> t = 0.0001$ ; Figure 1).

A test for trend was performed to examine if there was an association between disclosure and depression. Individuals who reported that they lived secretly/disclosed their HIV status to fewer than two people, had significantly higher depression scores (OR 4.1, 95% CI 1.6–10.3;  $p = 0.002$ ) than those who lived openly (i.e., disclosed their status to others). Those who lived partly openly (disclosing their HIV status to more than two people) were more likely to be at risk of depression than those who were living openly (OR 2.4, 95% CI 1.4–5.8;  $p = 0.04$ ) (Figure 2). The Kruskal–Wallis test showed a significant association between higher coping self-efficacy and living openly with HIV status versus living secretly/partly openly ( $p < 0.02$ ).

Multivariate logistic regression, after adjusting for the three different disclosure strategies and the association with HIV-related stress, showed a significant association between HIV-related stress and participants who lived secretly compared to either living openly (OR 3.3, 95% CI 1.6–6.8;  $p < 0.001$ ) or living partly openly (OR 2.5, 95% CI 1.2–3.7;  $p < 0.012$ ).

#### 4. Discussion

We found a significant relationship between the degree of coping self-efficacy and depression in HIV-infected individuals in a Danish setting. Non-disclosure of HIV status was significantly associated with depression. There was a significant relationship

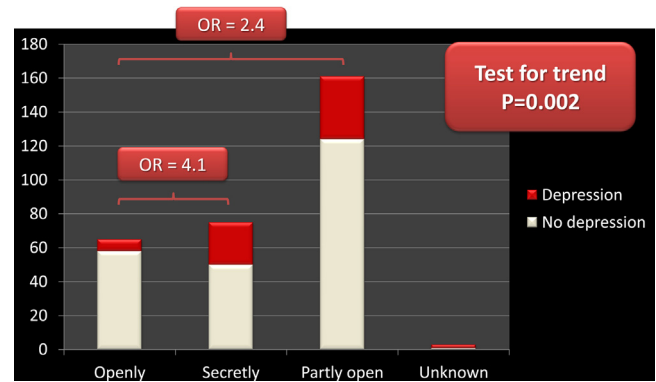


Figure 2. Disclosure of HIV status and risk of depression in 304 Danish HIV-infected individuals.

between having a higher degree of coping self-efficacy and living openly with HIV versus living secretly/partly openly. Other studies have found that for people coping with stressors associated with living with HIV, avoidance and disengagement coping styles are related to increased anxiety and depression,<sup>30,31</sup> while decreases in avoidance coping following interventions are related to decreased depression and grief.<sup>32,33</sup>

The objective of this study was not to identify specific coping behaviors, but it could be argued that individuals with high coping self-efficacy are likely to be more resourceful and seek coping resources and learning strategies to solve problems, thereby reducing their risk of depression. Coping self-efficacy is not concerned with the methods one uses to cope but rather with the perceived capability of managing the situation. Both disclosing and not disclosing one's HIV status can serve as a way of coping with being infected with HIV. However, not disclosing one's status may be more associated with the maladaptive form of coping, cognitive escape/avoidance. These findings suggest that rather than avoiding disclosure, interventions directed at increasing self-efficacy to determine how to disclose or to seek help in doing so from others may be particularly helpful in reducing the risk of depression. There are a number of approaches to HIV disclosure, and no single approach is optimal for relieving depression.<sup>17,34</sup> These findings suggest that HIV-infected individuals who are low in coping self-efficacy lack adaptive coping skills to handle disclosure. They cannot solve the problems of how to disclose their HIV status and to whom they should disclose it. Avoiding disclosure leads to isolation, increasing the risk of depression. Interventions such as coping effectiveness training that teach coping skills for handling HIV-related stressors such as disclosure may be particularly helpful in reducing the risk of depression. A review by Moskowitz et al.<sup>35</sup> about coping with HIV-related issues notes that it is important to measure situation-specific forms of coping. Context-specific coping strategies that are particularly effective can be translated directly into programs that are designed to help people cope with HIV, whereas findings about general coping are less applicable. Interventions such as coping effectiveness training provide this type of situation-specific coping support and training.<sup>21</sup>

