

Evaluation of Constructs Based on Self-Determination Theory and Self-Efficacy Theory as  
Predictors of Vocational Rehabilitation Engagement for People with Chronic Illness and  
Disability

by

Kanako Iwanaga

A dissertation submitted in partial fulfillment

of the requirement of the degree of

Doctor of Philosophy

(Rehabilitation Counselor Education)

at the

UNIVERSITY OF WISCONSIN-MADISON

2018

Date of final oral examination: 04/23/2018

This dissertation approved by the following members of the final oral committee:

Fong Chan, Professor and Chair, Department of Rehabilitation Psychology and Special Education  
Timothy Tansey, Associate Professor, Department of Rehabilitation Psychology and Special Education  
Brian Phillips, Associate Professor, Department of Rehabilitation Psychology and Special Education  
Norman Berven, Emeritus Professor, Department of Rehabilitation Psychology and Special Education  
William Hoyt, Professor and Chair, Department of Counseling Psychology

© Copyright by Kanako Iwanaga 2018

All Rights Reserved

## DEDICATION

This dissertation is dedicated to my advisor, Dr. Fong Chan, my mom and dad, Tomomi and Daigo, and my nieces, Honoka and Saho, whose love, unconditional support and encouragement made this Ph.D. journey endurable and possible. Thank you for helping me thrive and making me a better person.

## ACKNOWLEDGEMENTS

I would like to express my deepest appreciation to Professor Fong Chan, my advisor, for his selfless effort and devotion to helping me reach my fullest potential as a person, and as a teacher and a researcher. His tremendous unconditional support has made my PhD journey not only possible but also meaningful and enjoyable. My life changing decision to come to the United States from Japan to learn from such a wonderful and caring mentor was one of the best decisions I have ever made in my life. Dr. Chan, I promise you that I will always strive to be a caring and knowledgeable professor who will mentor and support my students the same way you have taught me.

I would also like to express the deepest appreciation to my co-advisor, Professor Timothy N. Tansey. He has always supported me, and I am particularly grateful for the opportunity to work with him on the article: *Testing an integrated self-determined work motivation model for people with disabilities: A path analysis*, which received the 2018 American Rehabilitation Counseling Association Research 2<sup>nd</sup> Place Award. I sincerely thank him not only for his support in my academic endeavors, but most importantly, for his generous effort to help me assimilate into the American culture. I am particularly grateful that he is always there for me when I encounter challenges living in America.

I am also appreciative of Professor Norman L. Berven for the wonderful clinical counseling experiences I have gained throughout my doctoral training, as well as his sage advice and empathic support during my job search process. I am grateful to Professor William T. Hoyt for being perhaps the smartest, kindest and most accessible statistics professor. Thank you for teaching me multiple regression analysis and sharing your prudent advice about the statistical analyses needed for my dissertation study—especially as I struggled with *R*, a free software

environment for statistical computing and graphics. Thank you Professor Brian Phillips for allowing me to be your teaching assistant for several of your classes, I learned a lot about teaching from you. Importantly, your insightful comments about interpreting the findings of my dissertation has been invaluable. I am grateful to you for helping me grow as a teacher and a researcher.

I would like to thank my fellow doctoral students: Jia-Rung Wu, Xiangli Chen, Emre Umucu, Beatrice Lee, Kerry Thompson, and Derek Ruiz for their friendship, lively conversations, hearty laughter, and big smiles. The great camaraderie among us helped us all to flourish and thrive in our PhD journey. I owe my mental health to my best friend, Jia-Rung. I am so grateful for her unconditional love and tremendous support. Every time I found myself in a very difficult situation, she would always come over to comfort and support me. Without her kindness and cheerful smiles, I would not be able to survive the challenges I faced last year. Thank you my dearest sister! I also want to say a heartfelt thank you to all of “Dr. Chan’s kids.” Specifically, I would like to thank Dr. Jessica Brooks at the University of North Texas. She has provided me with many valuable research opportunities as well as emotional support. Importantly, she helped me understand the job interview process, the pathways to becoming a professor, and the joy and reward of teaching in the United States.

Finally, a big thank you also goes out to my mom and dad, Tomomi and Daigo, and my nieces Honoka and Saho for their wise counsel and sympathetic ear. Thank you so much for always being there for me and making me feel loved and supported. I am very sorry that I was only able to visit Japan once during my four-years of study. Mom and Dad, I promise I will visit home more often now that I am gainfully employed as a professor.

In retrospect, I cannot count how many times I have said the words “worry” and “overwhelmed” during my years as a doctoral student in Madison, Wisconsin. However, I am not worried or anxious any more. Of course, there will still be challenges in my new life as a professor in the United States. According to Dr. Chan, it is called the vicissitudes of everyday life. However, with all the wonderful people I have met in Madison who have given me unwavering support and unconditional love, I know I will be fine. As long as I have such warm and trusting relationships, I have faith that the new chapter of my life as an assistant professor at Northern Illinois University will be valuable, meaningful, and successful. I will thrive and become a great teacher like my wonderful mentors and friends.

Thank you very much, everyone!

## ABSTRACT

Gainful employment is associated with health and well-being for people with chronic illness and disability (CID). However, the employment-to-population ratio for people with CID is considerably low, making this population vulnerable to secondary health conditions associated with unemployment and poverty. The role of the state-federal vocational rehabilitation (VR) program is to assist people with CID to obtain and maintain employment. However, the success of the program can be impeded by ambivalence among people with CID regarding going to work; ambivalence associated with fear of losing disability-related benefits and health insurance; anxiety regarding social functioning problems in the workplace; and concern about potential harassment in the workplace. Self-determination and self-efficacy have been proposed as a new paradigm to promote treatment adherence and engagement in medical rehabilitation. Self-determination theory (SDT) and self-efficacy theory (SET) identifies the constructs of autonomy, competence, relatedness, and outcome expectancy as critical components in understanding ambivalence to engage in treatment. However, there is a paucity of research on SDT and SET constructs as predictors of VR engagement for people with CID. The purpose of the present study was to evaluate SDT and SET constructs as predictors of VR engagement in a sample of VR clients ( $N=254$ ) using multiple regression analysis. After controlling for the effects of demographic variables and known person-environment (P-E) contextual factors in the regression model, SDT and SET predictors were found to account for 59% of the variance in VR engagement. Relatedness, observed as the working alliance, was the strongest predictor for VR engagement, followed by competence, observed as job performance competency, and then autonomy supportive climate. Although autonomous motivation and job seeking competency were significantly associated with VR engagement at the bivariate level, they were not

significant in the regression model. It appears that working alliance, due to its large effect size, may have mediated the effect of autonomous motivation and job seeking competency in the regression model. Interventions to enhance counselor skills to promote working alliance in addition to vocational training to increase job performance competency of rehabilitation clients may strengthen motivation to engage in VR services, leading to better employment outcomes.



## TABLE OF CONTENTS

	Page
DEDICATION .....	i
ACKNOWLEDGEMENTS .....	ii
ABSTRACT .....	v
LIST OF TABLES .....	ix
LIST OF FIGURES .....	x
CHAPTER ONE: INTRODUCTION .....	1
Importance of the Problem.....	2
Theoretical Framework.....	4
Purpose of the Study .....	5
Research Questions .....	6
Significance of the Study .....	7
CHAPTER TWO: REVIEW OF THE LITERATURE .....	8
Vocational Rehabilitation Engagement .....	8
Known Person and Environment (P-E) Predictors .....	10
Integrating SDT and SET as a Model of VR Engagement .....	16
Summary .....	24
CHAPTER THREE: METHODOLOGY .....	26
Research Design.....	26
Procedures .....	26
Measures .....	28
Data Analysis .....	37

Statistical Assumptions .....	42
CHAPTER FOUR: RESULTS .....	44
Data Screening .....	44
Means, Standard Deviations, and Intercorrelations for Variables in Primary Analyses .....	45
Primary Analyses Addressing Research Questions .....	50
Mediation Analysis .....	61
CHAPTER FIVE: SUMMARY AND IMPLICATIONS .....	65
Purpose.....	65
Discussion of Findings.....	68
Implications of Findings .....	72
Limitations .....	76
Future Research Direction .....	78
Conclusions.....	80
REFERENCES .....	82
APPENDICES .....	105
Appendix A: Institutional Review Board Notice of Approval .....	105
Appendix B: Study Questionnaire .....	106

## LIST OF TABLES

	Page
Table 3.1	Demographic Characteristics of the Participants (N = 254)..... 29
Table 3.2	Summaries of Study Measures, along with Means, Standard Deviations, and Cronbach’s Alpha Reliability Estimates for the Sample in the Present Study (N = 254) ..... 38
Table 4.1	Descriptive Statistics for Predictor, Criterion, and Moderator Variables (N = 254) ..... 46
Table 4.2	Correlations, Means, and Standard Deviations for Variables Used in the Hierarchical Regression Analyses (N=247) ..... 47
Table 4.3	Correlations for Variables Used in the RQ1 Simultaneous Regression Analyses (N=249)..... 51
Table 4.4	Demographic Covariates Predictors of VR engagement (N=249) ..... 51
Table 4.5	Correlations for Variables Used in the RQ2 Simultaneous Regression Analyses (N=248)..... 53
Table 4.6	Known P-E Predictors of VR engagement (N=248) ..... 53
Table 4.7	Correlations for Variables Used in the RQ3 Simultaneous Regression Analyses (N=243)..... 55
Table 4.8	SDT/SET variables Predictors of VR engagement (N=243)..... 55
Table 4.9	Hierarchical Regression Analysis for Prediction of VR engagement (N=247)..... 59

## LIST OF FIGURES

	Page
Figure 4.1. Path coefficients for serial multiple mediation analysis on VR engagement..	64

## **CHAPTER ONE**

### **INTRODUCTION**

Unemployment, poverty, and inequality are major causes of human adversity (Belle & Bullock, 2017; Weich & Lewis, 1998; World Health Organization, 2005). People who are without jobs tend to experience a higher prevalence of major depressive disorders, use alcohol and drugs more frequently, and report poorer health and lower levels of self-esteem and life satisfaction compared to people who are gainfully employed (Chan et al., 2017; Compton, Gfroerer, Conway, & Finger, 2014; Dooley, Catalano, & Hough, 1992; Dutta, Gervery, Chan, Chou, & Ditchman, 2008; Kasl, Rodriguez, & Lasch, 1998; Marrone & Golowka, 1999; Weich & Lewis, 1998). Poverty and income inequality have dire consequences on the social, mental, and physical well-being of individuals with and without disabilities (Murali & Oyebode, 2004). There is strong evidence to support that income inequality produces high levels of psychosocial stress, which in turn leads to deteriorating health and higher mortality (Dutta et al., 2008; Krause, Carter, Pickelsimer, & Wilson, 2008; Murali & Oyebode, 2004).

In the United States, the employment-to-population ratio for people with disabilities has been found to be 17.9 % compared to 65.3% of those without disabilities (U.S. Department of Labor, Bureau of Labor Statistics, 2017). The low employment participation effectively excludes many people with chronic illness and disability (CID) from full community inclusion and participation, stalls upward mobility, and greatly affects their quality of life (U.S. Senate Committee on Health, Education, Labor and Pensions [SCHELP], 2012). Without a doubt, prime working-age adults with disabilities, with ages between 25 and 54 face considerable personal, social, and environmental barriers that impede their access to steady employment and economic security, which in turn, greatly affect their health and well-being (Curb Cuts to the Middle Class

Initiative, 2015). The low employment rates of people with CID is particularly concerning, especially when two-thirds of unemployed persons with disabilities report that they would like to work (National Council on Disability, 2007).

Participation in competitive employment is considered a fundamental human right and crucial to the physical and psychological well-being of people with CID (Dutta et al., 2008; United Nations, 1948). The state–federal vocational rehabilitation (VR) program, which serves approximately one million individuals per year and spends more than \$2.5 billion annually, has a long history and plays an instrumental role in helping persons with disabilities achieve their independent living and employment goals (Martin, West-Evans, & Connelly, 2010; U.S. Government Accountability Office [GAO], 2005). The value of the state–federal VR program has been supported in the rehabilitation literature (e.g., Bolton, Bellini, & Brookings, 2000; Chan, Cheing, Chan, Rosenthal, & Chronister, 2006; Dutta et al., 2008; Gamble & Moore, 2003; O’Neill, Mamun, Potamites, Chan, & Cardoso, 2015). In general, the employment rates of people with CID after receiving VR services are consistently found to be 55% to 60% (Dutta et al., 2008; Kaye, 1998; Rosenthal, Chan, Wong, Kundu, & Dutta, 2006; U.S. Department of Education, 2016). Thus, VR has been shown play an active role in enhancing psychosocial and vocational outcomes of people with CID.

