

RESEARCH PAPER

Examining the role of vocational rehabilitation on access to care and public health outcomes for people living with HIV/AIDS

Liza Conyers¹ and K. B. Boomer²

¹Department of Educational Psychology, Counseling and Special Education, Penn State University, University Park, PA, USA and ²Department of Mathematics, Bucknell University, Lewisburg, PA, USA

Abstract

Purpose: The purpose of this study is to examine the role of vocational rehabilitation services in contributing to the goals of the National HIV/AIDS strategy. Three key research questions are addressed: (a) What is the relationship among factors associated with the use of vocational rehabilitation services for people living with HIV/AIDS? (b) Are the factors associated with use of vocational rehabilitation also associated with access to health care, supplemental employment services and reduced risk of HIV transmission? and (c) What unique role does use of vocational rehabilitation services play in access to health care and HIV prevention? **Method:** Survey research methods were used to collect data from a broad sample of volunteer respondents who represented diverse racial (37% Black, 37% White, 18% Latino, 7% other), gender (65% male, 34% female, 1% transgender) and sexual orientation (48% heterosexual, 44% gay, 8% bisexual) backgrounds. **Results:** The fit of the final structural equation model was good (root mean square error of approximation = 0.055), with 90% upper bound of 0.058, Comparative Fit Index = 0.953, TLI = 0.945). Standardized effects with bootstrap confidence intervals are reported. **Conclusions:** Overall, the findings support the hypothesis that vocational rehabilitation services can play an important role in health and prevention strategies outlined in the National HIV/AIDS strategy.

Keywords

Chronic illness, HIV/AIDS, public health, US National HIV/AIDS Strategy, vocational rehabilitation

History

Received 25 March 2013
Revised 19 August 2013
Accepted 21 August 2013
Published online 7 January 2014

► Implications for Rehabilitation

- Vocational rehabilitation services can play a unique role in contributing to the goals of the National HIV/AIDS strategy by increasing access to care, increasing use of job support services and reducing health-risk behaviors.
- Increased job confidence and more positive health perception reduced HIV stigma, which is a key mediator to use of vocational rehabilitation services.
- The Behavioral Model of Vulnerable Populations is a useful framework to evaluate the impact of vocational rehabilitation services on access to health care and health-risk behaviors.

Introduction

Implementation of the National HIV/AIDS Strategy (NHAS) [1] raises important questions regarding the role of vocational rehabilitation in this major public health initiative. The primary objectives of the National HIV/AIDS Strategy are to (a) reduce new HIV infections, (b) increase access to care and (c) improve health outcomes for people living with HIV/AIDS (PLWHA). The National HIV/AIDS Strategy Federal Implementation Plan [1] specifically directs federal agencies to “consider ways to increase supports for employers to hire and maintain employment of people with HIV and how to integrate them in broader employment initiatives for people with disabilities” (p. 25).

This inclusion of employment and vocational services in the National HIV/AIDS Strategy reflects an increased interest in examining structural factors (such as reducing poverty) on HIV health and prevention outcomes [2] as well as the increased need for these services among people living with HIV/AIDS.

With the improved health outcomes associated with advancements in medical treatments, many PLWHA want or need to work, yet many also face significant barriers to employment and could benefit from vocational services [3,4]. The most comprehensive employment initiative for people with disabilities within the United States is the State Federal Vocational Rehabilitation System (VR) [5]. Within this system, rehabilitation counselors provide a range of services designed to facilitate the employment of people with disabilities. Rehabilitation counselors can also authorize medical referrals and supportive rehabilitation services, including mental health counseling, if these services will remove barriers to employment [6]. Research findings indicate that use of VR services increases the chances of successful employment [7].

Address for correspondence: Liza Conyers, Associate Professor of Rehabilitation and Human Services, Department of Educational Psychology, Counseling and Special Education, Penn State University, 302 CEDAR Building, University Park, PA 16801, USA. Tel: (814) 863-6115. E-mail: Lmc11@psu.edu

Given the extent of valuable services provided by the VR system, it makes intuitive sense that use of VR services would improve access to health care and supplemental employment services for eligible PLWHA and reduce risk of HIV transmission. According to the Centers for Disease Control and Prevention [8], retaining individuals with HIV/AIDS in care is a significant public health challenge as it is estimated that 3 out of 4 PLWHA do not achieve the full benefits of the treatment needed to keep the virus under control; only 36% of PLWHA receive antiretroviral therapy of which only 28% are able to adhere to their medication to achieve an undetectable viral load. Once a person is able to maintain an undetectable viral load their chances of transmitting the HIV virus to another person is reduced by 96% [9], which underscores the role of treatment as prevention for PLWHA [10]. One key factor in reduced access to care is poverty. Successful engagement in vocational rehabilitation services not only increases the potential for being linked to important resources but it also increases the likelihood of improved economic outcomes through employment [7]. Engagement in vocational services is also associated with increased feelings of confidence and motivation to pursue employment [11].