A review by Harding et al.<sup>36</sup> suggests that greater understanding of how various subgroups cope with HIV (e.g., subgroups based on age, gender, ethnicity, or personality disorders) will lead to improved interventions that will enhance health, potentially prolonging and improving the quality of life. Our study revealed that there was a higher risk of depression in women, in individuals with an ethnicity other than Caucasian, and in those with <9 years of primary or elementary schooling, those with no further education, individuals in receipt of unemployment benefits, those

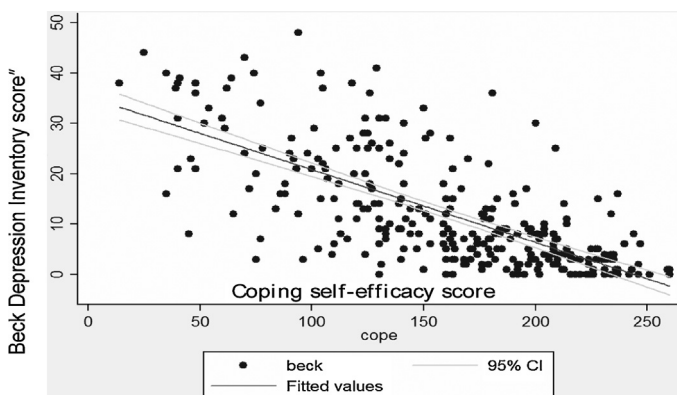


Figure 1. Risk of depression and confidence in performing coping behaviors in 304 Danish HIV-infected individuals.

undergoing rehabilitation, and those in receipt of sickness or disability benefits. This is in agreement with previous studies.<sup>37</sup> These factors might also influence disclosure of HIV, risk of depression, and the degree of coping self-efficacy.

Personality types also influence a person's ability to cope. A meta-analysis by Chida and Vedhara<sup>38</sup> showed that personality types or coping styles and psychological stress were more strongly associated with greater HIV disease progression than stress stimuli per se. This is consistent with evidence that our perceptions of and responses to stressors, rather than the stressors themselves, predict vulnerability to stress-related diseases among people with similar life experiences.<sup>39</sup> Furthermore, many people infected with HIV struggle with co-morbidities that are associated with poorer self-reported health status and quality of life.<sup>36</sup>

Cognitive behavioral interventions such as coping effectiveness training,<sup>21</sup> as well as stress and coping therapy,<sup>19</sup> strive to increase coping effectiveness with regard to problem-solving and other forms of adaptive coping in order to reduce psychological stress, improve well-being, and increase positive psychological states. If the goal is to provide training in coping skills, it is also essential that individuals develop the sense that they can perform such skills and that doing so will reduce their stress.<sup>20,21</sup> The CSE provides a standardized measurement of coping self-efficacy, but there is no current standardized measurement of coping strategies that apply to people infected with HIV. Further work is urgently needed to generate items that assess coping strategies in this population and that can be validated for further outcome research.<sup>36</sup>

Healthcare workers should be aware of the variety of ways in which the ability to disclose HIV status fits into the overall process of adjustment to living with HIV.<sup>17</sup> Should we consider going beyond the general measures of coping and consider including types of coping that are more HIV-specific, such as coping with the disclosure of HIV status, which is a lifelong stressor? For example, disclosure of one's HIV status to friends, family, and sexual partners is a stressor for many living with HIV, but not disclosing it is a risk and may involve types of coping that are not captured by the standard coping scales.