### **Importance of the Problem**

Although employment is central to promoting health and well-being (Diette, Goldsmith, Hamilton, & Darity, 2012), people with CID also have competing interests, values, conflicts, and concerns related to employment and may be ambivalent about the prospects of going to work (Dutta et al., 2008). For example, individuals with CID may have feelings of hopelessness and passivity, unrealistic service goals, fear of losing disability-related benefits, worry about the

unstable job markets, and wariness of harassment in the workplace (Manthey, Brooks, Chan, Hedenblad, & Ditchman, 2015). As a result of this ambivalence towards employment, rehabilitation counselors frequently express concern about people with CID's lack of motivation to engage in VR services and question their readiness to obtain and retain employment. Consequently, people with CID who might benefit from VR and mental health services do not always seek out those services, may not fully participate in treatment and service, or may terminate prematurely (Corrigan et al., 2012; Manthey et al., 2015; O'Neill, et al., 2015). Therefore, it is important for rehabilitation counselors to address concerns related to ambivalence, and the associated lack of motivation, to promote engagement in VR services and adherence to rehabilitation plans (Cook, 2004; Manthey et al., 2015; Wagner & McMahon, 2004). Corrigan et al. (2012) suggest that treatment non-compliance may be due to factors related to self-determination and autonomous choice, and they suggest a paradigm shift in rehabilitation and mental health services to encourage people with CID to be self-motivated and active participants in all aspects of the treatment and the rehabilitation process, including VR interventions (Corrigan et al., 2012; Dutta et al., 2016; Fitzgerald et al., 2015). Therefore, rehabilitation and mental health counseling treatment and service must emphasize collaborations between clients and counselors rooted in self-determination principles. Self-determination represents a change from the "shoulds" to "decisions and behaviors" as the best options for helping people with CID in achieving rehabilitation and recovery goals (Corrigan et al., 2012). Clinical consideration and application of self-determination principles may foster greater client participation in treatment leading to more successful treatment outcomes.

In this era of evidence-based medicine and patient or client choice, rehabilitation researchers are beginning to evaluate Deci and Ryan's (1985) self-determination theory (SDT)

along with Bandura's (2004) self-efficacy theory (SET), as a work motivation model in VR, with encouraging results (e.g., Iwanaga, Chan, Tansey, Strauser, & Bishop, 2017; Tansey, Iwanaga, Bezyak, & Ditchman, 2017). Tansey et al. (2017) found that SDT and SET variables were significant predictors of readiness for employment. Iwanaga, Chan et al. (2017) also found that working alliance was associated with readiness for employment, and SDT/SET variables of self-determined work motivation, vocational self-efficacy, and vocational outcome expectancy were significant serial multiple mediators explaining the relationship between working alliance and readiness for employment.

### **Theoretical Framework**

The sociocontextual framework of SDT/SET has proven to be useful in explaining motivation leading to health-related behavior change and engagement in rehabilitation activities and, as a result, may prove useful in developing a conceptual framework for understanding clients' motivation to engage in VR services leading to positive employment outcomes. Specifically, Deci and Ryan (1985) postulated in SDT that people are more likely to be motivated to participate in an activity when they have a sense of *autonomy* (i.e., self-determined motivation to pursue one's goal), *competence* (i.e., confidence in one's mastery of skills), and *relatedness* (i.e., feeling attached and supported by one's social network). In addition, autonomy supportive social contexts play a key role in facilitating self-determined motivation, healthy development, and optimal functioning (Fitzgerald et al., 2015). However, for rehabilitation and mental health counseling professionals to support client autonomy, it is necessary to elicit and validate their clients' perspective by supporting their ingenuities, discussing with them treatment choices, providing relevant information, and minimizing pressure and control (Fitzgerald et al., 2015; Williams et al., 2006). Similarly, in SET, self-efficacy refers to beliefs in one's capabilities



to organize and execute the courses of action required to manage prospective situations. Self-efficacy beliefs are assumed to play a central role in any type of personal change, and this construct is considered the “foundation of human motivation” (Bandura, 2004, p. 144). Although there are slight conceptual differences between the ways in which competence is conceptualized, it is one of the components of both SDT and self-efficacy theories, and Van den Broeck, Vansteenkiste, De Witte, Soenens, and Lens (2010) have suggested that the differences are not expected to be substantial at the empirical level. Therefore, it is possible to equate self-efficacy with competency. Outcome expectancies are individuals' beliefs regarding the consequences that are most likely to ensue if particular behaviors are performed (Bandura, 2004). Enhancement of self-efficacy can lead to an increase in outcome expectancy, and consequently support behavioral changes toward the targeted outcome. Adding outcome expectancy in SDT can potentially increase its ability to predict motivation to engage in different socially endorsed activities, including VR engagement and employment participation. However, a comprehensive review of the SDT/SET literature reveals no empirical studies evaluating SDT/SET as a treatment adherence and engagement model for people with CID.

### **Purpose of the Study**

Given the current emphasis on empowerment and self-determination as a paradigm shift to improve treatment adherence and engagement in health care and rehabilitation settings, the purpose of this study was to evaluate constructs based on SDT/SET as predictors of vocational rehabilitation engagement in a sample of people with CID receiving VR services. Specifically, I evaluated the contribution of SDT/SET variables above and beyond the contribution of demographic covariates and person-environment (P-E) contextual variables (commonly used in rehabilitation counseling research) in predicting VR engagement.

The dependent variable in this study was VR engagement. Demographic covariates included age, gender, race/ethnicity, marital status, educational attainment, functional disability, receipt of Supplemental Security Income (SSI), Social Security Disability Insurance (SSDI), and benefits counseling. Person-environment contextual factors included resilience, disability acceptance, social functioning, agreeableness, perceived social support, and perceived social stigma. The SDT/SET variables included autonomy support, autonomy/self-determined work motivation, competence (job performance self-efficacy and job seeking self-efficacy), relatedness (working alliance) and outcome expectancy.

### **Research Questions**

The following research questions were addressed in the current study:

1. What is the relationship between demographic covariates and VR engagement? It is hypothesized that several demographic variables will influence the likelihood that an individual with CID will engage in higher levels of VR activities.
2. What is the relationship between person (disability acceptance, resilience, social functioning, and agreeableness) and environment (perceived social support and perceived social stigma) predictors and VR engagement? It is hypothesized that various person-environment contextual factors will influence the likelihood that an individual engages in higher levels of VR activities.
3. What is the relationship between SDT/SET variables (autonomy support, autonomy, self-efficacy, working alliance, and outcome expectancy) and VR engagement? It is hypothesized that various SDT/SET variables will influence the likelihood that an individual engages in higher levels of VR activities.

4. What is the contribution of SDT/SET variables to the prediction of VR engagement beyond the variance already explained by the demographic covariates and known P-E Predictors? It is hypothesized that SDT/SET variables will explain individuals with CID's levels of engagement in VR activities beyond the explanation provided by demographic covariates and known P-E predictors commonly used in rehabilitation counseling research?

### **Significance of the Study**

People with CID are one of the most stigmatized groups in the world. Social stigma limits their opportunity to find employment and live a meaningful and flourished life (United Nations Human Rights Office of the High Commissioner, 2008). For example, the employment-to-population rate for people with disabilities is only 19.6% compared to 66.0% for people without disabilities (U.S. Department of Labor, Bureau of Labor Statistics, 2017) and yet two-thirds of people with CID who are not employed report that they would like to work (National Council on Disability [NCD], 2007). Because the adverse effect of poverty, unemployment, and income inequality on health and well-being, employment is considered a fundamental human right for people with disabilities. There is strong scientific evidence to support VR as an effective public health intervention that can help people with CID find and retain employment and build career pathways to the middle class (O'Neill et al., 2015). However, because of many internal and external factors, people with CID may feel ambivalent about staying at work or returning to work. In this study, I integrated two well-known motivation theories (SDT/SET) to investigate factors influencing rehabilitation clients' motivation to engage in VR services. I hoped to demonstrate the importance of conducting theory-driven research to inform the professional practice of rehabilitation and mental health counseling.

## CHAPTER TWO

### REVIEW OF THE LITERATURE

The purpose of this study was to evaluate constructs based on SDT/SET as predictors of vocational rehabilitation engagement in people with CID receiving state VR services. I hypothesized that SDT/SET variables would account for significant additional variance in VR engagement scores beyond the contribution of prominent demographic variables and known P-E predictors that have been found to associate with community integration and participation outcomes in rehabilitation counseling research. One of the limitations of the known P-E predictors described in the World Health Organization (WHO) International Classification of Functioning, Disability and Health (ICF) framework is that the ICF does not include any client motivation variables. Conversely, the strengths of SDT/SET are their strong focus on client motivation, counselor-client working relationship, self-efficacy and outcome expectations as predictors of treatment adherence/engagement. The following is a review of relevant literature from three broad areas: 1) VR engagement; 2) known P-E predictors related to participation and rehabilitation counseling outcomes; and 3) integrating SDT and SET as a model of VR engagement.

#### **Vocational Rehabilitation Engagement**

There is ample evidence in the medical rehabilitation and healthcare research literature to support the relationship between treatment adherence and engagement and positive health and rehabilitation outcomes (Jin, Sklar, Oh, & Li, 2008). Kortte, Falk, Castillo, Johnson-Greene, and Wegener (2007) reported that participation in comprehensive rehabilitation programs is effective in improving outcomes after injuries and illnesses, such as stroke, spinal cord injury (SCI), orthopedic injuries, and amputations. They defined participation as the degree or extent to which

individuals take part in rehabilitation activities during their acute rehabilitation stay. There are several different approaches to assess medical rehabilitation engagement. For example, the *Pittsburgh Rehabilitation Participation Scale (PRPS)* uses a single-item scale designed to capture the clinician's perception of patient's participation (effort and motivation) in the treatment session (Lenze et al., 2004). Conversely, Kortte et al. (2007) believe that medical rehabilitation engagement should comprise multiple elements, including the patients' attitude toward attending therapy, their level of understanding and/or acknowledgment of the need for treatment, and verbal or physical prompts required for effective communication. They developed and validated the *Hopkins Rehabilitation Engagement Rating Scale (HRERS)*, a 5-item rating scale for use in behavioral observations of patients during acute inpatient rehabilitation.

Engagement in rehabilitation activities is rated in terms of level of attendance at therapy sessions, the attitude expressed by patients toward their therapy, the need for verbal or physical prompts to facilitate initiation or maintenance of engagement within the therapy session, patients' acknowledgment of the need for therapy, and the patients' level of active participation in the therapy. They reported that the HRERS correlated positively with self-rated positive affect and level of functioning three months after hospital discharge.

In recent years, rehabilitation researchers have begun to emphasize the importance of client motivation in the VR process and to investigate factors that will improve clients' motivation to engage in VR services (Dutta et al., 2016; Fitzgerald et al., 2016; Tansey et al., 2017; Wagner & McMahon, 2004). Researchers have been studying the potential contributions of motivational interviewing, working alliance, SDT and SET variables as predictors of VR engagement and readiness for employment. Researchers at the University of Wisconsin-Madison Rehabilitation and Research and Training Center on Evidence-Based Practice in Vocational

Rehabilitation (RRTC-EBP VR) have developed and validated a 9-item *Vocational Rehabilitation Engagement Scale* (Dutta et al., 2016) for treatment adherence and engagement research in VR. Items were developed using the SDT framework and were based on a comprehensive review of the VR engagement literature and related patient engagement scales in medical rehabilitation (e.g., HRERS and the 22-item *Patient Activation Measure* developed by Hibbard, Stockard, Mahoney, & Tusler, 2004). Items were written to include cognitive engagement (e.g., “I understand and accept the need for vocational rehabilitation services”), affective engagement (e.g., “I am determined to complete all the services identified in my individualized plan for employment”), and behavior engagement (e.g., “I communicate with my rehabilitation counselor regularly”). The VRES was validated on a sample of 277 VR clients. Exploratory factor analysis results supported a one-factor measurement structure of the VRES. Confirmatory factor analysis results also indicated a good model fit for the one-factor measurement model. An internal consistency reliability coefficients (Cronbach’s alpha) for the scores on the VRES was computed to be .94. The VRES was found to be associated with working alliance, vocational self-efficacy, self-determined work motivation, and VR outcome expectancy in the expected directions. Similar results were found in a study with mental health clients (Fitzgerald et al., 2016). The VRES was used to assess VR engagement in this present study.

### **Known Person and Environment (P-E) Predictors**

As mentioned, rehabilitation researchers have consistently recognized the need to consider contextual and environmental factors in the development of efficacious and effective rehabilitation counseling practice (Chan, Tarvydas, Blalock, Stauser, & Atkins, 2008; Wright, 1983). As indicated by Chan et al. (2008), the World Health Organization’s ICF model has

explicitly underscored the importance of environment (E) and person (P) factors and their interaction with functioning and disability on community participation, including employment participation of individuals with CID. Person factors that have been frequently included in rehabilitation counseling studies to predict participation and life satisfaction include demographic covariates, disability acceptance, resilience, social functioning, and the Big-Five personality characteristics (Catalano, Chan, Wilson, Chiu, & Muller, 2011; Ferrin, Chan, Chronister, & Chiu, 2011; Sánchez, Rosenthal, Chan, Brooks, & Bezyak, 2016; Soto, 2015). As pointed out by Sánchez, Rosenthal et al. (2016), environment factors that have been frequently specified in ICF studies include social support and social stigma. It is hypothesized that these factors may also have an influence on VR clients' motivation to actively engage in VR services.