To date, the majority of rehabilitation research related to HIV/AIDS and employment in the United States has focused on vocational needs/experiences of PLWHA (e.g. [11–14]), use of vocational rehabilitation services [15,16] and the impact of employment interventions on vocational outcomes [17], with little attention to health and no examination of the impact of employment or vocational rehabilitation on HIV prevention [18]. To assess the potential impact of the employment mandates of the NHAS, this study will explore the role of vocational rehabilitation within the framework of the Behavioral Model of Vulnerable Populations (BMVP) [19]. The BMVP, which expands upon Andersen's Behavioral Model of Health Service Utilization [20], is based upon the core premise that health service utilization is a function of (a) predisposing factors: primarily demographic and social structure factors with relatively low mutability that can predispose individuals to use services or not (e.g. gender, sexual orientation, ethnicity), (b) enabling factors: personal and community resources that are often needed to facilitate access to health care and are thought to be more mutable than other factors (e.g. social service support, receipt of public benefits); and (c) need factors: both perceived (individual perceptions of need) and evaluated need (feedback from MD). Although this model has been the dominant model for assessing health-care utilization for over 25 years [21], no research on this model has specifically examined vocational rehabilitation (as an enabling factor) on key health care utilization and/or HIV/AIDS prevention outcomes. One study, Datti and Conyers [15], applied the BMVP to predict the use of VR services among a sample of Latino men with HIV/AIDS. This study identified job confidence (an enabling factor) and general health perception (a need factor) to be associated with the use of VR services. The current study will expand upon this previous research to examine further if factors associated with the use of VR services may also help explain the use of health and HIV prevention services. However, given the role of HIV stigma in both use of vocational services [22] and HIV prevention [23], we also included reduced HIV stigma as an important factor to consider in this model.

The purpose of this study is to examine the role of vocational rehabilitation services in contributing to the goals of the National HIV/AIDS strategy. Three key research questions are addressed: (a) What is the relationship among factors associated with the use of vocational rehabilitation services for people living with HIV/AIDS? (b) Are the factors associated with use of vocational rehabilitation also associated with access to health care, supplemental employment services and reduced risk of HIV

transmission? and (c) What unique role does use of vocational rehabilitation services play in access to health care and HIV prevention? Provision of vocational rehabilitation services for PLWHA is hypothesized to play an important role in (a) increasing access to both critical medical and mental health care as well as supplemental employment services and (b) reducing health-risk behaviors associated with HIV transmission.

Methods

Participants and instrument

This study used structural equation modeling to analyze data of 2506 respondents who were recruited from AIDS Service Organizations (ASO) and networks across the US to complete the National Working Positive Vocational Development and Employment Needs Survey (NWPC-VDES) [3]. This survey included four major sections consisting of demographic variables, knowledge and use of vocational resources, questions related to employment status, and several health-related subscales from the HIV Medical Outcomes Study (MOS-HIV [24]). It took about 30–45 minutes to complete and was available in paper and Internet formats in both English and Spanish. Volunteer participants represented diverse racial (37% Black, 37% White, 18% Latino, 7% other), gender (65% male, 34% female, 1% transgender) and sexual orientation (48% heterosexual, 44% gay, 8% bisexual) backgrounds. The mean age of the sample was 46. The majority of respondents were from low-income backgrounds (53% receive less than \$15 000 per year) and many had experienced significant barriers to employment such as homelessness (43%), drug abuse (38%) and incarceration (26%). About a quarter reported never using the Internet or email. Within the sample, 24% had used VR services.

Data analysis

Statistical analyses were conducted using Mplus v7 (Los Angeles, CA) [25]. Initially, a factor analysis was conducted that identified items which significantly loaded onto the three exogenous latent variables of job confidence, reduced HIV stigma, and health perception; items with factor loadings of $\lambda = 0.3$ or greater were retained. Further, items measured on 5-point Likert scales, or fewer categories, were treated as ordinal variables, to avoid biases with the estimates associated with treating such variables as continuous. The factor analysis, representing the measurement aspect of the statistical model, was combined with probit and linear regressions to explore the effects and associations among the three endogenous (i.e. outcome) latent variables (health risk behavior, access to medical/mental health care, and supplemental employment services) on the three exogenous (i.e. dependent) latent variables (job confidence, reduced HIV stigma, and health perception) and the binary indicator of the use of VR services, into a structural equation model. Each of these variables is defined in Table 1. A robust weighted least-squares estimator (WLSMV) in Mplus [26,27] was used to retain the ordinal nature of the variables. Because the analysis included binary, ordinal and continuous items, multivariate normality could not be assumed. Consequently, bootstrap resampling (1000 iterations) was used to obtain confidence intervals for standardized path coefficients within the structural equation model. Pairwise deletion was used within Mplus to respond to missing data. The sample size in the final analysis was 1873.

Results

Figure 1 illustrates the structural equation model that was used to assess relationships among job confidence, health perception,

Table 1. Definition of factors.

Resource	Description
Exogenous latent variables	
Job Confidence	How confident are you in your job-seeking skills? (1 = no confidence to 7 = extremely confident) How confident are you that you could ask for a job accommodations? (1 = no confidence to 7 = extremely confident) How confident are you that you could hold onto a job once you had it? (1 = no confidence to 7 = extremely confident) On a scale of 1 (low) through 7 (high), how would you rate your level of self-esteem? <i>Cross loaded on Health Perceptions</i>
Reduced HIV Stigma	I sometimes feel worthless because I am HIV positive (1 = strongly agree to 5 = strongly disagree) Others would think less of me if they know I was HIV positive (1 = strongly agree to 5 = strongly disagree) How many HIV positive people do you know? (1 = none, 2 = 1-2, 3 = 3-4, 4 = 5-6, 5 = 7+)
Health Perceptions	On a scale of 1 (low) through 7 (high), how would you rate your level of self-esteem? <i>Cross-loaded on Job Confidence</i> On a scale of 1 (very unstable) to 7 (very stable), during the past 12 months, my health status has been? On a scale of 1 (very unstable) to 7 (very stable), over the next five years I expect my health to be? I have enough energy to do the things that I need to do (1 = strongly disagree to 5 = strongly agree) MOS General Health Perceptions
Endogenous latent variables	
Reduced Health Risk Behaviors	Since your current job (if employed)/since you stopped working (if unemployed), have the following increased, decreased, or stayed the same: use of alcohol, drug use, amount of unprotected sex, and/or quality of self-care?
Supplemental Employment Services	Have you now, or in the past, had access to Social Security benefits counseling, services to help keep a job, and/or One Stop Career/Workforce Center services?
Access to Medical/Mental Health care	Have you now, or in the past, had access to on-going medical care, mental health counseling, case management services and/or drug and alcohol treatment?

reduced stigma and the three outcomes of reduced health-risk behaviors, increased access to mental health and medical care and supplemental employment services. An initial confirmatory factor analysis assessed the adequacy of the measurement model between the latent variables and their measured variables. All factor loadings were significant ($p < 0.001$).

