

Person-environment contextual factors as mediators for the relationship between symptom cluster and employment outcome in multiple sclerosis

Kanako Iwanaga^{a,*}, Jia-Rung Wu^a, Xiangli Chen^a, Beatrice Lee^a, Antonio Reyes^a,
Brian N. Phillips^a, Joseph Pfaller^b and Fong Chan^a

^a*University of Wisconsin-Madison, Madison, WI, USA*

^b*Global Recruiters of Madison, Madison, WI, USA*

Revised/Accepted December 2017

Abstract.

BACKGROUND: Multiple sclerosis (MS) symptoms often make it difficult for individuals with MS to stay at work or return to work. It is important to understand the relationship between symptom clusters and employment. Person-environment (P-E) contextual factors such as core self-evaluations (CSE) and social support have been found to be effective mediators for the relationship between disability and participation in rehabilitation research and may be able to reduce the adverse impact of MS symptom cluster on employment outcome of people with MS.

OBJECTIVE: To evaluate the mediation effect of CSE and social support on the relationship between symptom cluster and employment in MS.

METHOD: Quantitative descriptive research design using two simple mediation analyses. 154 persons with multiple sclerosis participated in this study.

RESULTS: Results show that symptom cluster, CSE, and social support were significantly related to employment. Both CSE and social support were significant mediators of the relationship between symptom cluster and employment, with CSE a stronger mediator than social support.

CONCLUSIONS: Managing MS symptoms and increasing CSE and social support will reduce the adverse impact of MS symptom cluster on employment outcome. Therefore, CSE and social support can be viewed as protective factors for maintaining employment in MS. These results provide support for the use of positive psychology interventions by vocational rehabilitation counselors working with individuals with multiple sclerosis.

Keywords: Multiple sclerosis, symptom cluster, core self-evaluations, social support, and employment

1. Introduction

Employment is considered to be an important public health intervention for people with multiple sclerosis (MS). Individuals with MS who are

employed, whether full or part-time, have better psychosocial and health outcomes than individuals who are not employed (Chiu et al., 2015). Employment, even at low levels, is associated with better health and better overall functioning for people with disabilities (Chiu et al., 2015; Hall, Kurth, & Hunt, 2013; Muller et al., 2017). Studies have shown that individuals with disabilities who have unsteady employment or who are unemployed tend to experience more mental and

*Address for correspondence: Kanako Iwanaga (M.S.), University of Wisconsin-Madison, #457 Education Building, 1000 Bascom Mall, Madison, WI 53706, USA. E-mail: iwanaga2@wisc.edu.

physical health problems, consume higher amounts of alcohol, and report lower self-esteem and overall well-being when compared to employed adults (Dutta, Gervy, Chan, Chou, & Ditchman, 2008; Krause, Carter, Pickelsimer, & Wilson, 2008; Murali & Oyebode, 2004). Work is believed to be beneficial because it increases financial security and access to high-quality health care, which in turn improves health status, social relationship, mental health, and quality of life (Jackson, Iezzi, & Lafreniere, 1996; Reisine, Fifield, Walsh, & Forrest, 2008).

According to the National Multiple Sclerosis Society (NMSS), approximately 400,000 individuals are living with MS in the United States (NMSS, 2014). MS is a chronic illness of the central nervous system that impacts physical, psychological, and social functioning (Tortorella et al., 2014; Tesar, Baumhackl, Kopp, & Gunther, 2003; Costa, Sa, & Calheiros, 2012). Age of onset for MS is generally between 20 and 50 years (McFadden et al., 2012). MS is associated with several symptoms that can result in loss of employment, economic and social status, and social relationships (Costa, Sa, & Calheiros, 2013; Pack, Szirony, Kushner, & Bellaw, 2014; Moore et al., 2013). MS symptoms have been studied in symptom clusters because they often co-occur and may have a compounding impact on an individual (Crayton & Rossman, 2006; Motl & McAuley, 2009; Motl, Suh, & Weikert, 2010). The study of symptoms clusters considers that multiple symptoms often occur concurrently and that co-occurring symptoms can provide a more useful construct for assessment and management than a single symptom (Dodd, Miaskowski, & Paul, 2001; Kim, McGuire, Tulman, & Barsevick, 2005; Miaskowski, Dodd, & Lee, 2004). Symptom clusters are defined as “three or more concurrent symptoms (e.g., pain, fatigue, sleep insufficiency) that are related to each other” (Dodd et al., 2001, p. 465). Symptoms associated with MS include pain, stress, depression, sleep problems, cognitive impairments and fatigue (Motl & McAuley, 2009).

Due to the progressive, unpredictable, and disabling nature of MS and its associated symptoms, employment rates for individuals with MS are low (O'Connor, Cano, Thompson, & Playford., 2005). Research shows that because of symptoms associated with MS and their impact on physical functioning, mental health, and social participation (Kwiatkowski et al., 2014; Ng, Amatya, & Khan, 2013), individuals with MS have lower community participation when compared to the general population (Khan & Pallant, 2007). Given the evidence of the benefits of work and

considering that symptom clusters have a significant impact on participation for persons with MS, it is important that we better understand the relationship between symptom clusters and employment.