### **Demographic Covariates**

Since rehabilitation researchers have just begun to focus on the importance of VR engagement, there has not been much research that investigates relationships between demographic covariates and VR engagement. Individuals of prime working age (i.e., 25 to 54) may be more committed and engaged with their VR interventions and services. Regarding gender, educational level, and marital status, meta-analysis of treatment adherence has shown mixed results (Jin et al. 2008; Kardas, Lewek, & Matyjaszczyk, 2013). Women have been found to have better compliance (Choi-Kwon, Kwon, & Kim, 2005; Fodor et al., 2005), while some studies have suggested otherwise (Caspard, Chan, & Walker, 2005; Hertz, Unger, & Lustik, 2005). In addition, some studies have not found a relationship between gender and treatment adherence (Senior, Marteau, Weinman, & Genetic Risk Assessment for FH Trial Study Group, 2004; Spikmans et al., 2003). Regarding educational level, several studies have found that patients with higher educational attainment might have better adherence, while some studies

found no association (Jin et al., 2008; Kardas et al., 2013; Senior et al., 2004). Intuitively, it may be expected that individuals with higher educational attainment would have better knowledge about diseases and therapy and, therefore, would be more compliant. Other researchers have found that individuals with lower educational level have better adherence and may have more trust in their physicians' advice (Kynge & Lahdenpera 1999; Senior et al 2004). Marital status might also influence medication adherence (Kardas et al., 2013; Jin et al., 2008). Support and reminders from a spouse could be the reason why married individuals are more adherent to taking medication as compared to those who are single. However, marital status was not found to relate to patient adherence in some studies (Ghods & Nasrollahzadeh 2003; Kaona, Tuba, Siziya, & Sikaona 2004; Spikmans et al 2003; Wild, Engleman, Douglas, & Espie, 2004).

Race/ethnicity is recognized as a factor influencing non-adherence. Caucasians are believed to have good adherence, while African-Americans, Hispanics and other minorities are believed to have comparatively poor adherence. However, a plausible explanation for these differences may be lower socio-economic status and language barriers that are more common for minority races. Hence, due to these confounding variables, ethnicity may not be a true predictive factor of poorer compliance (Jin et al., 2008; Kardas et al., 2013; Zhang, 2017).

Moreover, one of the major barriers to gainful employment for persons with severe disabilities is weighing the financial benefits of paid work against the real possibility of losing disability-related benefits including Social Security benefits (SSI or SSDI). Hennessey (1997) reported that less than 3% of SSDI recipients left the rolls because of working at what the Social Security Administration calls the "substantial gainful activity" level, which for 2018 is specified as \$1,970 per month for individuals who are blind and \$1,180 per month for individuals with other types of CID. Therefore, individuals with disabilities who are receiving SSI or SSDI may



be more ambivalent about work affecting their motivation to engage in VR services. As mentioned previously, there has not been much research on relationships between demographic covariates and VR engagement; however, demographic variables that are typically included in VR research are age, gender, race/ethnicity, educational attainment, marital status, functional disability, and variables related to Social Security benefits.

### **Person Factors**

**Disability acceptance.** The concept of disability acceptance is based on Beatrice Wright's coping vs. succumbing framework that focuses on accepting one's disability as non-devaluating (Wright, 1983). Disability acceptance is defined as a process of re-evaluation of values, and involves four value changes: (a) enlarging the scope of values, (b) containing the effects of the disability, (c) subordinating physique, and (d) transforming comparative-status values to asset values. Disability acceptance has been studied extensively and has been found to correlate significantly with self-esteem, social functioning, achievement, participation, and life satisfaction (Ferrin et al., 2011; Heinemann & Shontz, 1982; Sánchez et al., 2016).

**Resilience.** Resilience is defined as a dynamic process that encompasses both a behavioral and a psychological manifestation of positive adaptation within the context of significant adversity (Todd & Worell, 2000). Catalano et al. (2011) evaluated Kumpfer's Framework of Resilience Model (FRM; Kumpfer, 1999) in a sample of Canadians with spinal cord injury using structural equation modeling. They found that social support and positive coping significantly fostered resilience, whereas resilience served as a "buffer" between perceived stress and depression. The authors also found resilience to be positively related to subjective well-being and life satisfaction. Similarly, Moser (2017) in evaluating the FRM model with a sample of young adults with epilepsy also found that positive human traits, such as secure

attachment, core self-evaluations, and self-efficacy, and environmental factors, such as family support and friend support, significantly enhanced resilience, and resilience was significantly related to participation and life satisfaction.

**Social functioning.** Social functioning includes social role performance (work, leisure, family roles, and basic self-care) and interpersonal functioning (friendship, social relations, and family relations; Bosc, 2000). Chronic illness and disability often has a negative impact on social skill development, leading to low levels of engagement in self-care, social and civic activities, and employment (Corrigan et al., 2012; Phillips, Deiches, Morrison, & Kaseroff, 2016; Tschopp & Frain, 2009). Poor social functioning has been identified as one of the major impediments to vocational recovery and health-related quality of life of people with CID (Le Boutillier et al., 2014; Tschopp & Frain). Conversely, positive interpersonal relationships, which are influenced by empathy, social skills, and insight, have been found to be associated with higher functioning, community participation, employment, and life satisfaction (Didehbani et al., 2012; Rossler, 2006; Sánchez et al., 2016).

**Agreeableness.** Agreeableness is one of the Big-Five personality characteristics and has been seen as a major trait determinant of pro-sociality (Graziano, Bruce, Sheese, & Tobin, 2007). People who express high agreeableness are described as prosocial, altruistic, polite, sympathetic, and eager to help others (McCrae & Costa, 2010). Recent longitudinal findings support the role of empathic self-efficacy beliefs in partially mediating the relation between agreeableness and pro-sociality (Caprara et al., 2014). Agreeableness, conscientiousness, and emotional stability have been found to be positively related to job performance involving interpersonal interaction (Hough, 1992; Mount, Barrick, & Stewart, 1998). Higher levels of subjective well-being were associated with higher levels of extraversion, agreeableness, and conscientiousness (Soto, 2015).

Neuroticism, which is the opposite of agreeableness, is strongly associated with job burnout (Piedmont, 1993), poor job performance evaluations (Piedmont & Weinstein, 1994), and low reliability (Hogan & Hogan, 1989).

### **Environment Factors**

**Perceived social support.** Social support refers to subjective appraisal of social support systems and confidence in the satisfactoriness of those support systems (Sarason et al., 1991). Social support relates to the contribution of resources by others that may help an individual cope with unpleasant events and/or protect the individual from the negative consequences of stress (Cohen et al., 1985). Social support can be seen as an encouragement to engage in health promoting behaviors. Conversely, the lack of support or isolation has been found to be a barrier to health behavior adherence of cancer survivors (Thompson, Littles, Jacob, Coker, 2006) and HIV patients (Alfonso, Geller, Bermbach Drummond, & Montaner, 2006). Social support is also related to broader types of health behavior, including exercising (Emmons, Barbeau, Gutheil, Stryker, & Stoddard, 2007) and smoking cessation (Chouinard & Robichaud-Ekstrand, 2007). In rehabilitation, social support has been found to contribute significantly to the psychosocial adjustment of people with disabilities (Chronister, 2009).

**Perceived social stigma.** Stigma is a term that encompasses the problems associated with stereotyping, prejudice, and discrimination; it is the chain of events resulting from negative attitudes and beliefs, resulting in discrimination. Perceived social stigma has been found to be negatively correlated with community participation and life satisfaction (Calsyn, Morse, Tempelhoff, Smith, & Allen, 1995; Sánchez, Rosenthal et al., 2016) and poor VR outcomes (Gómez et al., 2016). Perceived social stigma can also lead to self-stigma and self-stigma may result in “why try” behaviors (Corrigan, Larson, & Rusch, 2009). Therefore, perceived social

stigma in the workplace and in the community may affect the motivation of individuals with CID to obtain and retain employment, and their level of motivation to work will influence their motivation to engage in VR services.

### **Integrating SDT and SET as a Model of VR Engagement**

As mentioned, the purpose of this proposed study is to evaluate an integrated SDT/SET model of VR engagement. The sociocontextual framework of SDT/SET has proven to be useful in explaining the motivation leading to health-related behavior change and rehabilitation activities and, as a result, may prove useful in developing a conceptual framework for understanding client motivation to engage in VR services leading to positive employment outcomes. Self-determined motivation is related to high levels of interest, persistence, and satisfaction when engaging in health promoting behaviors and rehabilitation activities. Emerging evidence supports the importance of SDT/SET to promote continued use of health care and rehabilitation services and active participation by clients with CID (Dutta et al., 2016). The following sections provide a thorough review of SDT and SET.

#### **Self-Determination Theory**

Self-determination theory has proven to be useful in explaining the motivation leading to health-related behavior change (Deci & Ryan, 2002, 2010; Ng et al., 2012). Self-determined motivation is related to high levels of interest, persistence, and satisfaction when engaging in health promoting and rehabilitation activities. Emerging evidence supports the importance of self-determination to promote continued use of health care and rehabilitation services and active participation by clients with disabilities. Self-determination theory provides a framework for understanding human motivation and behavioral self-regulation, and describes how human beings achieve goals, reach self-actualization, and experience a higher quality of life in treatment,

healthcare, or other contexts that support the realization of fundamental human needs (Deci & Ryan, 2002, 2010; Ng et al., 2012; Reeve, Nix, & Hamm, 2003; Ryan & Deci, 2000). Self-determination theory asserts that people are more likely to be motivated to participate in an activity when they have a sense of *autonomy support*, *autonomy*, *competence*, and *relatedness*.

**Autonomy support.** A central tenet of SDT is the idea that individuals' perception and interactions with the social climate significantly affect the motivation, performance, and well-being of individuals who operate within these contexts. *Autonomy support* is used to characterize the quality of these social environments. Three essential elements of autonomy support include; (a) providing a meaningful rationale for behavior change; (b) acknowledging people's feelings and perspectives; and (c) exhibiting an interpersonal style that encourages choice and minimizes control (Deci, Eghrari, Patrick, & Leone, 1994). These autonomy-supportive elements have been found to facilitate self-determined motivation, healthy development, and optimal functioning of clients (Williams et al., 2006).

**Autonomy.** In order for a person to experience internally derived motivation for a behavior or a set of behaviors, SDT suggests that the following three psychological needs must be met: (a) autonomy, (b) relatedness and (c) competence (Deci & Ryan, 2000, 2008, 2010; Ryan & Deci, 2000). Autonomy refers to acting volitionally with a sense of the need to experience one's behavior as integrated within and endorsed by the self. When autonomous, people initiate and regulate their behaviors with a high degree of volition and a sense of choice (Baumeister & Leary, 1995; Reeve et al., 2003; Ryan & Deci, 2000). Autonomous choice, acknowledgment of feelings, and opportunities for self-direction can enhance intrinsic motivation as they allow people to achieve greater feelings of autonomy. Thus, treatment environments that promote autonomy by acknowledging patients' perspectives, supporting their

initiatives, offering treatment options, and providing relevant information to support decision-making, while minimizing pressure and control, are likely to enhance treatment adherence and health and rehabilitation outcomes (Deci & Ryan, 2002, 2010; Ryan, Patrick, Deci, & Williams, 2008; Williams et al. 2006). Importantly, autonomy does not mean that individuals are making choices without input or support from others; autonomy is not synonymous with independence. Instead, it is referred to as the capacity to freely regulate motivation and behavior (Deci & Ryan, 1985, 2000, 2010).

Autonomy concerns behaving from an internalized motivation orientation, and it is considered a continuous process rather than a dichotomy between intrinsic and extrinsic motivation. Consequently, SDT theorists propose that behavioral regulation can be broadly categorized as *autonomous motivation*, *controlled motivation*, and *amotivation* (Ryan et al., 2008). *Autonomous motivation* refers to three different types of behavior regulation: (a) intrinsic regulation, which is the most autonomous motivation and is described as engaging in an activity for inherent pleasure, fun, or challenge; (b) integrated regulation, which involves participation in activities that are in line with one's personal goals and values; and (c) identified regulation, which occurs when one personally endorses or identifies with the value or importance of a behavior or health practice. Identification is facilitated when practitioners provide relevant information and a meaningful rationale for change without external controls and pressures (Ryan et al.). *Controlled motivation* refers to two different types of behavior regulation: (a) introjected regulation, which involves behavioral performance motivated by self-esteem related contingencies and occurs when an individual is motivated by guilt or shame; and (b) external regulation, which is the least autonomous type of motivation and can occur when external pressures (e.g., rewards or punishment) encourage an individual's health behavior (Ryan et al.).

The final category of behavioral regulation is *amotivation*, which occurs when an individual has a relative absence of motivation for a certain behavior (Ryan et al.).