The fit of the final structural equation model was good (root mean square error of approximation = 0.055, with 90% upper bound of 0.058, Comparative Fit Index = 0.953, Tucker Lewis Index = 0.945); it is recommended that the root mean square error of approximation be less than 0.06 and that the Comparative Fit Index and Tucker Lewis Index be at least 0.95 [28]. Standardized effects with bootstrap confidence intervals are reported in Table 2 and for each research question below. The path coefficients from the exogenous variables towards the use of VR are probit estimates (b) whereas path coefficients that terminate at the continuous endogenous outcomes measures are standardized least squares regression coefficients (β). Unstandardized probit coefficients were used to calculate the probability of VR use.

What is the relationship among factors that contribute to impact on VR use?

Neither job confidence nor health perception has a significant direct effect on the use of VR services; both have a significant direct effect on the latent factor of reduced stigma (p values < 0.001). However, reduced stigma has a significant direct effect on the use of VR services ($b = 0.15$, p value = 0.009), and both job confidence and health perception have a significant indirect effect, through reduced stigma, on the use of VR services. The direct effect of job confidence on reduced stigma is $\beta = 0.44$ and the direct effect of health perception on reduced stigma is $\beta = 0.26$; both p values are less than 0.001. Thus, reduced stigma completely mediates the association between job confidence and health perception, respectively, on the use of VR services.

The effect of a change in one's job confidence or one's perception of health has approximately the same effect on the probability of using VR services. The indirect effect of job confidence on the use of VR, through reduced stigma, is $b = 0.07$ (p value = 0.010). For an individual with a low job confidence (one SD below the factor mean), the probability of using VR services is 0.24 whereas the probability of using VR services for one with a high job confidence (one SD above the mean) is 0.27. The indirect effect of health perception on the use of VR, through reduced stigma, is $b = 0.04$ (p value = 0.018). For an individual with a perception of poor health (one SD below the factor mean), the probability of using VR services is 0.24 and for an individual with a perception of good health (one SD above the factor mean), the probability of using VR services is 0.27.

Are the factors associated with use of vocational rehabilitation also associated with access to health care, supplemental employment services and reduced risk of HIV transmission?

The use of VR services has a significant direct effect on health risk behaviors ($\beta = .15$), supplemental employment services ($\beta = 0.71$) and access to care ($\beta = 0.54$), with p values < 0.001 . The latent factors health perception and job confidence each had a direct negative effect on access to care, with respective standardized effects of $\beta = -0.15$ (p value 0.018) and $\beta = -0.14$ (p value 0.028). Reduced HIV-stigma did not have a direct effect on the outcome variables.

What unique role does use of vocational rehabilitation services play in access to health care and HIV prevention?

Health perception ($\beta = 0.03$, p value 0.017) and job confidence ($\beta = 0.05$, p value 0.009) each has a significant indirect effect on supplemental employment services through reduced stigma and the use of VR services. Health perception ($\beta = 0.01$, p value