The present study has some limitations. The questionnaire was in Danish, limiting participation to people infected with HIV who were literate in Danish. The participants were not representative in terms of injection drug use; only a few injection drug users participated in this study as the majority are followed at the departments of infectious diseases in Copenhagen. This study sample is, however, representative of the total Danish HIV population outside the capital of Denmark. The cross-sectional design of the study does not show how coping strategies vary over time, and we cannot deduce causal pathways. There might be gender and cultural differences, differences according to the route of infection (i.e., infection via homosexual, heterosexual, or transsexual contact, or from drug use, or from contracting HIV at birth), co-morbidities, age, or differences in children, youths, and adults that we did not consider. Approximately 10% of adults in the general population have personality disorders, but the prevalence rates of personality disorders are higher in the HIV-infected population (19–36%).<sup>40</sup> We do not have information about this prevalence in this study population, which might have biased our results. Specifically, personality disorders could lead to underestimation or overestimation of a person's confidence in his or her ability to cope effectively.

Future research should continue to explore the relationship between depression and coping skills in a larger random sample and in a more diverse HIV-infected population. We also suggest that future research should examine disclosure and interventions designed to increase comfort with disclosure. There is a need for early psychological interventions for those who are newly-diagnosed with HIV to achieve better psychological status. People infected with HIV are now living for extended periods of time, so

more attention should be devoted to the specific medical and psychosocial needs of this aging population.<sup>41</sup> Future studies should examine the use and effectiveness of specific and general coping strategies in regard to both specific stressors, such as disclosure, and to general stressors, such as chronic illness, comorbidities, and personality types. The relationship of coping strategies to physical and mental health outcomes also needs to be further examined.<sup>42</sup>

Our findings highlight the need for research that explores the association between the coping strategies of those infected with HIV and depression in order to develop effective interventions that increase coping strategies and that have long-term effectiveness. The CSE scale provides an alternate approach to the measurement of coping for intervention studies.<sup>27</sup>

We conclude that individuals who have low levels of coping self-efficacy are more likely to report living secretly with HIV and to be depressed. Disclosing HIV may constitute a social stressor, and a lack of coping self-efficacy may increase the likelihood of non-disclosure as well as depression. Interventions that enhance self-efficacy may increase one's ability to manage the daily demands of living with HIV, increasing disclosure and reducing depression.

Health professionals need innovative strategies and tools to better understand and improve physical and mental health outcomes for people infected with HIV. Teaching adaptive coping skills to deal with disclosure and providing opportunities for practice to increase self-efficacy may help prevent or reduce the risk of depression. There is a need to develop holistic interventions that address these multiple challenges.

## Acknowledgements

This project was funded by Aarhus University Hospital, the Skejby Research Foundation, the Health Insurance Foundation, the Central Denmark Region Health Research Foundation, and the Lundbeck Foundation. The authors are grateful to the participants, without whom this work would not have been possible.

*Conflict of interest:* None declared.