**Competency.** *Competency* is the need to be effective in one's interactions with the environment. When feeling competent, people desire to exercise their capacities and actively seek out optimal challenges to increase their skills and subsequent opportunities (Baumeister & Leary, 1995; Reeve et al., 2003; Ryan & Deci, 2000). Competency alone is not sufficient to support behavior change or action; rather, it must be accompanied by volition or autonomy (Deci & Ryan, 2002, 2010; Ryan & Deci, 2000). In other words, when individuals feel competent *and* they believe that they are in control of the decision-making process, they have a high degree of willingness to act. Subsequently, through actions to promote self-interests as a function of feeling autonomous and competent, individuals tend to expand their beliefs regarding their own competence (Deci & Ryan, 2012).

**Relatedness/working alliance.** *Relatedness* is the need to establish close and secure attachments with others. When feeling related, people identify with being emotionally connected and interpersonally involved in warm, caring relationships (Baumeister & Leary, 1995; Deci & Ryan, 2002, 2010; Reeve et al., 2003; Ryan & Deci, 2000). Individuals also need to feel a sense of being respected, understood, and cared for to form relationships and bonds that allow for internal motivation to engage and persist in treatment (Ryan et al., 2008). In the present study, working alliance was used as a proxy for relatedness. Deci and Ryan (2008) mentioned that working alliance is not an SDT construct *per se*; however, they agreed that working alliance is clearly aligned with SDT's conceptual framework. Working alliance is the collaboration between the client and the counselor based on the development of an attachment bond, as well as a shared commitment to the goals and tasks of counseling (Bordin, 1979). Bonds are the positive,

personal attachments that exist between the client and the counselor, including issues such as mutual trust, acceptance, and confidence. Goals are the targets of the intervention that are mutually endorsed and valued by the counselor-client dyad. Tasks are in-counseling behaviors and cognitions that the counselor and the client perceive as relevant and efficacious and for which *both* agree to accept the responsibility to perform (Horvath & Greenberg, 1989).

Although SDT may provide insight into client motivation, the theory does not lend itself to describing the transition that individuals undergo to move from an amotivational state to being active participants engaging in actions and behaviors toward a defined goal (Haggart & Chatzisarantis, 2009). To connect SDT and its underlying components to a targeted behavioral change, intermediary transition processes, such as the development of self-efficacy and outcome expectancy, as conceptualized by self-efficacy theory (SET; Bandura, 1997; Bandura, 2004), may explain the connection between individual processes and behavioral transformation. Recently, Tansey et al. (2017) evaluated SDT and SET as an integrated motivation-to-work model in a sample of VR clients and identified a strong relationship between readiness for employment and working alliance, autonomy, competence, outcome expectancy, and VR engagement. The authors suggest that SDT variables (i.e., autonomy support, autonomy, competence, and relatedness) and SET variables (i.e., self-efficacy and outcome expectancy) can be useful in identifying additional common factors that predict treatment outcomes. Moreover, Višlã, Constantino, Newkirk, Ogrodiczuk, and Söchting (2016) conducted a study to examine the mediational relationships among working alliance, outcome expectations, and treatment outcome in group therapy. They found that the relationship between early alliance and post-treatment interpersonal problems was mediated by outcome expectations. It appears that SDT and SET variables can be predictors of VR engagement.



## **Self-Efficacy Theory**

Beyond SDT, another widely applied motivation theory is self-efficacy theory (SET; Bandura, 2004). SET is concerned with the ways in which people acquire and maintain behavioral patterns. This theory identifies five determinants of change: (a) *knowledge*, (b) *self-efficacy*, (c) *outcome expectancy*, (d) *goals*, and (e) *facilitators and impediments*. Among these five determinants, self-efficacy and outcome expectancy are two of the most prominent determinants. *Self-efficacy* refers to beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations. Beliefs about personal efficacy are thought to play a central role in any type of personal change, and this construct is considered the "foundation of human motivation" (Bandura, 2004, p. 144). Although there are slight conceptual differences between the ways in which competence is conceptualized, it is one of the components of both SDT and SET, and Van den Broeck et al. (2010) has suggested that the differences are not expected to be substantial at the empirical level. *Outcome expectancies* are individuals' beliefs regarding the consequences are most likely to ensue if particular behaviors are performed (Bandura, 2004). Enhancement of self-efficacy can lead to an increase in outcome expectancy, and consequently support behavioral changes toward the targeted outcome.

## **Research Findings**

Self-determination theory has become a popular framework for health promotion. For instance, the SDT model has been extensively tested and validated as an effective health promotion intervention for smoking cessation (Williams, Gagne, Ryan, & Deci, 2002), alcohol treatment (Ryan, Plant, & O'Malley, 1995), medication adherence (Williams, Rodin, Ryan, Grolnick, & Deci, 1998), physical activity (Fortier et al., 2007), diabetes self-management (Williams, McGregor, Zeldman, Freedman, & Deci, 2004), and weight loss (Williams, Grow,

Freedman, Ryan, & Deci, 1996). Similar to SDT, self-efficacy and outcome expectancy have also been identified as outcome variables in studying the effectiveness of specific psychosocial and vocational interventions (Chou, Ditchman, Pruett, Chan, & Hunter, 2009; Ventura Salanova & Llorens, 2015). That is, increases in self-efficacy and outcome expectancy have been found to be positively related to enhancing physical activity (Ginis et al., 2011; Sweet, Fortier, Strachan, & Blanchard, 2012) and psychosocial well-being (Ventura et al., 2015).

A meta-analysis by Ng et al. (2012) supported the positive associations among SDT constructs, as well as significant relationships between SDT constructs and positive mental health and physical health outcomes. They combined techniques of meta-analysis and path analysis to test the overall SDT model for health behavior and reported that the model showed a good fit, reinforcing the usefulness of SDT to improve health behavior. Moreover, Davidson and Chan (2014) showed that factors that constitute a psychotherapeutic alliance between practitioners and clients' accounts for twice as much of the variance in outcomes than any particular technique. Ultimately, the therapeutic relationship makes substantial and consistent contributions to client success in any type of psychotherapy or counseling service.

There has been ample research evidence to show a positive relationship between SDT based intervention and physical activity and exercise. A systematic review identified consistent results showing evidence for a positive relationship between more autonomous forms of motivation and engagement in physical activity and exercise (Teixeira, Carraca, Markland, Silva, & Ryan, 2012). Moreover, Silva and colleagues (2010) compared a SDT-based exercise program to a general health education program, and they found that the SDT intervention group lost more weight and had significantly more engaging exercise behavior than those receiving health education, pointing to importance of autonomy-promoting climate. Hsu, Buckworth, Focht, and

O'Connell, (2013) investigated the effectiveness of an 8-week, SDT-based exercise intervention with a total of 50 sedentary overweight/obese women using an experimental design. Women were randomly assigned to either the SDT-based intervention or exercise-only intervention. The results indicated that adherence to physical activity goals was better for the SDT-based intervention group.

Aside from physical activity and exercise, Williams and colleagues (2006) used structural equation modeling to evaluate an SDT-based intervention for smoking cessation over time. Findings indicated that perceived autonomy support led to greater autonomous motivation, greater competence, and higher rates of smoking cessation. Health care providers' support for client autonomy and competence around medication use and diabetes self-management related positively to medication adherence, quality of life, and physiological outcomes among individuals with diabetes (Williams, 2009). Chan and colleagues (2009), using structural equation modeling, found that treatment motivation mediated the relationship between physiotherapist autonomy-supportive behaviors and rehabilitation adherence. Autonomy-supportive behavior positively predicted autonomous treatment motivation. Likewise, rehabilitation adherence was predicted positively by autonomous motivation and negatively predicted by controlled motivation. Greater autonomy support predicted greater autonomous motivation for adherence, which predicted adherence through an indirect relationship mediated by perceived competence. Autonomy support from health care providers was most predictive of autonomous motivation (Kennedy, Goggin, & Nollen, 2004).

Cheing et al. (2014) found that the effect of motivational interviewing on pain rehabilitation outcome can be explained by social-cognitive factors such as motivation, outcome expectancy, and working alliance. In addition, Vong, Cheing, Chan, So, & Chan (2011)

conducted a randomized controlled trial to investigate the impact of motivational interviewing on pain rehabilitation outcomes of physical therapy patients. Patients treated by physical therapy trained in the use of motivational interview to interact with patients showed significantly higher physical functioning and exercise compliance, as well as a greater reduction in perceived pain intensity and functional disability, relative to the conventional physical therapy group.

As such, the SDT components have been found to strongly associate with engagement in health promoting behavior and positive treatment outcome. Moreover, although there is a paucity of research related to VR engagement, Fitzgerald et al. (2015) showed that SDT components may be interconnected with individuals' desire to work and goal persistence for seeking and maintaining employment for people with severe mental illness.

### **Summary**

State VR has provided people with CID with effective support of finding and retaining employment, which contribute to build career pathways to the middle class. However, because of many internal and external factors, people with disabilities may feel ambivalent about staying at work or returning to work. It has been recognized that contextual and environmental factors (e.g., demographic covariates, disability acceptance, resilience, social functioning, the Big-Five personality characteristics, perceived social support and perceived social stigma) are important factors for the development of efficacious and effective rehabilitation counseling practice. Rehabilitation researchers have also found the importance of collaborations between VR consumers and rehabilitation counselors rooted in self-determination principles in order to encourage them to actively participate in all aspects of VR interventions. The socio-contextual framework of SDT/SET has been proven as a useful framework in explaining the motivation leading to health-related behavior change and engagement in rehabilitation activities.

Rehabilitation researchers have also started to evaluate several motivational theories including SDT and SET in a model integrating SDT and SET variables to identify variables that could improve VR consumers' readiness for employment and showed that SDT/SET variables could be significant predictors for readiness for employment. However, a comprehensive review of the SDT/SET literature reveals no empirical studies evaluating SDT/SET as a VR engagement model for people with CID.

## **CHAPTER THREE**

### **METHODOLOGY**

The present chapter provides a description of the research design, procedures, characteristics of the participants, measures and their psychometric properties, and data analysis procedures.

#### **Research Design**

A quantitative descriptive research design, utilizing simultaneous and hierarchical regression analysis (Heppner, Wampold, & Kivlighan, 2008), was used to determine the extent to which the SDT and SET variables can be used to predict VR engagement for VR consumers above and beyond the contribution of demographic covariates and known P-E predictors. Specifically, simultaneous regression analysis was applied to determine the unique contributions of three sets of predictors (i.e., a demographic set, a P - E contextual variables set, and a SDT/SET variables set) on the outcome variable of VR engagement. Hierarchical regression analysis was used to determine the unique contribution of SDT/SET variables after controlling for the effects of demographic covariates, along with the additional contribution of known P-E predictors.

#### **Procedures**

##### **Recruitment of Participants**

Data for this study were extracted from the Rehabilitation Research and Training Center on Evidence-Based Practice in Vocational Rehabilitation's (RRTC-EBP VR) World Health Organization (WHO) International Classification of Functioning, Disability and Health (ICF) database. The ICF database was consisted of a convenience sample of 277 VR clients. They were recipients of services from state VR agencies in Texas, New Mexico, Utah, Michigan, Wisconsin,

Minnesota, Kentucky, Florida, and Louisiana and were recruited at those state vocational rehabilitation program offices. Participants interested in participating in the study were asked to submit the signed consent forms to the researchers or to check a box on an informed consent webpage indicating their consent to take part in the study. The survey took approximately one hour to complete. The survey could be taken online or individuals could request to complete it in person and in printed format. Participants of this study met these criteria: (a) between 16 and 65 years of age, (b) current recipients of state VR services, (c) have a rehabilitation plan established, and (d) be persons with physical or sensory disabilities. In addition, participants had to be able to read and understand English as determined by self-report. We required parental consent for participants who are 16 and 17 year-olds by providing a signature line on the consent form for parent/guardian.

Researchers at the RRTC-EBP VR-ICF had received Institutional Review Board (IRB) approval for their project to establish the dataset from the University of Texas at El Paso. This researcher also obtained the required Human Subjects Protection Training from the University of Wisconsin-Madison (UW-Madison) Institutional Review Board (IRB), as well as approval for secondary data analysis of the data set from the UW-Madison IRB (see Appendix A).

### **Participants**

Participants included a convenience sample of 277 VR consumers recruited from Alaska, Kentucky, Florida, Michigan, New Mexico, Texas, Utah, and Wisconsin. In this survey, 23 (8%) provided incomplete data; therefore, the final study sample included 254 participants (92% of the original total of 277).

## Sample Characteristics

Descriptive statistics for the participants are presented in Table 3.1. Participants ranged in age from 16 to 70 years ( $M = 37.3$ ,  $SD = 12.7$ ). Fifty-six (22.0%) of the participants were transition-age youth (age 16 to 24), 175 (68.9%) were prime working-age adults (age 25 to 54), and 23 (9.1%) were older adults (age 55 to 70). One hundred and ten (43.3%) of the participants were white, 102 (40.2%) were Hispanic, 25 (9.8%) were Black or African American, 11 (4.3%) were American Indian or Alaska Native, and 3 (1.2%) were Asian. One hundred sixty-one (63.4%) were women. Forty-nine (19.3%) were married, 7 (2.8%) were co-habiting, 136 (53.5%) were single, 44 (17.3%) were divorced, 2 (0.8%) were widowed and 13 (5.1%) were separated. Regarding educational level, 1 (0.4%) of the participants had no formal schooling, 7 (2.8%) had elementary education (grades 1-8); 22 (8.7%) had secondary education, no high school diploma (grades 9-12); 12 (4.7%) had special education certificate of completion/diploma or in attendance, 60 (23.6%) had high school graduate or equivalency certificate (regular education students), 57 (22.4%) had post-secondary education, 48 (18.9%) had associate degree or vocational/technical certificate, 35 (13.8%) had bachelor's degree, and 11 (4.3%) had master's degrees or higher. One hundred and ten (43.3%) had received benefits counseling, 45 (17.7%) received SSDI, and 27 (1.6%) received SSI.