Rehabilitation researchers and scholars have long recognized the need to consider contextual and environmental factors in the development of effective practice (Chan, Taryvdas, Blalock, Strauser, & Atkins, 2009; Wright, 1983). Recent research on the World Health Organization's (WHO) International Classification of Functioning (ICF) as a model for vocational rehabilitation (VR) demonstrates the importance of person-environment (P-E) contextual factors in mediating the effect of impairments on participation (Chan et al., 2009). The positive human traits factors of core self-evaluations (CSE) and social support are considered effective P-E contextual factors in ICF research (Smedema, Chan, & Phillips, 2014; Smedema, Chan, et al., 2015; Smedema, Pfaller, et al., 2015; Wilson et al., 2013).

1.1. Core self-evaluations

Core self-evaluations (CSE) is a positive human trait construct that has received considerable attention as a positive person (P) variable in ICF research. It is defined as the overall, fundamental perception that people have about their worth and capability as human beings (Judge, Locke, Durham, & Kluger, 1998). The CSE construct was first developed as part of a theoretical framework to explain dispositional influences on job satisfaction (Judge, Locke, & Durham, 1997) and then extended to explain life satisfaction (Judge, Bono, Erez, & Locke, 2005). CSE is a higher order construct comprised of four lower-order traits: self-esteem, self-efficacy, locus of control, and emotional stability (Judge et al., 1998). Self-esteem is defined as a global appraisal of one's self-worth (Rosenberg, 1965). Self-efficacy is defined as one's belief in his or her ability to produce desired outcomes when performing specific activities and pursuing goals (Bandura, 1977). Emotional stability is defined as the tendency to feel calm and secure (Eysenck, 1990). The final CSE trait is locus of control, which is defined as one's belief that he or she has personal control over events in life, rather than believing that events are controlled by others or fate (Rotter, 1966).

Judge et al. (2005) noted that individuals' fundamental evaluations of themselves impact all their beliefs about their lives. Judge et al. (1998) notes that people who consider themselves to be good or competent will react differently to obstacles in life than

individuals who believe they are incompetent. Correspondingly, people with MS who consider themselves to be competent and worthy might cope more adaptively to the symptoms associated with their condition and, believing themselves to be capable of working, put more effort into pursuing employment. Conversely, people with MS who feel they are incompetent or lacking value may succumb to their symptoms, concluding that any attempt they make at pursuing employment will result in failure. Therefore, individuals with high CSE may have higher levels of employment than those with low CSE. There have not been any studies of the relationship between CSE and employment for individuals with MS. However, Smedema, Chan, and Phillips (2014) performed a study analyzing the relationship between CSE and participation for individuals with spinal cord injury and found that CSE contributes to life satisfaction and participation, including work participation. The study also found that CSE has a unique role in increasing motivation to pursue goals, which also predicts participation and life satisfaction. Research has also shown that CSE contributes to life satisfaction for college students with disabilities because they are better able to cope with stress, maintain a positive mood, and build social supports (Smedema et al., 2015).

1.2. Social support

Social support is a positive environment (E) construct that performs a vital role in an individual's health and well-being (Chronister, Johnson, & Berven, 2006; Chronister, Chou, Frain, & Cardoso, 2008; Wilson et al., 2013). Social support is defined as the social network in which an individual interacts, maintains contact, and shares with others (Costa et al., 2012). Social contacts are among the most important resources for promoting resilience in coping because they function as a buffer to mediate the impacts of stress (Martin & Martin, 2002). The benefits of strong social support for individuals with MS include reduced medical impairments, mortality, and increased quality of life, and community participation (Schwartz & Frohner, 2005; Yamout et al., 2013). Social support is also a facilitator to well-being and improved daily functioning for individuals with MS (Hamed, Tariah, & Hawamdeh, 2012). Although there is a paucity of studies regarding the relationship between social support and employment for individuals with MS, it is likely that having strong social support and the related benefits would increase the likelihood of employment for individuals with MS.

1.3. Purpose of the study

To iterate, the positive effect of employment is well documented in the literature. However, the employment rate of people with MS is notoriously low. It is hypothesized that positive P-E factors could reduce the adverse effect of MS cluster symptom on employment. CSE and social support have been found to be effective P-E contextual factors for predicting community integration and participation in several disability groups (e.g., people with SCI and college students with disabilities). The purpose of the present study is to evaluate CSE and social support as P-E mediators for the relationship between symptom cluster and employment for persons with MS.

2. Methods

2.1. Participants

One hundred and fifty-four prime working-age adults with MS participated in the present study. Participants were recruited from two regional chapters of the National Multiple Sclerosis Society (NMSS) including the Greater Washington D.C./Maryland Chapter in Washington D.C. and the Wisconsin Chapter in Hartland, Wisconsin. Inclusion criteria required individuals to be (a) diagnosed with multiple sclerosis, (b) between the ages of 25 and 54 (prime working-age), and (c) currently living in the community. The mean age of the participants was 41.03 years ($SD=8.04$). Most of the participants were women (87%), married (53%), and white (83%). Participants in the current study were relatively well-educated with 88% having some college education, two- or four-year college degrees, or graduate degrees. Fifty-nine percent of the participants were employed either part-time or full-time. The average age of MS diagnosis was 32.28 years old ($SD=8.56$), with the majority of participants (86%) experiencing relapsing-remitting multiple sclerosis (RRMS). A detailed description of participant characteristics is presented in Table 1.