## References

1. Leserman J. Role of depression, stress, and trauma in HIV disease progression. *Psychosom Med* 2008;**70**:539–45.
2. Rabkin JG. HIV and depression: review and update. *Curr HIV/AIDS Rep* 2008;**5**:163–71.
3. Leserman J, Pettito JM, Gu H, Gaynes BN, Barroso J, Golden RN, et al. Progression to AIDS, a clinical AIDS condition and mortality: psychosocial and physiological predictors. *Psychol Med* 2002;**32**:1059–73.
4. Chander G, Himelhoch S, Moore RD. Substance abuse and psychiatric disorders in HIV-positive patients: epidemiology and impact on antiretroviral therapy. *Drugs* 2006;**66**:769–89.
5. DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med* 2000;**160**:2101–7.
6. Rodkjaer L, Laursen T, Christensen NB, Lomborg K, Ostergaard L, Sodemann M. Changes in depression in a cohort of Danish HIV-positive individuals: time for routine screening. *Sex Health* 2011;**8**:214–21.
7. Alciati A, Gallo L, Monforte AD, Brambilla F, Mellado C. Major depression-related immunological changes and combination antiretroviral therapy in HIV-seropositive patients. *Hum Psychopharmacol* 2007;**22**:33–40.
8. Bouhnik AD, Préau M, Vincent E, Carrieri MP, Gallais H, Lepeu G, et al. Depression and clinical progression in HIV-infected drug users treated with highly active antiretroviral therapy. *Antivir Ther* 2005;**10**:53–61.
9. Pence BW, Miller WC, Gaynes BN, Eron Jr JJ. Psychiatric illness and virologic response in patients initiating highly active antiretroviral therapy. *J Acquir Immune Defic Syndr* 2007;**44**:159–66.
10. Cruess DG, Evans DL, Repetto MJ, Gettes D, Douglas SD, Pettito JM. Prevalence, diagnosis, and pharmacological treatment of mood disorders in HIV disease. *Biol Psychiatry* 2003;**54**:307–16.
11. Ickovics JR, Hamburger ME, Vlahov D, Schoenbaum EE, Schuman P, Boland RJ, et al. Mortality, CD4 cell count decline, and depressive symptoms among HIV-seropositive women: longitudinal analysis from the HIV Epidemiology Research Study. *JAMA* 2001;**285**:1466–74.