## Measures

Summaries of all measures used, including numbers of items, ranges of possible item ratings, and Cronbach's alpha reliability estimates found for the sample in the present study are presented in Table 3.2. In addition, the entire questionnaire, including all measures, may be found in Appendix B.



Table 3.1  
*Demographic Characteristics of the Participants (N=254)*

<b>Variable</b>	<b>n (%)</b>
<b>Age</b>	
Age 16 to 24	56 (22%)
Age 25 to 54	175 (68.9%)
Age 55 to 70	23 (9.1%)
<b>Gender</b>	
Male	93 (36.6%)
Female	161 (63.4%)
<b>Race/ethnicity</b>	
White	110 (43.3%)
Hispanic	102 (40.2%)
Black or African American	25 (9.8%)
American Indian or Alaska Native	11 (4.3%)
Asian	3 (1.2%)
Missing	3 (1.2%)
<b>Education level</b>	
No formal schooling	1 (0.4%)
Elementary education (grades 1-8)	7 (2.8%)
Secondary education, no high school diploma (grades 9-12)	22 (8.7%)
Special education certificate of completion/diploma or in attendance	12 (4.7%)
High school graduate or equivalency certificate (regular education students)	60 (23.6%)
Post-secondary education, no degree	57 (22.4%)
Associate degree or Vocational/Technical Certificate	48 (18.9%)
Bachelor's degree	35 (13.8%)
Master's degree or higher	11 (4.3%)
Missing	1 (0.4%)
<b>Marital status</b>	
Married	49 (19.3%)
Cohabiting	7 (2.8%)
Single	136 (53.5%)
Divorced	44 (17.3%)
Widowed	2 (0.8%)
Separated	13 (5.1%)
<b>Benefit counseling</b>	110 (43.3%)
<b>SSDI</b>	45 (17.7%)
<b>SSI</b>	27 (10.6%)

## Dependent Variable

The *Vocational Rehabilitation Engagement Scale* (VRES) was developed by Dutta et al. (2016) to assess VR clients' engagement in VR services. It is a 9-item measure (e.g., "I strive to complete assignments and rehabilitation activities agreed upon with my rehabilitation counselor"). Each item is rated on a five-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores are calculated by averaging ratings across the items, with high scores indicating a higher level of engagement in VR services. Fitzgerald et al. (2016) validated the VRES with a sample of people with mental illness. The VRES was found to be associated with vocational self-efficacy and vocational outcome expectancy. These results support the construct validity of the VRES. Fitzgerald et al. also report an internal consistency reliability coefficient (Cronbach's alpha) of .86. The Cronbach's alpha for the VRES in this study was also .95.

## Demographic Characteristics

A demographic questionnaire was used to identify demographic covariates (i.e., age [continuous variable], gender [0=women, 1=men], race/ethnicity [0=nonwhite, 1=white], educational attainment [1=No formal schooling, 2=Elementary education grades 1-8, 3=Secondary education, no high school diploma grades 9-12, 4=Special education certificate of completion/diploma or in attendance, 5=High school graduate or equivalency certificate (regular education students), 6=Postsecondary education, no degree, 7=Associate degree or Vocational/Technical Certificate, 8=Bachelor's degree, 9=Master's degree or higher], marital status [0=not married or not cohabitating, 1=married or cohabitating], benefit counseling [0=no, 1=yes], SSDI [0=no, 1=yes], SSI [0=no, 1=yes], and functional disability [self care functioning, and social and cognitive functioning]).

## **Functional Disability**

The *World Health Organization Disability Assessment Schedule* (WHODAS 2.0) is a 12-item measure that was developed by WHO (Üstün et al., 2010) to assess activity limitations and participation restrictions experienced by an individual irrespective of medical condition (e.g., “How much difficulty have you had in the past 30 days in standing for long periods such as 30 minutes?”; Üstün et al.). Each item is rated on a five-point Likert-type scale, ranging from 1 (*none*) to 5 (*extreme or cannot do*). Functional disability scores are calculated by averaging ratings across the WHODAS items, with the higher score indicating a higher level of disability. Luciano et al. (2010) validated the 12-item version establishing discriminative validity. They compared patients that were on sick leave with those that were working, controlling for the influence of sociodemographic characteristics, health-related quality of life and number of comorbid medical conditions and found significant differences between the two groups. According to the WHODAS manual, the Cronbach’s alpha of the WHODAS2.0 12-item version was computed to be .98 (Ustün et al.). In the present study, the Cronbach’s alpha was computed to be .87.

## **Known Person and Environment (P-E) predictors**

**Disability acceptance.** The *Multidimensional Acceptance of Loss Scale* (MALS) was developed by Ferrin et al. (2011) to assess disability acceptance based on the four value changes identified by Beatrice Wright. The original scale was comprised of 42 items with four factors (i.e., subordinating physique relative to other values, enlarging the scope of values, transforming comparative-status values into asset values, and containing the effects of disability; e.g., “I am a person of value even though I have a disability”). Each item is rated on a five-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In Ferrin et al.’s study, higher

disability acceptance score was associated with higher quality of life scores. The internal consistency reliability coefficient was reported to be .98. The MALS-Brief was developed by RRTC researchers by extracting two most relevant items from each of the value change factors (Chan & Tansey, 2017a). The MALS-Brief was used for the current study and Cronbach's alpha for the current sample was computed to be .90.

**Resilience.** The *Brief Resilience Scale* (BRS) was developed by Smith et al. (2008) to assess the ability to bounce back or recover from stress. It is a 6-item measure (e.g., “I tend to bounce back quickly after hard times”). Each item is rated on a five-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The BRS is scored by reverse coding Items 4, 5 and 6, and scores are calculated by averaging ratings across items, with higher scores indicating a higher level of resilience. Smith et al. reported the BRS was positively correlated with optimism, purpose in life, social support and negatively correlated with pessimism, alexithymia, and negative interactions. Smith et al. also reported Cronbach’s alpha coefficients of .84 for a sample of undergraduates .and .80 for a sample of cardiac rehabilitation patients.. In the present study, the Cronbach’s alpha was computed to be .81.

**Social functioning.** The *Perceived Empathic and Social Self-Efficacy Scale* was developed by Di Giunta et al. (2010) to assess empathy and social functioning. It comprises two factors: (a) perceived empathic self-efficacy (e.g., ‘how well can you read your friends’ needs?’), with 6 items; and (b) perceived social self-efficacy (e.g., ‘how well can you express your opinion to people who are talking about something of interest to you?’), with 5 items. Each item is rated on a five-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores are calculated by averaging ratings across items with higher scores indicating higher levels of empathy and social functioning. Akin and Basören (2015) and Di Giunta et al. reported internal

consistency reliability estimates ranging from .78 to .81 for the empathy subscale and .66 to .76 for the social functioning subscale. In this study, only the *Perceived Social Self-Efficacy* (PSSE) scale was used, and the Cronbach's alpha for the PSSE was computed to be .91.

**Agreeableness.** The *Ten-Item Personality Inventory* (TIPI) was developed by Gosling, Rentfrow and Swann (2003) as a brief measure of the Big-Five personality dimensions of extraversion, agreeableness, conscientiousness, emotional stability (Gosling, 2017; Gosling et al., 2003), and openness to experience, and the agreeableness scale was used here. A person with a high level of agreeableness is usually warm, friendly, and tactful. The TIPI is composed of 10 items total, 2 for each of the five factors. Each participant is asked to rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other. An example for agreeableness is "I see myself as: sympathetic or warm." Each item is rated on a five-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). This study used only two agreeableness items. Scores are calculated by averaging ratings across items with higher scores indicating higher levels of agreeableness. Gosling et al. reported test-retest reliability coefficients for the TIPI; extraversion ( $r=.77$ ), agreeableness ( $r=.71$ ), conscientiousness ( $r=.76$ ), emotional stability ( $r=.70$ ), and openness to experience ( $r=.62$ ). Only the Agreeableness subscale was used in the present study.

**Perceived social support.** The RRTC *Brief Social Support Scale* (BSS) was developed by researchers in the RRTC-EBP VR to assess how participants' perceive support from their family or friends (Tansey & Chan, 2016). The BSS scale is composed of five items (e.g., "My friends/family have helped out with responsibilities at home;" and "My friends/family would help if I needed transportation"). Each item is rated on a five-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores are calculated by averaging ratings

across items, with higher scores indicating greater perceived social support. The BSS was reported to be negatively related to depression ( $r = -.354, p < .001$ ) and positively associated with life satisfaction ( $r = .279, p < .001$ ; Tansey & Chan, 2016). In the present study, Cronbach's alpha for the BSS scores was computed to be .88.

**Perceived social stigma.** The RRTC *Perceived Stigma Scale* (PSS) was developed by researchers in the RRTC-EBP VR to assess *VR consumers' perception of employers' stigma toward people with disabilities*. It is composed of 5 items (e.g., “Employers are uncomfortable hiring individuals with disabilities”). Each item is rated on a five-point Likert-type agreement scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Stigma scores are calculated by averaging ratings across the items, with the higher score indicating a higher level of perceived stigma. In the present study, Cronbach's alpha for the PSS scores was computed to be .94.

#### **SDT/SET Variables**

**Autonomy support.** The *Normative Belief Scale* (NBS) was adapted by researchers in the RRTC-EBP VR to assess the extent to which the climate of clients' environment is perceived to be supportive of their efforts to obtain and retain employment (Chan & Tansey, 2017b). The normative belief scale consists of five items (e.g., “My close friends think that I should try to get a job”) and is rated on a seven-point Likert-type scale ranging from 1 (*Extremely unlikely*) to 7 (*Extremely likely*). Scores are calculated by averaging ratings across the items, with higher scores indicating perceptions of an environment that is more supportive of their efforts toward employment. In the present study, Cronbach's alpha was computed to be .88.

**Autonomy.** The *Behavioral Regulation in Work Questionnaire* (BRWQ) adapted from the *Behavioral Regulation in Exercise Questionnaire-2* (BREQ-2; Markland & Tobin, 2004) was used to assess controlled motivation and autonomous motivation to obtain and retain

employment. It is a 19-item measure with four subscales: (a) amotivation, (b) external regulation, (c) introjection, and (d) autonomous motivation. Fitzgerald et al. reported excellent internal consistency for a people with severe mental illness: amotivation (.82), external regulation (.80), introjection (.73), and autonomous motivation (.89). The *BRWQ-Brief* extracts two items from identified regulation (e.g., “I want to work because I value the social and financial benefits of work”) and intrinsic regulation (e.g., “I want to work because it is fun”) to form a four-item self-determined work motivation scale. Each item is rated on a five-point Likert-type scale, ranging from 1 (*not true*) to 5 (*very true for me*). Scores are calculated by averaging ratings across the items, with higher scores indicating higher levels of autonomous motivation. In the present study, Cronbach's alpha was computed to be .80.

**Working alliance.** The *Working Alliance Inventory-Vocational Rehabilitation* (WAI-VR), which is a modified version of the *Working Alliance Inventory-Short Revised* (WAI-SR), which was developed by Munder, Wilmers, Leonhart, Linster, and Barth (2010). The WAI-S was validated by Tracey and Kokotovic (1989) to assess the goal, bond, and task dimensions of working alliance. The WAI-VR was modified by Chan, McMahon, Shaw and Lee (2004) for use in VR agency settings. The WAI-VR is composed of 12 items assessing three factors (i.e., bond, task, and goal). Each item is rated on a seven-point Likert-type scale, ranging from 1 (*never*) to 7 (*always*). Scores are calculated by averaging ratings across the items with the higher score indicating a higher level of working alliance. Munder et al. reported internal consistency reliability coefficients for bond (.82), task (.85), goal (.81) and total (.90). In the present study, total scores were used, and a Cronbach's alpha of .98 was found for the WAI-VR scores.

**Competency/self-efficacy.** The *LSI-Vocational Competency Scale* (LSI-VCS) was adapted by Umucu et al. (2016) to assess vocational competency of people with mental illness. It

is a 15-item scale with two subscales: (a) job performance self-efficacy (e.g., “I know how to maintain regular work attendance on the job”) with 11 items; and (b) job-seeking self-efficacy (e.g., “I know how to prepare a cover letter and resume”) with four items. Each item is rated on a five-point Likert-type scale, ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). Scores are calculated by averaging ratings across items, with higher scores indicating greater job performance self-efficacy or job-seeking self-efficacy. Umucu et al. found that both factors were correlated with other SDT constructs, including autonomy support, autonomous motivation, relatedness, outcome expectancy, and stages of change for employment in the expected directions. Umucu et al. reported Cronbach’s alpha coefficients as .93 for job performance self-efficacy and .84 for job seeking self-efficacy. Both job performance and job-seeking self-efficacy were used to assess vocational competency in this study, and Cronbach's alpha for present study was computed to be .93 for job performance self-efficacy and .87 for job seeking self-efficacy.