2.2. Measures

2.2.1. Core self-evaluations

The *Core Self-Evaluations Scale* (CSES) developed by Judge, Erez, Bono, and Thoresen (2003) was used to assess CSE. The CSES is a 12-item measure (e.g., "I am confident I get the success I deserve in

Table 1
Participant Demographic Characteristics and MS Characteristic
(N = 154)

Variable	N (%)	M	(SD)
Age		41.04	8.40
Age of onset		32.28	8.56
Gender			
Male	20 (13%)		
Female	134 (87%)		
Race			
Africa American	16 (10.4%)		
Asian American/Pacific Islander	3 (1.9%)		
Caucasian	127 (82.5%)		
Latino/Hispanic	6 (3.9%)		
Native American	1 (0.6%)		
Others	1 (0.6%)		
Marital status			
Single	36 (23.4%)		
Married	82 (53.2%)		
Divorced	17 (11%)		
Cohabiting	15 (9.7%)		
Others	4 (2.5%)		
Type of MS			
A relapsing-remitting MS	133 (86.4%)		
Secondary-progressive MS	16 (10.4%)		
Primary-progressive MS	4 (2.6%)		
Employment status			
Full-time employed	70 (45.5%)		
Part-time employed	20 (13%)		
Unemployed	33 (21.4%)		
Retired	9 (5.8%)		
Full-time homemaker	11 (7.1%)		
Seeking employment	5 (3.2%)		
Student	4 (2.6%)		
Education level			
Less than High School	2 (1.3%)		
High school/GED	16 (10.4%)		
Some college	45 (29.2%)		
2-year College Degree	17 (11%)		
4-year College Degree	48 (31.2%)		
Master Degree	21 (13.6%)		
Professional Degree (JD, MD)	4 (2.6%)		

life”) and each item is rated on a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). CSE scores were calculated by summing the 12 CSES items, with higher scores indicating greater levels of CSE. The Cronbach’s alpha coefficient for CSES in the present study was computed to be 0.88.

2.2.2. Symptom cluster

Symptom cluster included separate measures of pain, stress, sleep difficulty, depression and fatigue. Pain was measured using a four-item version of the *Numeric Pain Scale* (NPS; Castarlenas, Jensen, von Baeyer, & Miro, 2017; Childs, Piva, & Fritz, 2005), which captures present levels of pain intensity (e.g., “How would you rate your pain right now?”) and past

week pain (e.g., “How would you rate your worst level of pain during the last week?”). Each item is rated on a 11-point Likert-type scale, ranging from 0 (*no pain*) to 10 (*worst imaginable pain*). Pain scores are computed by averaging the four items, with higher scores indicating greater levels of pain. The Cronbach’s alpha coefficient for NPS in the present study was computed to be 0.94. Stress was measured by an abbreviated version of the *Perceived Stress Questionnaire* (PSQ; Levenstein et al., 1993). It is composed of 9 items (e.g., “During the past month, have you felt under pressure from deadlines?”) and each item is rated on a 4-point Likert type scale (1 = *almost never* to 5 = *usually*). Stress scores were calculated by averaging the nine items with higher scores indicating greater levels of stress. The Cronbach’s alpha coefficient for PSQ in the present study was computed to be 0.88.

Sleep difficulty was measured using an abbreviated version of the *Medical Outcomes Study-Sleep Scale* (MOS-Sleep; Stewart, & Ware, 1989). The MOS-Sleep Scale is comprised of four items (e.g., “How often during the past 4 weeks did you feel that your sleep was not quiet [moving restlessly, feeling tense, speaking, etc., while sleeping?]”), with each item rated on a 6-point Likert type scale (1 = *none of the time* to 6 = *all of the time*). Sleep difficulty scores were computed by averaging all four items, with higher scores indicating greater levels of sleep difficulty. The Cronbach’s alpha coefficient for MOS-Sleep in the present study was computed to be 0.63. Depression was measured using the *Patient Health Questionnaire-4* (PHQ-4; Kroenke, Spitzer, Williams, & Lowe, 2009). The PHQ-4 is a 4-item measure (e.g., “Over the last 2 weeks, how often have you been bothered by feeling nervous, anxious or on edge?”), with each item is rated on a 4-point Likert type scale (0 = *not at all* to 3 = *nearly every-day*). Depression scores were calculated by summing the items, with higher scores indicating greater levels of depression. The Cronbach’s alpha coefficient for PHQ-4 in the present study was computed to be 0.90. Fatigue was measured using the abbreviated version of the *Modified Fatigue Impact Scale* (MFIS; Larson, 2013). The brief MFIS is a five-item measure (e.g., “Because of my fatigue during the past four weeks I have been less alert”), with each item rated on a 5-point Likert scale (0 = *never* to 4 = *always*). Fatigue scores were computed by averaging the MFIS items with higher scores indicating greater levels of fatigue. The Cronbach’s alpha coefficient for MFIS in the present study was computed to be 0.91. Exploratory

factor analysis was computed for the symptom cluster variables with a one-factor solution and the participants' factor scores were used to generate symptom cluster scores for the participants.

2.2.3. Social support

The *Interpersonal Support Evaluation List* (ISEL-12) developed by Cohen, Mermelstein, Kamarck, and Hoberman (1985) was used to assess perceived social support. The ISEL is a 12-item measure (e.g., "If I wanted to go on a trip for a day [for example, to the country or mountains], I would have a hard time finding someone to go with me."), with items rated on a 4-point Likert scale (0 = *definitely false* to 3 = *definitely true*). Social support scores were computed by averaging the items with higher scores indicating greater levels of perceived social support. The Cronbach's alpha coefficient for ISEL-12 in the present study was computed to be 0.86.