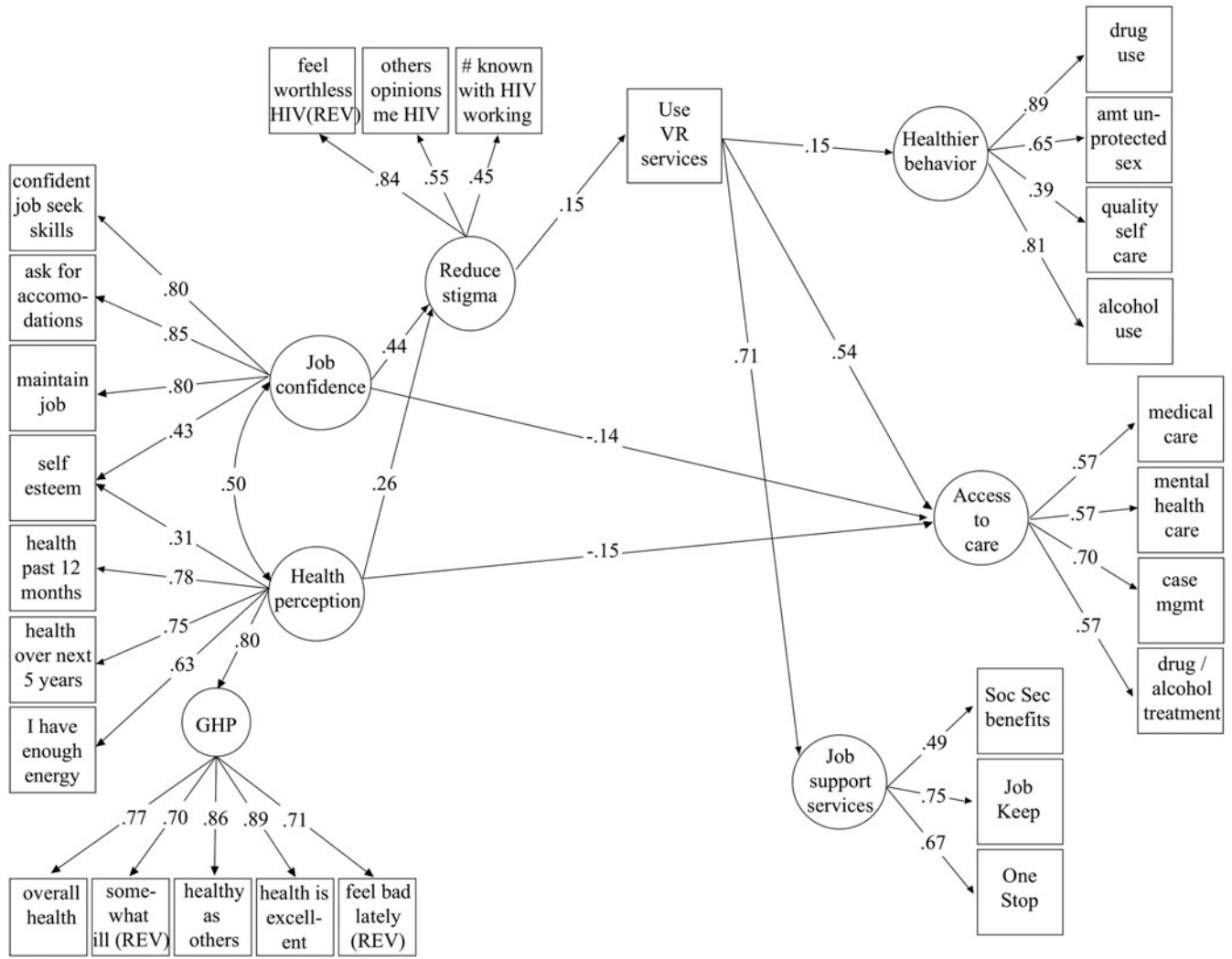


Figure 1. The structural equation model linking health perception (a need factor) and job confidence, through reduced stigma, to the use of VR (enabling factors) and the outcomes of healthier behavior, access to care and job support services.

Table 2. Impact of VR on access to care.

Direct and indirect paths	Standardized coefficient (95% CI) ^a	p Value
<i>Outcome: Reduced stigma</i>		
Health perceptions→Reduced stigma	0.26 (0.169, 0.342)	<0.001
Job confidence→Reduced stigma	0.44 (0.363, 0.525)	<0.001
<i>Outcome: VR Use</i>		
Reduced stigma→Use of VR services	0.15 (0.045, 0.308)	0.009
Health perceptions→Reduced stigma→Use of VR services	0.04 (0.006, 0.069)	0.014
Job confidence→Reduced stigma→Use of VR services	0.07 (0.016, 0.115)	0.010
<i>Outcome: Reduced Health Risk Behaviors</i>		
Use of VR services→Health risk behaviors	0.15 (0.074, 0.230)	<0.001
Job confidence→Reduced stigma→Use of VR services→Health risk behaviors	0.01 (0.001, 0.019)	0.031
Health perceptions→Reduced stigma→Use of VR services→Health risk behaviors	0.01 (0.000, 0.011)	0.048
<i>Outcome: Supplemental Employment Services</i>		
Use of VR services→Supple. Employ. Services	0.71 (0.635, 0.781)	<0.001
Job confidence→Reduced stigma→Use of VR services→Suppl. Employ. Services	0.05 (0.012, 0.081)	0.009
Health perceptions→Reduced stigma→Use of VR services→Suppl. Employ. Services	0.03 (0.005, 0.049)	0.017
<i>Outcome: Access to Medical and Mental Health Care</i>		
Use of VR services→Access to Medical/MH care	0.54 (0.457, 0.630)	<0.001
Job confidence→Access to Medical/MH care	-0.14 (-0.250, -0.022)	0.028
Job confidence→Reduced stigma→Use of VR services→Access to Medical/MH care	0.04 (0.008, 0.063)	0.010
Health perceptions→Access to Medical/MH care	-0.15 (-0.252, -0.41)	0.018
Health perceptions→Reduced stigma→Use of VR services→Access to Medical/MH care	0.02 (0.003, 0.037)	0.018

^a95% Confidence Interval based on 1000 bootstrap samples provided for significant effects.

0.048) and job confidence ($\beta=0.01$, p value 0.031) each has significant indirect effect on health-risk behaviors when considering reduced stigma and the use of VR services. Health perception ($\beta=0.02$, p value 0.018) and job confidence ($\beta=0.04$, p value 0.01) each has a significant indirect positive effect on access to medical and mental health care through reduced stigma and the use of VR services. Any indirect path from either health perception or job confidence, which excludes the use of VR services, to an outcome measure, is insignificant.

Discussion

The primary purpose of this study is to explore the role of vocational rehabilitation services in helping to accomplish the goals of the National HIV/AIDS strategy. In response to the three main research questions, this study makes several contributions to the vocational rehabilitation literature. First, this study helps us to better understand the relationship among three key factors associated with the use of VR services (job confidence, health perception and reduced HIV stigma) and highlights the critical role that reduced HIV stigma plays as a key mediator to accessing vocational rehabilitation services. Second, this study identifies the pathways through which these three factors impact reduced health risk behaviors, access to care, and use of supplemental employment services. Third, this study highlights the unique role that vocational rehabilitation services play on reduction of health-risk behaviors and access to supplemental employment services and the partial role that it plays in mediating access to medical and mental health care. Overall, the findings support the hypothesis that vocational rehabilitation services can play an important role in health and prevention strategies outlined in the National HIV/AIDS strategy. This discussion will elaborate on the findings associated with each of the key research questions in greater depth.