**Outcome expectancy.** The *Vocational Outcome Expectancy Scale* (VOES) was adapted by Iwanaga, Umucu et al. (2017) to assess outcome expectancy related to obtaining and retaining employment. It is an 11-item measure with two subscales: (a) positive outcome expectancy related to work, with 6 items; and (b) negative outcome expectancy related to work, with 5 items. In this study, only the positive outcome expectancy related to work subscale was used. The VOES requires that participants rate their levels of agreement with statements that completed the sentence, “Completing my vocational rehabilitation program will likely allow me to:” One example of an item reflecting a positive outcome expectancy related to work is “have a job with good pay and benefits.” Each item is rated on a five-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), and scores are computed by averaging ratings across



the six items. Iwanaga et al. reported a Cronbach's alpha for the positive outcome expectancy related to work subscale as .79. In the present study, Cronbach's alpha was computed to be .94.

### **Data Analysis**

To facilitate understanding and interpretation of the meaning of scores in terms of participant responses, scores on all measures were computed as the mean item responses for each instrument. The Statistical Package for Social Sciences (SPSS) 24.0 for Mac was used to manage raw data and perform all data analyses. Data were analyzed using data screening procedures, descriptive statistics and simultaneous and hierarchical regression analyses to test the research hypotheses. Descriptive statistics were computed for all independent variables (predictors) and the dependent variable (criterion) to determine measures of central tendency (mean), dispersion (standard deviation), and normality (kurtosis and skewness). Frequencies, percentages, means, and standard deviations were used to summarize demographic characteristics and categorical variables for participants. The Cronbach's alpha was computed for all scales included in the study. In addition, all data were screened for missing information, outlier and multicollinearity.

### **Missing Data**

Missing data represent one of the most pervasive problems in data analysis (Cohen, Cohen, West, & Aiken, 2003; Tabachnick & Fidell, 2007). Cohen et al. (2003) reported that researchers should consider several factors when they deal with missing data: (a) the amount of missing data, (b) sample size, (c) reasons of missing data, and (d) number of researchers who will use the dataset. According to Cohen et al. (2003), there is no one rule of thumb that will provide the best answer as to what missing data approach (e.g., dropping variables, dropping participants, simple imputation, and multiple imputation) a researcher should use when analyzing data. Therefore, the best scientific solution is to reduce the missing data to a minimum. In this

Table 3.2  
*Summaries of Study Measures, along with Means, Standard Deviations, and Cronbach's Alpha Reliability Estimates for the Sample in the Present Study (N = 254)*

	<b>Scale</b>	<b>Number of items</b>	<b>Ratings scale</b>	<b>Mean (SD)</b>	<b>Cronbach's alpha</b>
<b>DV</b>					
VR engagement	<i>The Vocational Rehabilitation Engagement Scale</i>	9	1-5	4.11 (.74)	.95
<b>Demographic Covariate</b>					
Functional disability	<i>The World Health Organization Disability Assessment Schedule (WHODAS 2.0) 12-item version</i>	12	1-5	2.05 (.77)	.87
<b>Known P-E Predictors</b>					
Disability acceptance	<i>The Multidimensional acceptance of loss scale-8items version</i>	8	1-5	3.90 (.83)	.90
Resilience	<i>The Brief Resilience Scale</i>	6	1-5	3.15 (.86)	.81
Social functioning	<i>The Perceived Empathic and Social Self-Efficacy Scale</i>	5	1-5	3.69 (1.12)	.91
Agreeableness	<i>Ten-item personality inventory</i>	2	1-5	3.70 (.77)	--*
Perceived social support	<i>The RRTC Brief Social Support Scale</i>	5	1-5	3.75 (.95)	.88
Perceived social stigma	<i>The Perceived Barriers and Stigma Scale</i>	5	1-5	3.55 (.97)	.94
<b>SDT/SCT Variables</b>					
Autonomy support	<i>The Normative beliefs scale</i>	5	1-7	5.32 (1.43)	.88

Autonomy	The <i>Behavioral Regulation in Exercise Questionnaire-2</i>	4	1-5	3.94 (.79)	.80
Working alliance	The <i>Working Alliance Inventory-Vocational Rehabilitation (WAI-VR)</i> , a modified version of the <i>Working Alliance Inventory – Short Revised</i>	10	1-7	5.24 (1.66)	.98
Job performance competency	The <i>LSI-Vocational Competency Scale</i>	11	0-4	2.93 (.76)	.93
Job seeking competency	The <i>LSI-Vocational Competency Scale</i>	4	0-4	2.70 (.91)	.87
Outcome expectancy	The <i>Vocational Outcome Expectancy Scale</i>	6	1-5	4.04 (.81)	.94

*Note.* \*According to the author of the instrument, it is not appropriate to compute Cronbach's alpha for the five two-item subscales that are used to define the big-five personality.

study, missing values for the participants were estimated with a simple imputation method using regression to handle missing data at the item level for measures with missing values. Using this method to replace missing data is preferred over case deletion, since it will not decrease the sample size (i.e., statistical power loss) or affect the sample representativeness. Using the no more than 15% missing values rule for the entire battery, 23 (8%) participants were eliminated from the study.

### **Outliers**

An outlier is a case with an extreme value that does not fit with the rest of the data (Cohen et al., 2003; Tabachnick & Fidell, 2007). Outliers should not be ignored as they can have a profound impact on the estimates of regression coefficients and standard errors, as well as on the estimate of the overall prediction (Cohen et al.; Tabachnick & Fidell). In this study, Cook's distance (*Cook's D*) was used to identify outliers in the data set. Participants with Cook's distance greater than the cut-off value ( $4/(n-k-1)$ ; Chatterjee & Hadi, 1986, 2009) was regarded as outliers and deleted from analysis. Specifically, five participants with Cook's distance greater than 0.016, were deleted from the RQ1 analysis; six participants with Cook's distance greater than 0.016 were deleted from the RQ2 analysis; 11 participants with Cook's distance greater than 0.016 were deleted from the RQ3 analysis; and 7 participants with Cook's distance greater than 0.017 were deleted from the RQ4 analysis.

### **Categorical Variables**

Categorical variables (e.g., gender, race/ethnicity, benefit counseling, SSDI, SSI) were dummy coded. Cohen et al. (2003) indicated that researchers should decide which group is the focal group based on reasonable criteria: (a) the focal group should serve as a useful comparison, (b) the focal group should be well-defined, and (c) the focal group should have sufficient sample

size proportion to the other groups. In present study, categorical variables (i.e., gender [male = 1], race/ethnicity [white = 1], marital status [married or cohabitating = 1], benefit counseling [receiving benefit counseling = 1], SSI [receiving SSI = 1] and SSDI [receiving SSDI = 1]) were dummy coded, with 1 represented the focal group and 0 represented the reference group.

### **Simultaneous Regression Analysis**

Simultaneous regression analysis (SRA) was used to find the variance in the dependent variable (i.e., VR engagement) that may be accounted for by the predictors as a set, and the unique association of each of the predictors with the criterion variable when all the other predictors in the regression analysis are statistically controlled (Hoyt, Imel, & Chan, 2008; Hoyt, Leierer, & Millington, 2006). In this study, three sets of predictors (i.e., demographic covariates set, known P-E predictors set, and SDT/SET variables set) were utilized to predict the dependent variable (i.e., VR engagement).

### **Hierarchical Regression Analysis**

Hierarchical regression analysis (HRA) was used to measure the incremental variance accounted for by each predictor set. HRA was used to determine the correlation of each predictor set and to determine the unique contribution and predictive ability of each predictor variable to the variance of the dependent variable (i.e., VR engagement). The change in  $R^2$  ( $\Delta R^2$ ) was examined as a measure of each predictor set's contribution over and above the variance explained by prior sets of predictors. Four blocks were entered: (a) demographic covariates (i.e., age, gender, race/ethnicity, education level, marital status, benefit counseling, SSDI, SSI, functional disability); (b) known P-E predictors (i.e., disability acceptance, resilience, social functioning, agreeableness, perceived social support, and perceived stigma), and (c) SDT/SET variables (i.e., autonomy support, autonomy, working alliance, job performance competency, job

seeking competency, and outcome efficacy). This order of blocks was used to facilitate more accurate understanding of the effect on VR engagement when controlling for the other predictor sets. Significance tests for the regression coefficients for each predictor variable were assessed at each block and at the final model to assess unique relationships to the dependent variable (i.e., VR engagement).

### **Statistical Assumptions**

Major assumptions for multiple regression analysis include: (a) linearity in the variables, (b) correct specification of the independent variables, (c) measurement error, (d) independence of errors, (e) homoscedasticity, (f) normality, and (g) multicollinearity (Cohen et al., 2003). First, the relationship between the independent variables and the outcome variable must be *linear*. Violations can lead to an inaccurate representation of population estimates. Scatterplots must be visually inspected for the presence of a linear relationship. Second, *correct specification of the independent variables* assumption is related to the first assumption but specifically focuses on the IVs in the regression model (Cohen et al.). After presuming that the theory we are testing is correct, then correct specification implies that all variables identified by the theory are included in the model, that they are measured properly, and that the form of the relationship between each IV and DV has been properly specified. If all conditions are met, then each of the IVs and residuals will be independent in the population and the estimates of regression coefficients will be unbiased. A series of scatterplots must be visually inspected for this issue. Third, each IV in the regression equation is assumed to be *measured without error*. Measurement error can be detected with a measure of reliability. Fourth, *error terms must be independent* of one another. In other words, multiple regression assumes the residuals are independent. Fifth, the assumption of *homoscedasticity* specifies that standard deviations must be consistent throughout the values.

However, multiple regression analysis is robust to violations of homoscedasticity. In addition, multicollinearity assumes that no strong correlation exists between variables within the predictor sets. Violations of this assumption lead to difficulty in determining the unique statistical contribution of each variable to the criterion variable. Finally, each variable data plot is normally distributed. To test for violations, scatterplots will be inspected, as well as formal tests of skewness and kurtosis.

Violation of any of these assumptions may potentially lead to one of two problems (Cohen et al., 2003). First, the estimate of the regression coefficients may be biased due to violation of an assumption. In this case, the estimates the regression coefficients,  $R^2$ , significance tests, and confidence intervals may be incorrect. Second, only the estimate of the standard error of the regression coefficients may be biased, which the estimated value of the regression coefficients is correct, but hypothesis tests and confidence intervals may be incorrect.

## **CHAPTER FOUR**

### **RESULTS**

The purpose of this study was to examine the contribution of SDT/SET variables above and beyond the contribution of demographic covariates and known P-E predictors in predicting VR engagement. Specifically, the dependent variable in this study was VR engagement. Demographic covariates included age, gender, race/ethnicity, marital status, educational attainment, functional disability, Supplemental Security Income (SSI), Social Security Disability Insurance (SSDI), and benefits counseling. Known person-environment predictors included resilience, disability acceptance, social functioning, Big-Five personality—agreeableness, perceived social support, and perceived social stigma. The SDT/SET variables included autonomy support, autonomy, working alliance, job performance competency, job seeking competency, and outcome expectancy.

#### **Data Screening**

Data for all predictor and criterion variables were screened for accuracy, data entry, multivariate outliers, and normality using SPSS 24.0. Multicollinearity was assessed using the variance inflation factors (VIFs) and tolerance. No VIF values exceeded 10, with values ranging from 1.03 to 2.66. None of the tolerance values was less than .10, ranging from .38 to .97. These findings indicate no evidence for multicollinearity within the dataset and that deleting or adding variables would not result in a large change in the coefficients. Outliers were assessed with Cook's distance cut-off values. In SRA, a total of 5, 6, and 11 outliers were found and were deleted from the dataset for the demographic covariates set, the known P-E predictors set, and the SDT/SET variables set, respectively. In addition, in HRA, 7 outliers were found and were deleted.



Histograms, scatter plots of residuals, skewness, and kurtosis statistics were examined to test assumptions of normality and linearity. The results indicated that the assumptions for simultaneous regression analysis were met.

### **Means, Standard Deviations, and Intercorrelations for Variables in Primary Analyses**

Mean values, standard deviations, intercorrelations for VR engagement and the measures in each of the sets of predictors: the demographic covariates, known P-E predictors, and SDT/SET variables are presented in Table 4.1. The mean for the VR engagement dependent variable was 4.11 (from 1-5 points) for the sample as a whole, about midway between 4 = *agree* and 5 = *strongly agree* with the nine statements indicative of relatively high engagement in VR services, and the standard deviation of .74 suggests that about two-thirds of the sample was between 3 = *unsure* and 5 = *strongly agree* with those statements.