2.3. Procedures

Participants were recruited by advertisements through monthly electronic newsletters and through a single round of direct email solicitation sent by NMSS chapters to their members. Participants who completed the online survey received a US\$15 gift card upon completion of the study. The University of Wisconsin-Madison Institutional Review Board (IRB) approved this study.

2.4. Data analysis

The Statistical Package for the Social Sciences (SPSS) version 24.0 was used to compute descriptive statistics. The SPSS INDIRECT macro written by Preacher and Hayes (2008) was used to compute the mediation analysis.

3. Results

3.1. Correlation analysis

Multiple sclerosis symptom cluster was found to be negatively associated with CSE ($r = -0.70, p < 0.001$) and employment status ($r = -0.23, p < 0.01$). Core self-evaluations was positively related to employment status ($r = 0.31, p < 0.001$). Symptom cluster was negatively associated with social support ($r = -0.26, p < 0.01$) and employment status ($r = -0.29, p < 0.001$).

3.2. Mediation analysis

Two simple mediation analyses were computed to evaluate the relationship between MS symptom cluster and employment status using CSE and social support as mediators.

3.2.1. Core self-evaluations

The following are the equations for symptom cluster and employment with CSE as the mediator:

Log odds(employment status)

$$= \text{constant} + c(\text{symptom cluster}) + \text{error} \quad (1)$$

$$\text{CSE} = \text{constant} + a(\text{symptom cluster}) + \text{error} \quad (2)$$

Log odds(employment status)

$$= \text{constant} + c'(\text{symptom cluster}) + b(\text{CSE}) + \text{error} \quad (3)$$

Total effect (c) = Direct effect (c') + Indirect effect ($a \times b$)

Because employment status is a dichotomous variable, coefficients in Equations 1 and 3 were estimated in INDIRECT using logistic regression, whereas ordinary least-squares (OLS) regression was used for the coefficients in Equation 2. A graphical representation of the simple mediation model for CSE and information for the unstandardized path coefficients (a, b, c , and c') are presented in Fig. 1.

As can be observed in Fig. 1, the odds of being employed were lower among individuals with higher levels of MS symptoms (Total effect: $c = -0.49, p < 0.01$). Symptom cluster was negatively associated with CSE (path $a = -0.70, p < 0.01$). Finally, CSE was positively associated with the odds of being employed (path $b = 0.64, p < 0.05$) after controlling for the effect of symptom cluster. The direct effect of symptom cluster ($c' = -0.07$) on employment status was not statistically significant after controlling for the effect of CSE, indicating CSE fully mediated the relationship between symptom cluster and employment status. The indirect effect of symptom cluster on employment through CSE was evaluated using bootstrapping (Preacher & Hayes, 2008; Hayes, 2009). This indirect effect is considered significant if the bias-corrected bootstrap confidence interval (CI) for the product of path a and path b does not include zero. Using the Preacher and Hayes (2009) INDIRECT procedure with 5,000 bootstrap samples revealed a significant indirect effect of MS symptoms

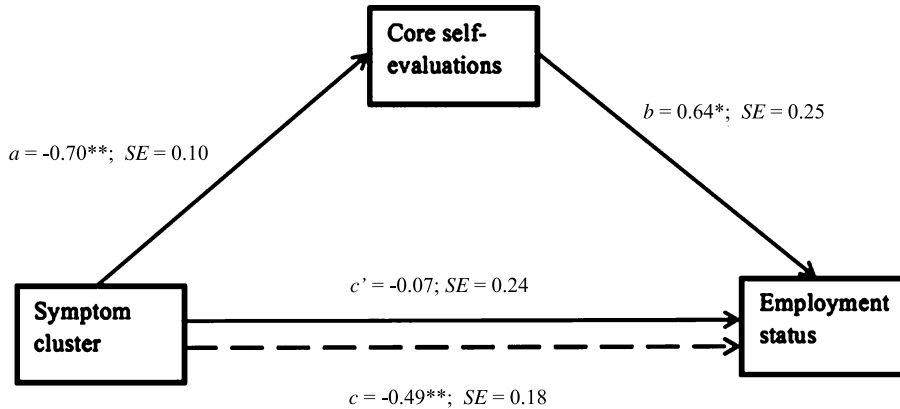


Fig. 1. Path Coefficients for Simple Mediation Analysis on Employment Status (N=154). Note. Dotted line denotes the effect of MS symptom on employment status when CSE is not included as a mediator. b , c and c' are unstandardized logistic regression coefficients, a is an unstandardized ordinary least squares (OLS) regression coefficient. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