What is the relationship among factors associated with the use of vocational rehabilitation services for people living with HIV/AIDS?

This study helps us to better understand the relationship among three key factors associated with use of vocational rehabilitation services: job confidence, health perception and reduced HIV stigma. A review of the research literature indicates general support for the importance of these three factors when considering use of VR services.

Specific studies examining the impact of job confidence on use of VR services is limited. However, the overall role of self-efficacy in the career decision-making process is well-established [29]. One study that included job confidence as a predictor of use of VR services found that higher levels of job confidence predicted increased use of VR services: for every unit of increase in job confidence, the odds of using VR services increased about 1.4 times [15]. In another study, Hergenrather, Rhodes, Turner, & Barlow [30] administered a Self-efficacy of Job Seeking Skills Scale to 577 people with disabilities who were attending an orientation at a public VR service provider and found that participants had high confidence in these skills. Although job confidence did not have a significant direct effect on use of VR services in the current study, it did have a significant direct effect on reducing HIV stigma ($\beta=0.44$) and a significant indirect effect on the use of VR services through reduced stigma. Reflecting on the relationship between disability and job confidence, Roessler and Rumrill [31] noted that chronic illness can undermine individuals' confidence and self-efficacy and ultimately their belief in their ability to maintain work. It is also well recognized that a HIV diagnosis can have a devastating impact on one's sense of self and self-stigma [32]. Qualitative research that

examined the impact of vocational services on people with HIV indicated that engagement in vocational services provided a sense of normalcy for many of the participants as they began to reconnect with their potential and refocus on skills that they could develop [11]. This return to a sense of normalcy may help to explain the reduced levels of stigma noted in the current study. These findings also highlight the critical role that prevocational services can play in helping people with HIV gain enough self-confidence to at least consider applying for more formalized public vocational rehabilitation services (i.e. State Federal Office of Vocational Rehabilitation services).

Health perception has been recognized as an important factor to consider in assessing the likelihood of seeking employment among people with disabilities or chronic health conditions [33]. Only one study specifically examined the relationship between health perception and use of public vocational rehabilitation services among a population of Latino men living with HIV/AIDS [15]. This study used the General Health Perception Scale of the MOS-HIV (GHP) and found that although GHP was a significant predictor for the use of vocational rehabilitation services, the odds ratio did not reveal a strong relationship between GHP and use of vocational rehabilitation services ($\text{Exp}(B)=1.02$). Studies that have examined myocardial infarction [34] and back pain [33] indicate that health perception can impact the return to work process. In a study that examined the perceptions regarding returning to work among participants in a Social Security Ticket to Work program, 41% of those who indicated that they would not likely return to work within a year reported disability-related symptoms as the primary reason for not doing so [35]. According to Petrie and Weinman [36], individual illness perceptions can vary extensively despite similar diagnoses or objective measures of health status and can have significant implications for the person's life. For the current study, the two variables that contributed the most to the health perception factor were GHP ($\lambda=0.80$) and an assessment of the stability of health over the past year ($\lambda=0.78$). There was no direct relationship between health perception and use of vocational rehabilitation services. There was, however, a direct relationship ($\beta=0.26$) on health perception to reduced stigma and a significant indirect effect of health perception on use of VR services through reduced stigma. This finding suggests that a positive overall perception of one's health coupled with a sense of overall health stability can lead to reduced levels of HIV stigma, which make a person more likely to use VR services. Although this finding was statistically significant, the effect size was relatively small, which suggests that more research is needed beyond the limits of this exploratory study to further examine this potential relationship.

The negative impact of HIV stigma is widely recognized in research literature relating to access to a wide range of services, including employment [11,37–40]. In a systematic review of the literature on the effectiveness of the reduction of stigma related to substance abuse disorders, Livingston et al. [41] found that skills development and group-based acceptance and commitment therapy are likely to lead to reduced stigma. One randomized control trial conducted by the National Institute on Drug Abuse [42] specifically focused on an employment skills intervention and found that employment skills training significantly improved the view of society among the intervention group and also reduced alienation compared to the control group. In a more recent study that examined the impact of gainful employment on reducing levels of stigma against people with both a mental illness and criminal record found that gainful employment de-stigmatized a fictional person with both schizophrenia and a criminal record [43]. In a prior qualitative research study, HIV/AIDS stigma is identified as an important theme that is associated with willingness to seek vocational services outside of an AIDS Service

Organization setting [22]. Despite the critical relationship between reduced HIV stigma and access to services, no prior research examining predictors of use of vocational rehabilitation among people living with HIV/AIDS has included reduced stigma as a main point of analysis. The current study provides a unique opportunity to gain a deeper understanding of the potential role of reduced HIV stigma on VR utilization as a critical mediating factor and highlights the need for further research in this area.

Are the factors associated with use of vocational rehabilitation also associated with access to health care, supplemental services and reduced risk of HIV transmission?

This study found that both health perception and job confidence had a negative direct effect on access to health care, suggesting that as one felt healthier or had a higher degree of confidence in one's ability to obtain or maintain employment, he or she was less likely to seek care. This finding is consistent with the framework of the Behavioral Model of Vulnerable Populations where health perception is defined as a need variable [19,20]. Within this framework, the lower one perceives their health to be, the greater the perceived need would be to seek out medical services. Although reduction of utilization of medical services makes sense if one's health is stable, in the case of HIV/AIDS, it is recommended to consult with a health care provider at least every 3–4 months to monitor symptoms and assess the levels of viral load and CD4 count [44]. High CD4 counts reflect a stronger immune system and low viral loads reduce the risk of HIV transmission [10]. It is important to monitor these lab reports to ensure that the medications are effective and to prevent further illness and risk of transmission. Therefore, reduction in use of medical care could be perceived as a negative outcome from a personal and public health perspective when it comes to HIV care, if the person is no longer accessing care at all. However, for "highly adherent and stable patients with suppressed viral load for at least several years, some experts monitor every 6 months" [44, p. 94].