12. Leserman J. HIV disease progression: depression, stress, and possible mechanisms. *Biol Psychiatry* 2003;**54**:295–306.
13. Lima VD, Geller J, Bangsberg DR, Patterson TL, Daniel M, Kerr T, et al. The effect of adherence on the association between depressive symptoms and mortality among HIV-infected individuals first initiating HAART. *AIDS* 2007;**21**:1175–83.
14. Rodkjaer L, Laursen T, Balle N, Sodemann M. Depression in HIV patients is under-diagnosed: a cross-sectional study among HIV patients in Denmark. *HIV Med* 2010;**11**:46–53.
15. Berg CJ, Michelson SE, Safren SA. Behavioral aspects of HIV care: adherence, depression, substance use, and HIV-transmission behaviours. *Infect Dis Clin North Am* 2007;**21**:181–200.
16. Holt R, Court P, Vedhara K, Nott KH, Holmes J, Snow MH. The role of disclosure in coping with HIV infection. *AIDS Care* 1998;**10**:49–60.
17. Rodkjaer L, Sodemann M, Ostergaard L, Lomborg K. Disclosure decisions: HIV-positive persons coping with disease-related stressors. *Qual Health Res* 2011;**21**:1249–59.
18. Marshall GD. The adverse effects of psychological stress on immunoregulatory balance: applications to human inflammatory diseases. *Immunol Allergy Clin North Am* 2011;**31**:133–40.
19. Lazarus RS, Folkman S. Stress, appraisal, and coping. New York: Springer; 1984.
20. Bandura A. Self-efficacy: toward a unifying theory of behavior change. *Psychol Rev* 1977;**84**:191–215.
21. Chesney MA, Chambers DB, Taylor JM, Johnson LM, Folkman S. Coping effectiveness training for men living with HIV: results from a randomized clinical trial testing a group-based intervention. *Psychosom Med* 2003;**65**:1038–46.
22. Ashton E, Vosvick M, Chesney M, Gore-Felton C, Koopman C, O'Shea K, et al. Social support and maladaptive coping as predictors of the change in physical health symptoms among persons living with HIV/AIDS. *AIDS Patient Care STDS* 2005;**19**:587–98.
23. Strentz T, Auerbach SM. Adjustment to the stress of simulated captivity: effects of emotion-focused versus problem-focused preparation on hostages differing in locus of control. *J Pers Soc Psychol* 1998;**5**:652–60.
24. Vitaliano PP, DeWolfe DJ, Maiuro RD, Russo J, Katon W. Appraised changeability of a stressor as a modifier of the relationship between coping and depression: a test of the hypothesis of fit. *J Pers Soc Psychol* 1990;**59**:582–92.
25. Vosvick M, Gore-Felton C, Koopman C, Thoresen C, Krumboltz J, Spiegel D. Maladaptive coping strategies in relation to quality of life among HIV/AIDS adults. *AIDS Behav* 2002;**6**:97–106.
26. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry* 1961;**4**:561–71.
27. Uher R, Farmer A, Maier W, Rietschel M, Hauser J, Marusic A, et al. Measuring depression: comparison and integration of three scales in the GENDEP study. *Psychol Med* 2008;**38**:289–300.
28. Chesney MA, Neilands TB, Chambers DB, Taylor JM, Folkman S. A validity and reliability study of the coping self-efficacy scale. *Br J Health Psychol* 2006;**11**:421–37.
29. Obel N, Engsig FN, Rasmussen LD, Larsen MV, Omland LH, Sørensen HT. Cohort profile: The Danish HIV Cohort Study. *Int J Epidemiol* 2009;**38**:1202–6.
30. Gonzalez JS, Penedo FJ, Antoni MH, Duran RE, McPherson-Baker S, Ironson G, et al. Social support, positive states of mind, and HIV treatment adherence in men and women living with HIV/AIDS. *Health Psychol* 2004;**23**:413–8.
31. Gore-Felton C, Koopman C, Spiegel D, Vosvick M, Brondino M, Winningham A. Effects of quality of life and coping on depression among adults living with HIV/AIDS. *J Health Psychol* 2006;**11**:711–29.
32. Hansen NB, Tarakeshwar N, Ghebremichael M, Zhang H, Kochman A, Sikkema KJ. Longitudinal effects of coping on outcome in a randomized controlled trial of a coping group intervention for HIV-positive adults with AIDS-related bereavement. *Death Stud* 2006;**30**:609–36.
33. Smith NG, Tarakeshwar N, Hansen NB, Kochman A, Sikkema KJ. Coping mediates outcome following a randomized group intervention for HIV-positive bereaved individuals. *J Clin Psychol* 2009;**65**:319–35.
34. Hult JR, Wrubel J, Bränström R, Acree M, Moskowitz JT. Disclosure and nondisclosure among people newly diagnosed with HIV; an analysis from a stress and coping perspective. *AIDS Patient Care STDS* 2012;**26**:181–90.
35. Moskowitz JT, Hult JR, Bussolari C, Acree M. What works in coping with HIV? A meta-analysis with implications for coping with serious illness. *Psychol Bull* 2009;**135**:121–41.
36. Harding R, Clucas C, Lampe FC, Date HL, Fisher M, Johnson M, et al. What factors are associated with patient self-reported health status among HIV outpatients? A multi-centre UK study of biomedical and psychosocial factors. *AIDS Care* 2012;**24**:963–71.
37. Blalock AC, McDaniel JS, Farber EW. Effect of employment on quality of life and psychological functioning in patients with HIV/AIDS. *Psychosomatics* 2002;**43**:400–4.
38. Chida Y, Vedhara K. Adverse psychosocial factors predict poorer prognosis in HIV disease: a meta-analytic review of prospective investigations. *Brain Behav Immun* 2009;**23**:434–45.
39. McEwen BS. Protective and damaging effects of stress mediators. *N Engl J Med* 1998;**338**:171–9.
40. Treisman GJ, Angelino AF. The psychiatry of AIDS. A guide to diagnosis and treatment. Baltimore, MD: The Johns Hopkins University Press; 2004.
41. Justice A. HIV and aging: time for a new paradigm. *Curr HIV/AIDS Rep* 2010;**7**:69–76.
42. Di Benedetto M, Lindner H, Aucote H, Churcher J, McKenzie S, Croning N, et al. Co-morbid depression and chronic illness related to coping and physical and mental health status. *Psychol Health Med* 2013 Jun 3. [Epub ahead of print].