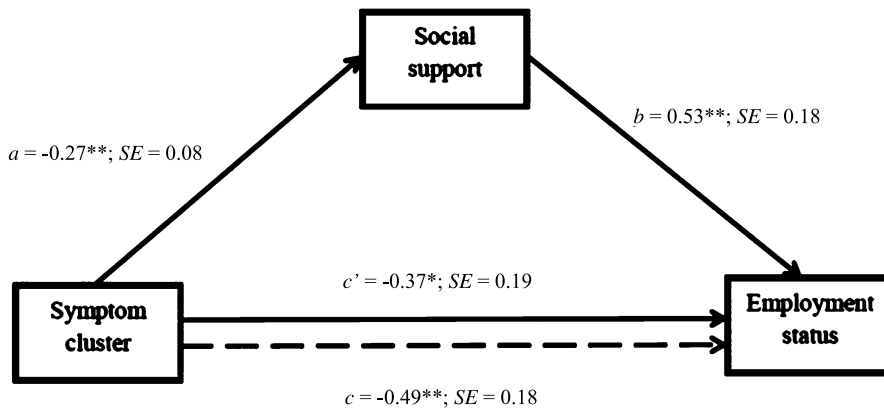


Fig. 2. Path Coefficients for Simple Mediation Analysis on Employment Status (N=154). Note. Dotted line denotes the effect of MS symptom on employment status when social support is not included as a mediator. b , c and c' are unstandardized logistic regression coefficients, a is an unstandardized ordinary least squares (OLS) regression coefficient. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

on employment through CSE (point estimate = -0.45 , 95% CI: -0.81 to -0.08).

3.2.2. Social support

The equations for symptom cluster and employment with social support as the mediator are as follows:

$$\begin{aligned} \text{Log odds}(\text{employment status}) \\ = \text{constant} + c(\text{symptom cluster}) + \text{error} \end{aligned} \quad (4)$$

$$\begin{aligned} \text{Social support} \\ = \text{constant} + a(\text{symptom cluster}) + \text{error} \end{aligned} \quad (5)$$

$$\begin{aligned} \text{Logodds}(\text{employment status}) \\ = \text{constant} + c'(\text{symptom cluster}) \\ + b(\text{social support}) + \text{error} \end{aligned} \quad (6)$$

Total effect (c) = Direct effect (c') + Indirect effect ($a \times b$)

A graphical representation of the simple mediation model for social support and information regarding the unstandardized path coefficients (a , b , c , and c') are presented in Fig. 2.

As can be observed in Fig. 2, the odds of being employed were lower among individuals who have higher levels of MS symptoms (Total effect: $c = -0.49$, $p < 0.01$). Symptom cluster was negatively associated with social support (path $a = -0.27$, $p < 0.01$). Finally, social support was positively associated with the odds of employment (path $b = 0.53$, $p < 0.01$). The direct effect of symptom cluster ($c' = -0.37$, $p < 0.05$) was still statistically significant but reduced after controlling for the effect of social support. Using the INDIRECT procedure with 5,000 bootstrap samples revealed a significant indirect effect of MS symptom cluster on

employment through perceived social support (point estimate = -0.14 , 95% CI: -0.31 to -0.04). The results indicated that perceived social support partially mediates the relationship between symptom cluster and employment status.

4. Discussion

Work has received considerable attention in recent years as a public health intervention for people with disabilities including people with MS (Chiu et al., 2015; Hall, Kurth, & Hunt, 2013; Muller et al., 2017). Factors such as unemployment, income inequality and poverty can cause considerable levels of psychological distress, resulting in high prevalence of secondary health conditions among people with disabilities. Conversely, employment, even at low levels, has been associated with better health and health behaviors as well as lower healthcare expenditures (Hall et al., 2013). Research has indicated that staying at work for as long as possible and returning to work when possible helps people with disabilities including people with MS maintain better health and well-being (Hall et al., 2013). It is well-documented that pain, stress, sleep problems, fatigue and depression are common occurrence among people with MS and these symptoms significantly affect their stay-at-work and return-to-work outcomes. Therefore, identifying psychosocial factors that promote employment for people with MS is warranted.

In recent year, there is a trend to move away of focusing on pathology but to focus on elevating positive human strengths and promoting positive supportive communities. Within the ICF framework, the disability-employment relationship is mediated by person-environment (P-E) contextual factors (Chan et al., 2009).

In this study, we first confirmed the relationships among MS symptom cluster, CSE, social support, and employment. MS symptom cluster, CSE, and social support were all significant predictors of employment. Second, we tested CSE and social support, respectively, as P-E mediators for the relationship between MS symptoms cluster and employment. Both of the tested models accounted for significant variance in employment, with CSE fully mediating the relationship between symptom cluster and employment and social support partially mediating the same relationship. In other words, the presence of CSE rendered the symptom cluster-employment relationship nonsignificant, while social support could

reduce the total effect of the symptom cluster-employment relationship but the direct effect remains statistically significant.

These findings suggest that both CSE and social support play an important role in the employment of people with MS, with CSE acting as a stronger mediator than social support. Together, increasing both CSE and social support will reduce the adverse impact of MS symptom cluster on employment outcome. Therefore, CSE and social support can be viewed as protective factors for maintaining employment in MS.

4.1. Implications for rehabilitation practice

The findings of this study have important implications to rehabilitation practice. First, our finding that symptom cluster directly influences employment suggests that health promotion interventions can be utilized to reduce the negative influence of MS symptoms on employment outcomes. For instance, engaging in regular exercise and physical activities could help people with MS alleviate depressive symptoms, restore function, improve health self-management, promote wellness, and increase community participation including employment (White & Dressendorfer, 2004). Perhaps more importantly for rehabilitation counseling, our findings show that much can be done to address employment of clients with MS regardless of symptom severity.