Within the context of the Behavioral Model of Vulnerable Populations, job confidence would be conceptualized as an enabling variable. As with health perception, increase in job confidence had a direct negative effect on access to care, indicating that as respondents became more confident in their ability to maintain a job, ask for accommodations, use job seeking skills, and/or experienced improved self-esteem, they were less likely to access care. One potential benefit of vocational services would be increased self-sufficiency leading to a reduction in need and/or demand for case management services [45]. Job confidence and ability to request accommodations and job seeking skills reflects the ability for a person to advocate for and take care of many personal needs independently. Reduction in the need for case management could be a very positive outcome as it can save limited financial resources and reduce the burden on the HIV system of care, which is typically underfunded and in high demand. It also makes sense that increases in confidence would also be associated with improved mental health and a reduced need for mental health services and drug/alcohol treatment.

Reduced HIV stigma did not have a direct effect on any of the outcome variables. This is a bit surprising as reduced stigma is generally thought to be associated with increased access to care [23]. As we look closer at the operational definition for reduced stigma for this study, we see that it consists of three main components including ratings of self-stigma (I sometimes feel worthless because I am HIV positive), public stigma (others would think less of me if they knew I was HIV positive) and a third variable more directly related to employment (number of

known people with HIV who are working). Although this last component of the definition of HIV stigma contributes the least to the overall factor, it may capture an aspect of stigma more directly related to employment and/or vocational status that has not previously been examined. More research is needed to further explore this relationship.

There are a number of different elements that can impact the results from the current study. One important consideration is looking at the influence of the individual items that define the access to care factor (medical care, mental health care, drug/alcohol treatment and case management). Although medical care, mental health care and drug and alcohol treatment all seem to have a similar relationship within the broader factor of access to care ($\lambda = 0.57$), receipt of case management services seems to have a stronger effect ($\lambda = 0.70$). In this regard, it makes sense that as individuals' health perception or job confidence improves, they may have less need for case management services, especially those related to medical case management. Likewise, improvements in health perception and job confidence are associated with improved mental health and may also be an indicator of either the absence of drug and alcohol problems and/or improved health outcomes in this area as well. These relationships need to be examined in greater depth and with a more precise measure of access to care that can distinguish between HIV monitoring by a medical professional, medical care, mental health services, medical case management and drug and alcohol treatment.

Neither reduced HIV stigma nor improved health perception had a direct effect on reduced health-risk behaviors or use of supplemental job support services. However, they did have a significant indirect effect, which will be discussed below when considering the unique impact of vocational rehabilitation services.

What unique role does use of vocational rehabilitation services play in access to health care and HIV prevention?

This study provided support for the role of vocational rehabilitation in contributing to the goals of the National HIV/AIDS strategy as the use of vocational rehabilitation services had a significant direct effect on reducing health-risk behaviors ($\beta = 0.15$), increasing access to care ($\beta = 0.54$) and increasing job support services ($\beta = 0.71$). From these results, we can see that the smallest impact was on the reduction of health-risk behaviors. Although this overall effect is small, it is noteworthy and worth further exploration. The highest effect was on increased access to job support services, which includes benefits counseling, use of the one stop career centers and services to help keep a job. This is not surprising given that the primary role of vocational rehabilitation services is to provide vocational support and to remove barriers to employment. Fear of loss of social security (SS) benefits is one of the most common barriers to people living with HIV as well as to people with disability generally [12,46]. Benefits counseling is essential as it is widely acknowledged that it may be more expensive to work for some, once one considers the loss in benefits and potential housing subsidies that can result from increased income. Often people with disabilities, including people with HIV, are not aware of the work incentives that are available to help make the transition to employment [3]. Given the importance of this topic one might expect this effect to be even larger. However, it is important to note that only 40.3% of the sample currently received SS benefits.

With respect to access to care, we can see that vocational rehabilitation had a moderate effect ($\beta = 0.54$) on this outcome. As aforementioned, vocational rehabilitation counselors have access to a wide range of resources that they can draw upon to reduce barriers to employment for people with HIV or other

disabling conditions. Vocational rehabilitation counselors can also request direct consultations from medical providers to assess vocational readiness and confirm that the consumer has a medical condition that is a significant barrier to employment. Vocational rehabilitation counselors can also fund a number of prevocational services and access the range of integrated employment and mental health services and/or recovery-based programs for individuals with alcohol and drug dependency. With this level of resources and case management services related to the goal of obtaining employment, it is not surprising that VR facilitates access to care. Unfortunately, this resource is not fully recognized within the AIDS service system and many do not know about or access this valuable resource.

In addition to the direct effect that use of VR services has on the study outcomes, it is also important to discuss the key role that VR plays in the significant indirect effect of both health perception and job confidence. Health perception and job confidence each has a significant indirect impact on all of the outcome variables (use of job support services, reduced health risk behaviors, increased access to care) through reduced HIV stigma and the use of VR services. Importantly, any indirect path from either health perception or job confidence, which excludes the use of VR, is insignificant. This finding demonstrates the unique contribution that VR services may play in helping to maintain PLWHA in the service delivery system and achieving important health and prevention outcomes. Considering the significant challenges of keeping PLWHA in the service delivery system and the benefits of doing so, this is an important contribution and suggests that vocational rehabilitation plays an important role in the National HIV/AIDS strategy that deserves greater attention.