#### **Demographic covariates**

Consistent with the data provided in Table 3.1, the 1-0 values in Table 4.2 indicate that the sample was approximately 37% male, 43% Caucasian, 22% married or cohabitating, 43% receiving benefit counseling, 18% receiving SSDI benefits and 11% receiving SSI benefits. The mean of 5.87 for educational attainment was between 5 = *High school graduate or equivalency certificate (regular education students)* and 6 = *Postsecondary education, no degree*. Finally, the mean of 2.05 for functional disability was between 2 = *mild* and 3 = *moderate*. As indicated in the intercorrelation matrix in Table 4.2, VR engagement was positively associated with age, race and benefits counseling ( $r = .19, p < .01$ ,  $r = .11, p < .05$ , and  $r = .19, p < .01$ , respectively).

#### **Known P-E Predictors**

Means and standard deviations and the intercorrelations for the known P-E predictors and VR engagement are presented in the Table 4.2. The mean value of 3.90 for disability acceptance

Table 4.1  
*Descriptive Statistics for Predictor, Criterion, and Moderator Variables (N = 254)*

<b>Variables</b>	<b><i>M</i></b>	<b><i>SD</i></b>	<b>Range</b>	<b>Skewness</b>	<b>Kurtosis</b>
<b>DV</b>					
Engagement	4.11	0.74	1-5	-0.80	0.82
<b>Demographic Covariates</b>					
Age	37.29	12.65	16-70	0.14	-0.95
Education	5.87	1.69	1-9	-0.35	-0.25
Functional disability	2.05	0.77	1-4.5	0.66	-0.08
<b>Known P-E Predictors</b>					
Disability acceptance	3.90	0.83	1-5	-0.82	0.66
Resilience	3.15	0.86	1-5	-0.26	0.07
Social functioning	3.69	1.12	1-5	-0.80	-0.27
Agreeableness	3.70	0.77	2-5	-0.03	-0.75
Perceived social support	3.74	0.95	1-5	-0.86	0.39
Perceived social stigma	3.55	0.97	1-5	-0.47	-0.09
<b>SDT/SCT Variables</b>					
Autonomy support	5.32	1.43	1-7	-0.88	0.55
Autonomy	3.94	0.79	1-5	-0.77	1.02
Working Alliance	5.24	1.66	1-7	-1.10	0.62
Job Performance competency	2.93	0.76	0-4	-1.09	2.39
Job Seeking competency	2.70	0.91	0-4	-0.61	0.44
Outcome Expectancy	4.04	0.81	1-5	-1.04	2.03

Table 4.2

*Correlations, Means, and Standard Deviations for Variables Used in the Hierarchical Regression Analyses (N=247)*

	1	2	3	4	5	6	7	8	9	10	11
1. VR Engagement											
2. Age	0.19**										
3. Gender(Men)	0.07	0.10									
4. Race(White)	0.11*	0.09	0.06								
5. Education	0.08	0.21**	-0.05	0.27***							
6. Married	0.05	0.18**	0.06	0.03	0.09						
7. Functional disability	-0.02	0.15**	-0.06	0.05	0.03	0.06					
8. Benefits counseling	0.19**	0.12*	-0.06	0.22***	0.17**	0.08	0.18**				
9. SSDI	0.03	0.16**	-0.01	0.02	-0.03	-0.02	0.16**	0.06			
10. SSI	-0.04	-0.11*	0.03	-0.13*	-0.04	-0.12*	0.03	-0.08	-0.06		
11. Acceptance	0.22***	0.02	-0.11*	-0.09	0.16**	0.06	-0.28***	-0.03	0.03	0.11	
12. Resilience	0.10	0.06	-0.05	-0.06	0.11*	0.07	-0.40***	-0.02	0.03	0.04	0.48***
13. Social functioning	0.27***	0.01	-0.09	-0.10	0.15**	0.08	-0.20***	0.05	0.04	0.08	0.47***
14. Agreeableness	0.26***	0.09	-0.05	0.08	0.16**	-0.05	-0.26***	0.14**	0.10	0.02	0.38***
15. Perceived social support	0.14*	-0.15**	-0.07	-0.05	0.06	0.09	-0.18**	0.02	-0.03	0.05	0.40***
16. Perceived social stigma	0.10	0.06	0.00	0.00	0.15**	0.04	0.19***	0.07	-0.03	-0.03	0.02
17. Autonomy support	0.39***	-0.02	0.02	0.12*	0.08	-0.07	-0.13*	0.15*	-0.06	-0.04	0.09
18. Autonomy	0.42***	0.05	0.03	-0.04	0.07	0.03	-0.25***	0.05	-0.01	0.09	0.44***
19. Working Alliance	0.68***	0.12*	-0.03	0.04	0.04	-0.02	0.05	0.25***	-0.01	-0.02	0.11*
20. Job Performance competency	0.46***	0.11*	0.06	0.01	0.17**	0.05	-0.32***	0.09	-0.05	0.03	0.48***
21. Job Seeking competency	0.30***	0.13*	-0.01	0.04	0.26***	0.04	-0.29***	0.11*	-0.11*	-0.07	0.38***
22. Outcome Expectancy	0.40***	-0.05	0.07	-0.13*	-0.06	-0.05	-0.18**	-0.09	-0.11*	0.09	0.30***
<i>Mean (N=254)</i>	4.11	37.29	0.37	0.43	5.87	0.22	2.05	0.43	0.18	0.11	3.90
<i>SD (N=254)</i>	0.74	12.65	0.48	0.50	1.69	0.42	0.77	0.50	0.38	0.31	0.83

Table 4.2 (continued)

*Correlations, Means, and Standard Deviations for Variables Used in the Hierarchical Regression Analyses (Continued)*

	12	13	14	15	16	17	18	19	20	21	22
1. VR Engagement											
2. Age											
3. Gender(Men)											
4. Race(White)											
5. Education											
6. Married											
7. Functional disability											
8. Benefits counseling											
9. SSDI											
10. SSI											
11. Acceptance											
12. Resilience											
13. Social functioning	0.44***										
14. Agreeableness	0.37***	0.39***									
15. Perceived social support	0.27***	0.26***	0.24***								
16. Perceived social stigma	-0.15**	0.07	0.00	0.02							
17. Autonomy support	-0.01	0.24***	0.13*	0.26***	0.10						
18. Autonomy	0.34***	0.48***	0.37***	0.27***	0.03	0.35***					
19. Working Alliance	0.04	0.18**	0.20***	0.14*	0.05	0.30***	0.29***				
20. Job Performance competency	0.41***	0.45***	0.37***	0.29***	0.15**	0.37***	0.62***	0.26***			
21. Job Seeking competency	0.37***	0.55***	0.26***	0.20***	0.15**	0.23***	0.45***	0.18**	0.69***		
22. Outcome Expectancy	0.23***	0.29***	0.23***	0.23***	0.04	0.20***	0.48***	0.37***	0.45***	0.38***	
<i>Mean (N=254)</i>	3.15	3.69	3.70	3.74	3.55	5.32	3.94	5.24	2.93	2.70	4.04
<i>SD (N=254)</i>	0.86	1.12	0.77	0.95	0.97	1.43	0.79	1.66	0.76	0.91	0.81

measure was between 3 = *unsure* and 4 = *agree* on the items indicating relative acceptance of their own disability; the mean value of 3.15 for the resilience measure was between at 3 = *unsure* and 4 = *agree* indicating middle to higher resilience; the mean value of 3.69 for social functioning measure (from 1= *not well at all* to 5= *very well*) indicates a relatively positive social functioning level; the mean value of 3.70 for the agreeableness measure was between at 3 = *unsure* and 4 = *agree* indicating that participants on average relatively agree they are warm, friendly, and tactful; the mean value of 3.74 for the perceived social support measure was between at 3 = *unsure* and 4 = *agree* indicating that participants perceived relatively high social support; the mean value of 3.55 for perceived social stigma was between at 3 = *unsure* and 4 = *agree* indicating a relatively positive social functioning level. As indicated in the intercorrelation matrix in Table 4.2, VR engagement was positively correlated with disability acceptance ( $r = .22$ ,  $p < .001$ ), social functioning ( $r = .27$ ,  $p < .001$ ), agreeableness ( $r = .26$ ,  $p < .001$ ), and perceived social support ( $r = .14$ ,  $p < .05$ ).

### **SDT/SET variables**

Means and standard deviations and intercorrelations for the SDT/SET variables and VR engagement are presented in Table 4.2. The mean value of 5.32 for autonomy support measure (from 4= *neither unlikely or likely* to 7= *extremely likely*) indicates that participants more likely perceived that their environments were supportive of their efforts to obtain and retain employment. The mean value of 3.94 for autonomy was between 3 = *unsure* and 4 = *agree* on the items indicating relatively high autonomous motivation to work. The mean value of 5.24 for working alliance was between 5 = *often* and 6 = *very often* on the items indicating relatively strong working alliance with VR counselors. The mean value of 2.93 for job performance competency measure was between at 2 = *unsure* and 3 = *agree* indicating relatively high job

performance self-efficacy. The mean value of 2.70 for the job seeking competency measure was also between at 2 = *unsure* and 3 = *agree* indicating relative high job seeking self-efficacy. The mean value of 4.04 for the outcome expectancy measure was between 4 = *agree* and 5 = *strongly agree* indicating that participants have relatively high positive outcome expectancy for work. As indicated in the intercorrelation matrix in Table 4.2, VR engagement was positively correlated with autonomy support ( $r = .39, p < .001$ ), autonomy ( $r = .42, p < .001$ ), working alliance ( $r = .68, p < .001$ ), job performance competency ( $r = .46, p < .001$ ), job seeking competency ( $r = .30, p < .001$ ), and outcome expectancy ( $r = .40, p < .001$ ).

### **Primary Analyses Addressing Research Questions**

#### **Research Question# 1**

*What is the relationship between demographic covariates and VR engagement?* It is hypothesized that several demographic variables will influence the likelihood that an individual engages in higher levels of VR activities.

A simultaneous regression analysis was conducted with the demographic covariates (i.e. age, gender, race/ethnicity, marital status, educational attainment, functional disability, SSI, SSDI, and benefits counseling) with VR engagement as the dependent variable. The correlation matrix is presented in Table 4.3 and the regression results are summarized in Table 4.4. As can be observed in Table 4.4, this set of demographic covariates accounted for 8% of the variance in VR engagement,  $R = .28, R^2 = .08, F(9, 239) = 2.28, p < .05$ , 95% confidence interval (CI) (.018, .142). Upon examining the standardized partial regression coefficients, age and benefit counseling were found to significantly contribute to explaining the variance in VR engagement scores after controlling for the effect of other predictor variables in the model, with age,  $\beta = .17, t(247) = 2.61, p < .05$ ; and benefit counseling,  $\beta = .17, t(247) = 2.58, p < .01$ . Specifically, older

Table 4.3  
Correlations for Variables Used in the RQ1 Simultaneous Regression Analyses (N=249)

	1	2	3	4	5	6	7	8	9	10
1. VR Engagement										
2. Age	.19**									
3. Gender(Men)	.06	.10								
4. Race(White)	.09	.09	.04							
5. Education	.06	.21***	-.06	.26***						
6. Married	.05	.19***	.07	.02	.10					
7. Functional disability	-.06	.17**	-.05	.05	.03	.07				
8. Benefits counseling	.18**	.14*	-.06	.22***	.17**	.08	.16**			
9. SSDI	.06	.17**	-.00	.04	-.01	-.04	.16**	.06		
10. SSI	-.04	-.14*	.01	-.14*	-.06	-.11*	.04	-.06	-.06	

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

Table 4.4  
Demographic Covariates Predictors of VR engagement (N=249)

Variable	$R^2$	$B$	$SE B$	$\beta$	$p$	$CI$
Demographic Covariates	.08*					[.02 - .14]
Age		.01	.00	.17**	.01	[.00 - .02]
Gender (Men)		.06	.10	.04	.51	[-.13 - .25]
Race (White)		.07	.10	.05	.48	[-.12 - .26]
Education		-.00	.03	-.01	.89	[-.06 - .05]
Married		.02	.12	.01	.87	[-.21 - .24]
Functional disability		-.12	.06	-.12	.07	[-.24 - .01]
Benefits counseling		.25	.10	.17**	.01	[.06 - .44]
SSDI		.07	.12	.04	.59	[-.17 - .31]
SSI		.02	.15	.01	.90	[-.28 - .32]

\* $p < .05$ ; \*\* $p < .01$

participants reported higher VR engagement levels than younger participants, and participants who received benefit counseling also reported higher levels of VR engagement. In contrast, there is no difference in VR engagement based on gender, race, educational attainment, marital status, functional disability, SSDI and SSI status (Table 4.4).