The adverse impact of MS symptom cluster on employment outcome can be reduced and even eliminated by client CSE. It has been argued that CSE can be improved through the use of positive psychology interventions (Smedema, 2014). Judge and Kammeyer-Muller (2011) discussed the potential malleability of CSE despite its stable, trait-like construct nature. They indicated for instance that CSE could be increased through the use of positive feedback. Core self-evaluation for individuals with MS may be improved by focusing on psychosocial interventions on positive personality traits. Specifically, methods for enhancing self-esteem, generalized self-efficacy, internal locus of control, and emotional stability. For instance, self-esteem can be increased by developing coping strategies (Smedema, Cate-lano, & Ebener, 2010).

Social support has been associated with happiness and well-being (Charlifue, 1999; Schulz & Decker, 1985; Wilson et al., 2013). However, it is well documented that the distress causing by disability reduce perceived social support (Elliott, Herrick, Witty, Godshall, & Spruell, 1992). Social support

can potentially be increased by training clients on making clear and active requests for help to natural supports and to better communicate social support needs, including providing suggestions on how help could be provided (Rini & Dunkel-Schetter, 2010). Further, effectively providing social support requires providers to acknowledge and encourage a sense of competence and skill in the receiver (Elliott et al., 1992). The use of natural supports has been found to increase social relationship of people with disabilities in the workplace (Mank, Cioffi, & Yovanoff, 1997).

4.2. Limitations

Several limitations inherent this study should be considered when interpreting the study findings. This study used a cross-sectional convenience sample of individuals who provided anonymous responses to an online, self-report survey. Self-report measures are susceptible to social desirability bias and response bias. Participants were recruited online through the National MS Society. It is possible that individuals who participate in this organization differ from the broader population of people with MS. Participants were predominantly White and well-educated, reflecting higher socioeconomic status and an underrepresentation of individuals with other racial/ethnic background. These limitations might reduce the generalizability of the findings.

5. Conclusion

This study examined CSE and social support as P-E mediators for the relationship between MS symptoms cluster and employment. Findings provide increased understanding of the intermediary roles of CSE and social support in explaining how to reduce the effect of MS symptom cluster on employment outcomes of people with MS. Specifically, MS symptoms can be improved through health promotion interventions, and evidence suggests that both CSE and social support can be enhanced with psychosocial interventions (Smedema, 2014). Thus, this study provides an alternative way to improve employment outcome of people with MS.

Acknowledgments

The contents of this article were developed with support from the Rehabilitation Research and

Training Center (RRTC) on Employment of People with Physical Disabilities. The RRTC was funded by the National Institute on Disability, Independent Living and Rehabilitation Research Grant H133B13001 to Virginia Commonwealth University.

Conflict of interest

None to report.

References

- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- Castarlenas, E., Jensen, M., von Baeyer, C. L., & Miro, J. (2017). Psychometric properties of the numerical rating scale to assess self-reported pain intensity in children and adolescents: A systematic review. *Clinical Journal of Pain*, 33, 376-383.
- Chan, F., Tarvydas, V., Blalock, D., Strauser, D., & Atkins, B. J. (2009). Unifying and elevating rehabilitation counseling through model-driven, diversity-sensitive evidence-based practice. *Rehabilitation Counseling Bulletin*, 52, 114-119.
- Charlifue, R. H. S. (1999). Ageing with spinal cord injury: The impact of spousal support. *Disability and Rehabilitation*, 21(5-6), 250-257.
- Childs, J. D., Piva, S. R., & Fritz, J. M. (2005). Responsiveness of the numeric pain rating scale in patients with low back pain. *Spine*, 30(11), 1331-1334.
- Chiu, C. Y., Chan, F., Sharp, S. E., Dutta, A., Hartman, E., & Bezyak, J. (2015). Employment as a health promotion intervention for persons with multiple sclerosis. *WORK: A Journal of Prevention, Assessment & Rehabilitation*, 52, 749-756.
- Chiu, C., Chan, F., Sharp, S., Dutta, A., Hartman, E., & Bezyak, J. (2015). Employment as a health promotion intervention for persons with multiple sclerosis. *Work*, 52(4), 749-756.
- Chronister, J., Chou, C., Frain, M., & Cardoso, E. (2008). The relationship between social support and rehabilitation related outcomes: A meta-analysis. *Journal of Rehabilitation*, 74(2), 16-32.
- Chronister, J., Johnson, E., & Berven, N. (2006). Measuring social support in rehabilitation. *Disability and Rehabilitation*, 28(2), 75-84.
- Cohen, S., Mermelstein, R., Kamarck, T., & Hoberman, H. M. (1985). Measuring the functional components of social support. In I. G. Sarason & B. R. Sarason (Eds.), *Social support: Theory, research, and applications* (pp. 73-94). The Hague, Holland: Martinus Nijhoff.
- Costa, D. C., Sá, M. J., & Calheiros, J. M. (2012). The effect of social support on the quality of life of patients with multiple sclerosis. 70(2), 108-113. doi:10.1590/S0004-282X2012000200007
- Costa, D., Marques Sá, C., & Calheiros, M. (2013). Social Characteristics and Quality of Life of Portuguese Multiple Sclerosis Patients. *Neurology and Therapy*, 2(1), 43-56.
- Crayton, H. J., & Rossman, H. S. (2006). Managing the symptoms of multiple sclerosis: A multimodal approach. *Clinical Therapeutics*, 28(4), 445-460.