Limitations of this study

This study is not without limitations and further research is needed. For one, this study was exploratory in nature and used a cross sectional design. Further research is needed to apply an experimental design with randomized assignment to better assess the impact of vocational rehabilitation services within a longitudinal framework. A longitudinal design would help us to gain a better understanding of the mechanisms that might help to explain both use of vocational rehabilitation services and how use of vocational rehabilitation may facilitate access to care and reduction in HIV-related health risk behaviors.

Furthermore, research respondents consisted of a volunteer sample. Although the sample represented the diverse demographics of people living with HIV/AIDS in the United States, the sample may not generalize to this overall population. In addition to being a volunteer sample, the respondents were recruited primarily from AIDS Service Organizations and networks and would not represent those who are not linked to these services and/or networks. The survey methodology relied primarily on self-report, which could possibly lead to response bias related to social desirability and/or discomfort in responding to some of the more sensitive questions relating to stigma, health, financial and sexual issues. Finally, the variables used for this study came from the NWPC Vocational Development and Employment Needs Survey. In order to be able to compare findings across studies, it would be helpful to incorporate other measures of some of the key variable to be better able to compare findings across studies.

Conclusion

This study examined the role of vocational rehabilitation services in contributing to the goals of the National HIV/AIDS strategy among a diverse range of volunteer respondents in the NWPC-VDENS study. The original survey instrument was designed to

assess factors contributing to VR use and this study shows the potential impact of VR use on key aspects of the National HIV/AIDS strategy related to access to care, use of supplemental employment services and reduced health-risk behaviors associated with the transmission of HIV/AIDS. The fit of the final structural equation model was good (root mean square approximation of error = 0.055, Comparative Fit Index = 0.953, Tucker Lewis Index = 0.945) and the study found significant yet small associations among the factors studied. Overall, the findings support the hypothesis that vocational rehabilitation services play an important role in health and prevention strategies outlined in the National HIV/AIDS strategy. The integration of these services into HIV care and prevention interventions deserves greater attention and research.

Acknowledgements

Data collection for this study was provided by both the National Institute on Disability and Rehabilitation Research Mary Switzer Fellowship and by the New York State AIDS Institute. Dr. Conyers would like to thank the HIV/AIDS Office on Psychology Education and Cheryl Catz for their feedback and support in the Cyber Mentor Program.

Declaration of interest

This study was funded by a Mary Switzer Fellowship from the National Institute on Disability and Rehabilitation Research as well as funding from the New York State Department of Health AIDS Institute.

References

1. Anon. National HIV/AIDS strategy: federal implementation plan. White House Office of National AIDS Policy; 2010. Available from: <http://www.whitehouse.gov/files/documents/nhas-implementation.pdf> [last accessed 28 Feb 2013].
2. Adimora AA, Auerbach JD. Structural interventions for HIV prevention in the United States. *JAIDS* 2010;55:S132–5.
3. Conyers LM. Overview of the National Working Positive Coalition Employment Needs Survey. *HIV/AIDS Employment Roundtable Summary of Proceedings*; 2011:22–30.
4. Worthington C, O'Brien K, Zack E, et al. The National Working Positive Coalition Vocational Training and Employment Needs Survey. *AIDS Behavior* 2012;16:231–43.
5. Patterson JB, Bruyere S, Szymanski EM, Jenkins W. Philosophical, historical, and legislative aspects of vocational rehabilitation counseling profession. In: Parker RM, Szymanski EM, Patterson JB, eds. *Rehabilitation counseling: basics and beyond*. 4th ed. Austin (TX): Pro-Ed; 2005:27–53.
6. U.S. Department of Education. The Rehabilitation Act. 2005 December 19. Available from: <http://www2.ed.gov/policy/speced/reg/narrative.html> [last accessed 15 Mar 2013].
7. Hayward BJ, Schmidt-Davis H. Longitudinal study of the vocational rehabilitation services program. Final Report 2: VR Services and Outcomes. Available from: <http://www2.ed.gov/policy/speced/leg/rehab/eval-studies.html> [last accessed 28 Sep 2013].
8. U.S. Centers for Disease Control and Prevention. Vital signs: HIV prevention through care and treatment – United States. *Morbidity Mortality Weekly Rep* 2011;60:1618–23.
9. U.S. Centers for Disease Control. Undetectable viral load essentially eliminates HIV transmission risk in straight couples. *TheBodyPRO.com* [Internet]. 2013 January 25. Available from: <http://www.thebodypro.com/content/70369/undetectable-viral-load-essentially-eliminates-hiv.html> [last accessed 15 Mar 2013].
10. Mugavero MJ, Amico KR, Westfall AO, et al. Early retention in HIV care and viral load suppression. *JAIDS* 2012;59:86–93.
11. Conyers LM. The impact of vocational services and employment on people with HIV/AIDS. *Work* 2004;23:205–14.
12. Conyers L, Datti P. The unmet vocational rehabilitation needs of women with HIV/AIDS. *Work* 2008;31:277–90.