- Dodd, M. J., Miaskowski, C., Paul, S. M. (2001). Symptom clusters and their effect on the functional status of patients with cancer. *Oncology Nursing Forum*, 28, 465-470.
- Dutta, A., Gervery, R., Chan, F., Chou, C. C., & Ditchman, N. (2008). Vocational rehabilitation services and employment outcomes of people with disabilities: A United States study. *Journal of Occupational Rehabilitation*, 18, 326-334.
- Elliott, T. R., Herrick, S. M., Witty, T. E., Godshall, F., & Spruell, M. (1992). Social support and depression following spinal cord injury. *Rehabilitation Psychology*, 37(1), 37-48.
- Eysenck, H. J. (1990). Biological dimensions of personality. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 244-276). New York, NY: Guilford Press.
- Hall, J. P., Kurth, N. K., & Hunt, S. L. (2013). Employment as a health determinant for working-age, dually-eligible people with disabilities. *Disability and Health Journal*, 6, 100-106.
- Hamed, R., Tariah, H. A., & Hawamdeh, Z. M. (2012). Personal Factors Affecting the Daily Functioning and Well-Being of Patients with Multiple Sclerosis Using the International Classification of Functioning Model. *International Journal of Mental Health*, 41(4), 47-61.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, 76(4), 408-420.
- Hays, R. D., & Stewart, A. L. (1992). Sleep measures. In A. L. Stewart & J. E. Ware (eds.), *Measuring functioning and well-being: The Medical Outcomes Study approach* (pp. 235-259). Durham, NC: Duke University Press.
- Jackson, T., Iezzi, A., & Lafreniere, K. (1996). The differential effects of employment status on chronic pain and healthy comparison groups. *International Journal of Behavioral Medicine*, 3(4), 354-369.
- Jensen, M. P., Karoly, P., O'riordan, E. F., Bland, F., & Burns, R. S. (1989). The Subjective Experience of Acute Pain An Assessment of the Utility of 10 Indices. *The Clinical Journal of Pain*, 5(2), 153-160.
- Judge, T. A., & Kammeyer-Mueller, J. D. (2011). Implications of CSE for a changing organizational context. *Human Resource Management Review*, 21, 331-341.
- Judge, T. A., Bono, J. E., Erez, A., & Locke, E. A. (2005). Core self-evaluations and job and life satisfaction: The role of self-concordance and goal attainment. *Journal of Applied Psychology*, 90, 257-268.
- Judge, T. A., Erez, A., Bono, J. E., & Thoresen, C. J. (2003). The CSE Scale (CSES): Development of a measure. *Personnel Psychology*, 56, 303-331.
- Judge, T. A., Locke, E. A., & Durham, C. C. (1997). The dispositional causes of job satisfaction: A core evaluations approach. *Research in Organizational Behavior*, 19, 151-188.
- Judge, T. A., Locke, E. A., Durham, C. C., & Kluger, A. N. (1998). Dispositional effects on job and life satisfaction: The role of core evaluations. *Journal of Applied Psychology*, 83, 17-34.
- Khan, F., & Pallant, J. (2007). Use of international classification of functioning, disability and health (ICF) to describe patient-reported disability in multiple sclerosis and identification of relevant environmental factors. *Journal of Rehabilitation Medicine*, 39(1), 63-70.
- Kim, H. J., McGuire, D. B., Tulman, L., & Barsevick, A. M. (2005). Symptom clusters: Concept analysis and clinical implications for cancer nursing. *Cancer Nursing*, 28(4), 270-282.
- Krause, J. S., Carter, R., Pickelsimer, E., & Wilson, D. (2008). A prospective study of health and risk of mortality after spinal cord injury. *Archives of Physical Medicine and Rehabilitation*, 89, 1482-1491.
- Kroenke, K., Spitzer, R. L., Williams, J. B. W., Löwe, B. (2009). An ultra-brief screening scale for anxiety and depression: The PHQ-4. *Psychosomatics*, 50, 613-621.
- Kwiatkowski, A., Marissal, J. P., Pouyfaucou, M., Vermersch, P., Hauteceur, P., & Dervaux, B. (2014). Social participation in patients with multiple sclerosis: Correlations between disability and economic burden. *BMC Neurology*, 14(115), 1-8.
- Larson, R. D. (2013). Psychometric properties of the modified fatigue impact scale. *International Journal of MS Care*, 15(1), 15-20.
- Levenstein, S., Pranter, C., Varvo, V., Scribano, M. L., Berto, E., Luzi, C., & Andreoli, A. (1993). Development of the Perceived Stress Questionnaire: A new tool for psychosomatic research. *Journal of Psychosomatic Research*, 37(1), 19-32.
- Mank, D., Cioffi, A., & Yovanoff, P. (1997). Analysis of the typicalness of supported employment jobs, natural supports, and wage and integration outcomes. *Mental Retardation*, 35(3), 185-197.
- Martin, P., & Martin, M. (2002). Proximal and Distal Influences on Development: The Model of Developmental Adaptation. *Developmental Review*, 22(1), 78-96.
- McFadden, E., Horton, M. C., Ford, H. L., Gilworth, G., McFadden, M., & Tennant, A. (2012). Screening for the risk of job loss in multiple sclerosis (MS): Development of an MS-specific Work Instability Scale (MS-WIS). *Multiple Sclerosis Journal*, 18(6), 862-870.
- Miaskowski, C., Dodd, M., & Lee, K. (2004). Symptom clusters: The new frontier in symptom management research. *Journal of National Cancer Institute Monographs*, 32, 17-21.
- Moore, P., Harding, K., Clarkson, H., Pickersgill, T., Wardle, M., & Robertson, N. (2013). Demographic and clinical factors associated with changes in employment in multiple sclerosis. *Multiple Sclerosis Journal*, 19(12), 1647-1654.
- Motl, R. W., & McAuley, E. (2009b). Symptom cluster as a predictor of physical activity in multiple sclerosis: Preliminary evidence. *Journal of Pain and Symptom Management*, 38, 270-280.
- Motl, R. W., Suh, Y., & Weikert, M. (2010). Symptom Cluster and Quality of Life in Multiple Sclerosis. *Journal of Pain and Symptom Management*, 39(6), 1025-1032.
- Muller, V., Chiu, C., Tang, X., Eagle, D., Peebles, M., Iwanaga, K.,... Chan, F. (2017). Association of Employment and Health and Well-Being in People with Fibromyalgia. *Journal of Rehabilitation*, 83(3), 37-43.
- Murali, V., & Oyebode, F. (2004). Poverty, social inequality and mental health. *Advances in Psychiatric Treatment*, 10, 216-224.
- National Multiple Sclerosis Society. What is MS? (2014). Retrieved from <http://www.nationalmssociety.org/What-is-MS>
- Ng, L., Amatya, B., & Khan, F. (2013). Outcomes of a peer support program in multiple sclerosis in an Australian community cohort: A prospective study. *Journal of Neurodegenerative Diseases*, 2013, 1-7.
- O'Connor, R., Cano, S., Thompson, A., & Playford, E. (2005). Factors influencing work retention for people with multiple sclerosis. *Journal of Neurology*, 252(8), 892-896.