13. Hergenrather KC, Rhodes SD, Clark G. Windows to work: exploring employment-seeking behaviors of persons with HIV/AIDS through Photovoice. *AIDS Educ Prev* 2006;18:243–58.
14. Maguire CP, McNally CJ, Britton PJ, et al. Challenges of work voices of persons with HIV disease. *Couns Psychol* 2008;36:42–89.
15. Datti PA, Conyers LM. Application of the behavioral model of service utilization to predicting factors associated with vocational rehabilitation use among a sample of Latino men with HIV/AIDS in New York State. *J Vocat Rehabil* 2010;33:15–25.
16. Jung Y, Bellini J. Rates of access to the State/Federal Vocational Rehabilitation Program, Service Provision, Successful Closure, and Reasons for Closure for Persons Living with HIV/AIDS. Center on Human Policy, Law, and Disability Studies. Syracuse University, Division of Special Education and Rehabilitation, 805 South Crouse Avenue, Syracuse, NY 13244-2280. 2009. Available from: <http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED507321> [last accessed 01 Mar 2013].
17. Martin DJ, Arns PG, Batterham PJ, et al. Workforce reentry for people with HIV/AIDS: intervention effects and predictors of success. *Work* 2006;27:221–33.
18. Conyers LM. HIV/AIDS and Employment Research: a need for an integrative approach. *Counsel Psychol* 2008;36:108–17.
19. Gelberg L, Andersen RM, Leake BD. The behavioral model for vulnerable populations: application to medical care use and outcomes for homeless people. *Health Serv Res* 2000;36:1273–302.
20. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav* 1995;36:1–10.
21. Calsyn RJ. A modified ESID Approach to studying mental illness and homelessness. *Am J Community Psychol* 2003;32:319–31.
22. Conyers LM. HIV/AIDS as an emergent disability: the response of vocational rehabilitation. *J Vocat Rehabil* 2005;22:67–73.
23. Sayles JN, Wong MD, Kinsler JJ, et al. The association of stigma with self-reported access to medical care and antiretroviral therapy adherence in persons living with HIV/AIDS. *J Gen Internal Medicine* 2009;24:1101–8.
24. Wu AW. MOS-HIV health survey users manual. Baltimore (MD): John Hopkins University; 1999.
25. Muthén LK, Muthén BO. Mplus users guide. 7th ed. Los Angeles (CA): Muthén & Muthén; 1998–2012.
26. Brown TA. Confirmatory factor analysis for applied research. New York (NY): Guilford Press; 2006.
27. Muthén BO, Du Toit SHC, Spisic D. Robust inference using weighted least squares and quadratic estimating equations in latent variable modeling with categorical and continuous outcomes. November 1997. Available from: http://www.statmodel.com/papers_date.shtml [last accessed 19 Aug 2013].
28. Hu L, Bentler PM. Cutoff criteria for fit indices in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Model* 1999;6:1–55.
29. Choi BY, Park H, Yang E, et al. Understanding career decision self-efficacy: a meta-analytic approach. *J Career Dev* 2012;39:443–60.
30. Hergenrather KC, Rhodes SD, Turner AP, Barlow J. Persons with disabilities and employment: application of the self-efficacy of job-seeking skills scale. *J Rehabil* 2008;74:34–44.
31. Roessler R, Rumrill P. Strategies for enhancing career maintenance self-efficacy of people with multiple sclerosis. *J Rehabil* 1994;60:54–9.
32. Demi A, Bakeman R, Sowell R, et al. Suicidal thoughts of women with HIV infection: effect of stressors and moderating effects of family cohesion. *J Fam Psychol* 1998;12:344–53.
33. Øyeflaten I, Hysing M, Eriksen H. Prognostic factors associated with return to work following multidisciplinary vocational rehabilitation. *J Rehabil Med* 2008;40:548–54.
34. Petrie KJ, Weinman J, Sharpe N, Buckley J. Role of patients' view of their illness in predicting return to work and functioning after myocardial infarction: longitudinal study. *BMJ* 1996;312:1191–4.
35. Roessler RT, Williams BT, Featherston L, Featherston JB. Motivational factors affecting Ticket to Work utilization: a pilot investigation. *J Appl Rehabil Counsel* 2006;37:23–32.
36. Petrie KJ, Weinman J. Patients' perceptions of their illness: the dynamo of volition in health care. *Curr Dir Psychol Sci* 2012;21:60–5.
37. Brown L, Macintyre K, Trujillo L. Interventions to reduce HIV/AIDS stigma: what have we learned? *AIDS Ed Prev* 2003;15:49–69.
38. Conyers LM. Expanding understanding of HIV/AIDS and employment perspectives of focus groups. *Rehabil Couns Bull* 2004;48:5–18.
39. Herek GM, Capitano JP, Widaman KF. HIV-related stigma and knowledge in the United States: Prevalence and trends, 1991–1999. *Am J Public Health* 2002;92:371–7.
40. Naughton J, Vanable PA. An experimental investigation of a dual process model of HIV-related stigma. *Basic Appl Soc Psych* 2012;34:8–19.
41. Livingston JD, Milne T, Fang ML, Amari E. The effectiveness of interventions for reducing stigma related to substance use disorders: a systematic review. *Addiction* 2012;107:39–50.
42. National Institute on Drug Abuse. Skills training and employment for ex-addicts in Washington, DC: a report on TREAT. Department of Health, Education, and Welfare, Public Health Service, Alcohol, Drug Abuse, and Mental Health Administration, National Institute on Drug Abuse; 1978.
43. Perkins DV, Raines JA, Tschopp MK, Warner TC. Gainful employment reduces stigma toward people recovering from schizophrenia. *Community Mental Health J* 2009;45:158–62.
44. US Department of Health and Human Services, Health Resources and Services Administration, HIV/AIDS Bureau. Guide for HIV/AIDS Clinical Care. Washington, DC; 2011.
45. Ciasullo EC, Escovitz K. Positive futures: the need for paradigm shift in HIV/AIDS services. *J Vocat Rehabil* 2005;22:125–8.
46. National Council on Disability. Empowerment for Americans with disabilities: breaking barriers to careers and full employment. 2007. Available from: <http://www.ncd.gov/publications/2007/Oct2007> [last accessed 01 Mar 2013].