- Pack, T. G., Szirony, G. M., Bellaw, J. R., & Kushner, J. D. (2014). Quality of life and employment in persons with multiple sclerosis. *Work*, 49(2), 281-287.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879-891.
- Reisine, S., Fifield, J., Walsh, S., & Forrest, D. D. (2008). Employment and health status changes among women with fibromyalgia: A five-year study. *Arthritis Care & Research*, 59(12), 1735-1741.
- Rini, C., & Dunkel Schetter, C. (2010). The effectiveness of social support attempts in intimate relationships. *Support Processes in Intimate Relationships*, 26-67.
- Rosenberg, M. (1979). *Conceiving the self*. New York, NY: Basic Books.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80(1), 1-28.
- Schulz, R., & Decker, S. (1985). Long-term adjustment to physical disability: The role of social support, perceived control, and self-blame. *Journal of Personality and Social Psychology*, 48(5), 1162.
- Schwartz, C., & Frohner, R. (2005). Contribution of Demographic, Medical, and Social Support Variables in Predicting the Mental Health Dimension of Quality of Life among People with Multiple Sclerosis. *Health & Social Work*, 30(3), 203-212.
- Smedema, S. M. (2014). CSE and well-being in persons with disabilities. *Rehabilitation Psychology*, 59(4), 407-414.
- Smedema, S. M., Chan, F., Yaghmaian, R. A., Cardoso, E. D., Muller, V., Keegan, J., ... Ebener, D. J. (2015). The Relationship of Core Self-Evaluations and Life Satisfaction in College Students with Disabilities: Evaluation of a Mediator Model. *Journal of Postsecondary Education and Disability*, 28(3), 341-358.
- Smedema, S. M., Pfaller, J. S., Yaghmaian, R. A., Weaver, H., Cardoso, E., & Chan, F. (2015). Core self-evaluations as a mediator between functional disability and life satisfaction in college students with disabilities. *Rehabilitation Research, Policy, and Education*, 29, 1-9.
- Smedema, S., Chan, J., & Phillips, B. (2014). Core self-evaluations and Snyder's hope theory in persons with spinal cord injuries. *Rehabilitation Psychology*, 59(4), 399-406.
- Smedema, S. M. & Catalano, D., & Ebener, D. (2010). The relationship of coping responses to self-worth and subjective well-being: A structural equation model. *Rehabilitation Counseling Bulletin*, 53, 131-142.
- Tesar, N., Baumhackl, U., Kopp, M., & Günther, V. (2003). Effects of psychological group therapy in patients with multiple sclerosis. *Acta Neurologica Scandinavica*, 107(6), 394-399.
- Tortorella, P., Tavazzi, E., Caputo, D., Rovaris, M., Laganà, M. M., Preti, M. G., ... Ricci, C. (2014). Determinants of disability in multiple sclerosis: An immunological and MRI study. *BioMed Research International*, 2014. doi:10.1155/2014/875768
- White, L. J., & Dressendorfer, R. H. (2004). Exercise and multiple sclerosis. *Sports Medicine*, 34(15), 1077-1100.
- Wilson, L., Catalano, D., Sung, C., Phillips, B., Chou, C. C., Chan, Y.C., & Chan, F. (2013). Attachment, social support, and coping as psychosocial correlates of happiness in people with spinal cord injuries. *Rehabilitation Research, Policy, & Education*, 27, 186-205.
- Wright, B. A. (1983). *Physical disability - a psychosocial approach*, 2nd ed. New York, NY, US: HarperCollins Publishers.
- Yamout, B., Issa, Z., Herlopian, A., El Bejjani, M., Khalifa, A., Ghadieh, A. S., & Habib, R. H. (2013). Predictors of quality of life among multiple sclerosis patients: A comprehensive analysis. *European Journal of Neurology*, 20(5), 756-764.