### **Research Question# 2**

*What is the relationship between person (disability acceptance, resilience, social functioning, and agreeableness) and environment (perceived social support and perceived social stigma) predictors and VR engagement? It is hypothesized that various person-environment predictors will influence the likelihood that an individual engages in higher levels of VR activities.*

A simultaneous regression analysis was conducted with several known P-E predictors (resilience, disability acceptance, social functioning, agreeableness, perceived social support, and perceived social stigma) with VR engagement as the dependent variable. The correlation matrix is presented in Table 4.5 and the regression results are summarized in Table 4.6. As may be seen in the table, this set of known P-E predictors accounted for 11% of the variance in VR engagement,  $R = .33$ ,  $R^2 = .11$ ,  $F(6, 241) = 4.95$ ,  $p < .001$ , 95% CI (.039, .181). Upon examining the standardized partial regression coefficients, only social functioning was found to significantly contribute to explaining the variance in VR engagement scores after controlling for the effects of other predictor variables in the model, with social functioning,  $\beta = .23$ ,  $t(246) = 3.03$ ,  $p < .001$ . Although all of these predictors had a significant bivariate association with engagement (medium to high), only social functioning showed unique predictive power when the variables were entered as a set. Participants with higher levels of social functioning were more engaged in VR services than other participants.



Table 4.5  
Correlations for Variables Used in the RQ2 Simultaneous Regression Analyses (N=248)

	1	2	3	4	5	6	7
1. VR Engagement							
2. Disability acceptance	.21***						
3. Resilience	.12*	.50***					
4. Social functioning	.29***	.49***	.45***				
5. Agreeableness	.22***	.38***	.41***	.40***			
6. Perceived social support	.13*	.41***	.28***	.25***	.26***		
7. Perceived social stigma	.09	.04	-.13*	.10	-.00	.04	

\* $p < .05$ ; \*\*\* $p < .001$

Table 4.6  
Known P-E Predictors Predictors of VR engagement (N=248)

Variable	$R^2$	$B$	$SE B$	$\beta$	$p$	$CI$
<i>Known P-E Predictors</i>	.11***					[.04 - .18]
Disability acceptance		.06	.07	.07	.37	[-.08 - .20]
Resilience		-.06	.07	-.07	.34	[-.20 - .07]
Social functioning		.15	.05	.23**	.00	[.05 - .25]
Agreeableness		.13	.07	.13	.07	[-.01 - .26]
Perceived social support		.02	.05	.03	.69	[-.08 - .13]
Perceived social stigma		.04	.05	.06	.36	[-.05 - .14]

\*\* $p < .01$

### Research Question# 3

*What is the relationship between SDT/SET variables (autonomy support, autonomy, self-efficacy, working alliance, and outcome expectancy) and VR engagement?* It is hypothesized that various SDT/SET variables will influence the likelihood that an individual engages in higher levels of VR service activities.

A simultaneous regression analysis was conducted with the SDT/SET variables (autonomy support, autonomy, working alliance, job performance competency, job seeking competency, and outcome expectancy) with VR engagement as the dependent variable. The correlation matrix is presented in Table 4.7 and the regression results are summarized in Table 4.8. As may be seen in the table, this set of SDT/SET variables accounted for 51% of the variance in VR engagement,  $R = .71$ ,  $R^2 = .51$ ,  $F(6, 236) = 40.74$ ,  $p < .001$ , the 95% CI (.424, .595). Upon examining the standardized partial regression coefficients, working alliance, job performance competency and outcome expectancy were found to significantly contribute to explaining variance in VR engagement, with working alliance,  $\beta = .53$ ,  $t(241) = 10.44$ ,  $p < .001$ ; and job performance competency,  $\beta = .18$ ,  $t(241) = 2.35$ ,  $p < .01$  contributing to higher VR engagement scores. Although all of these predictors had a significant bivariate association with engagement (medium or high), only working alliance and job performance self-efficacy demonstrated unique predictive power when the variables were entered as a set. It is interesting to note that perceived self-efficacy in job performance uniquely predicts engagement, whereas perceived self-efficacy in job seeking is not uniquely predictive. This is because the two self-efficacy measures (job performance and job seeking) are highly correlated, so it is not surprising that the partial coefficients for these predictors (Table 4.8) are substantially smaller than their bivariate correlations with engagement (Table 4.7).

Table 4.7  
Correlations for Variables Used in the RQ3 Simultaneous Regression Analyses (N=243)

	1	2	3	4	5	6	7
1. VR Engagement							
2. Autonomy support	.34***						
3. Autonomy	.42***	.41***					
4. Working Alliance	.65***	.26***	.31***				
5. Job Performance competency	.42***	.41***	.65***	.26***			
6. Job Seeking competency	.28***	.25***	.43***	.19***	.71***		
7. Outcome Expectancy	.40***	.16**	.44***	.38***	.41***	.33***	

\*\*\* $p < .001$

Table 4.8  
SDT/SET variables Predictors of VR engagement (N=243)

Variable	$R^2$	$B$	$SE B$	$\beta$	$p$	$CI$
SDT/SET variables	.51***					[.42 - .60]
Autonomy support		.05	.03	.09	.08	[-.01 - .10]
Autonomy		.06	.06	.06	.33	[-.06 - .17]
Working alliance		.24	.02	.53***	.00	[.19 - .28]
Job performance competency		.18	.08	.18**	.02	[.03 - .33]
Job seeking competency		-.02	.05	-.03	.65	[-.12 - .08]
Outcome expectancy		.08	.05	.09	.09	[-.01 - .18]

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

#### Research Question# 4

*What is the contribution of SDT/SET variables to the prediction of VR engagement beyond the variance already explained by the demographic covariates and the known P-E predictors?* It is hypothesized that SDT/SET variables will explain individuals with CID's levels of engagement in VR activities beyond the explanation provided by demographic covariates and known P-E predictors commonly used in rehabilitation counseling research. A HRA was conducted with VR engagement as the dependent variable and three sets of predictors were entered in sequential steps: (a) step 1—demographic covariates (i.e. age, gender, race/ethnicity, marital status, educational attainment, functional disability, SSI, SSDI, and benefits counseling); (b) step 2—known P-E predictors (resilience, disability acceptance, social functioning, agreeableness, perceived social support, and perceived social stigma); and (c) step 3—SDT/SET variables (autonomy support, autonomy, working alliance, job performance competency, job seeking competency, and outcome expectancy). Hierarchical regression analysis was used to quantify the variance accounted for by each of the sets of the predictor variables entered sequentially for the sample of VR consumers. The results of the HRA, including values of change in  $R^2$  ( $\Delta R^2$ ), along with unstandardized regression coefficients ( $B$ ), standard errors of unstandardized regression coefficients ( $SE B$ ), and standardized regression coefficients ( $\beta$ ) for the predictor variables at each step and in the final model are presented in Table 4.9.

In the first step of the HRA, demographic covariates (i.e. age, gender, race/ethnicity, marital status, educational attainment, functional disability, SSI, SSDI, and benefits counseling) were entered. This set of variables accounted for a small amount of variance in VR engagement scores,  $R = .27$ ,  $R^2 = .08$ ,  $\Delta F(9, 237) = 2.15$ ,  $p < .05$ , the 95% CI (.518, .662). Upon examining the standardized partial regression coefficients, age,  $\beta = .17$ ,  $t(245) = 2.46$ ,  $p < .05$ ; and benefit

counseling,  $\beta = .17$ ,  $t(245) = 2.63$ ,  $p < .01$ , were found to significantly contribute to the change in variance in VR engagement scores. This result indicates that older age and receiving benefit counseling were positively associated with VR engagement.

In the second step, six known P-E predictors (resilience, disability acceptance, social functioning, agreeableness, perceived social support, and perceived social stigma) were entered. The addition of known P-E predictors accounted for a significant increase in variance of VR engagement scores beyond that explained by demographic covariates,  $R = .44$ ,  $R^2 = .19$ ,  $\Delta R^2 = .12$ ,  $\Delta F(6, 231) = 5.47$ ,  $p < .001$ . Upon examining the standardized partial regression coefficients, social functioning was found to significantly contribute to the change in variance in VR engagement scores,  $\beta = .21$ ,  $t(245) = 2.89$ ,  $p < .001$ . This result indicates that social functioning level was positively associated with VR engagement after controlling for the effect of step 1 variables and the rest of the P-E predictors. In addition, Age ( $\beta = .16$ ,  $t(245) = 2.52$ ,  $p = .012$ ) and benefit counseling ( $\beta = .14$ ,  $t(245) = 2.13$ ,  $p = .035$ ) are also significant after controlling for the effect of demographic variables in Step 1 and the rest of the P-E variables in Step 2.

In the third step, SDT/SET variables (autonomy support, autonomy, working alliance, job performance competency, job seeking competency, and outcome expectancy) were entered. The addition of SDT/SET variables accounted for a significant increase in variance of VR engagement scores beyond that explained by the covariates entered in the first and second steps,  $R = .77$ ,  $R^2 = .59$ ,  $\Delta R^2 = .553$ ,  $\Delta F(6, 225) = 36.721$ ,  $p < .001$ . At this step, autonomy support ( $\beta = .13$ ,  $t(245) = 2.43$ ,  $p < .05$ ), working alliance ( $\beta = .52$ ,  $t(245) = 10.26$ ,  $p < .001$ ), and job performance competency ( $\beta = .22$ ,  $t(245) = 2.97$ ,  $p < .001$ ), were found to significantly contribute to the change in variance in VR engagement. This result indicates that increased

autonomy support, working alliance, and job performance competency were associated with higher VR engagement after controlling for the effect of demographic variables in step 1 and P-E variables in step 2 as well as the rest of the SDT/SET variables in step 3.

The final regression model accounted for 59% of the variance in VR engagement, considered a large effect size according to Cohen's standards for the behavioral sciences research (Cohen, 1988; 1992). Controlling for all other factors, autonomy support,  $\beta = .13$ ,  $t(245) = 2.43$ ,  $p < .05$ ; working alliance,  $\beta = .52$ ,  $t(245) = 10.26$ ,  $p < .001$ ; and job performance competency,  $\beta = .22$ ,  $t(245) = 2.97$ ,  $p < .001$ , were found to be significant predictors of VR engagement for the sample of VR consumers. Autonomy support, working alliance and job performance competency were positively associated with VR engagement. Although the association between age, benefit counseling, social functioning and VR engagement were significant at the entry model, the effect of these variables dissipated in the presence of SDT/SET variables. This means the SDT/SET variables significantly explained levels of VR engagement beyond the effects of demographic covariates and known P-E predictors. Controlling for all other factors in the model, working alliance was the strongest predictor of VR engagement.

### **Post-hoc Power Analysis**

A *post hoc* power analysis was conducted using the G\*POWER software (Faul, Erdfelder, Buchner, & Lang, 2009) for a hierarchical regression analysis with 22 predictor variables, power at .80, and an alpha level of .05. The 22 predictors include VR engagement, demographic covariates (i.e., age, gender, race/ethnicity, education level, marital status, benefit counseling, SSDI, SSI, functional disability); known P-E predictors (i.e., disability acceptance, resilience, social functioning, agreeableness, perceived social support, perceived stigma); and SDT/SET variables (i.e., autonomy support, autonomy, working alliance, job performance competency, job

Table 4.9  
*Hierarchical Regression Analysis for Prediction of VR engagement (N=247)*

Variable	$R^2$	$\Delta R^2$	At entry into model			Final model		
			$B$	$SE B$	$\beta$	$B$	$SE B$	$\beta$
Step 1	.08	.08*						
Age			.01	.00	.17*	.00	.00	.08
Gender (Men)			.08	.10	.05	.07	.07	.05
Race (White)			.08	.10	.05	.12	.07	.08
Education			.00	.03	.01	-.01	.02	-.03
Married			.01	.11	.01	.08	.08	.04
Functional disability			-.07	.06	-.07	.04	.05	.04
Benefits counseling			.25	.10	.17**	.00	.07	.00
SSDI			.01	.12	.01	.06	.09	.03
SSI			-.01	.15	.00	-.09	.10	-.04
Step 2	.19	.12***						
Disability acceptance			.11	.07	.13	.05	.05	.06
Resilience			-.07	.06	-.08	-.04	.05	-.05
Social functioning			.14	.05	.21**	.03	.04	.05
Agreeableness			.12	.07	.13	.02	.05	.02
Perceived social support			.05	.05	.07	-.04	.04	-.06
Perceived social stigma			.04	.05	.06	.01	.04	.01
Step 3	.59	.40***						
Autonomy support			.07	.03	.13*	.07	.03	.13*
Autonomy			.05	.06	.05	.05	.06	.05

Working alliance	.23	.02	.52***	.23	.02	.52***
Job performance competency	.21	.07	.22***	.21	.07	.22***
Job seeking competency	-.05	.06	-.06	-.05	.06	-.06
Outcome expectancy	.09	.05	.10	.09	.05	.10

Note:  $F(21, 225) = 15.47, p < .001$  for the full model;  $\Delta F(9, 237) = 2.15, p < .05$ , for Step 1;  $\Delta F(6, 231) = 5.47, p < .001$  for Step 2;  $\Delta F(6, 225) = 36.72, p < .001$  for Step 3.  
 \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$



seeking competency, and outcome expectancy). Cohen's  $f^2$  for hierarchical regression for final model was computed by following formula.

Model 1:  $Y \sim$  demographic covariates + known P-E predictors

Model 2:  $Y \sim$  demographic covariates + known P-E predictors + SDT/SET variables

$$f^2 = R^2 / (1 - R^2)$$

The power analysis yielded a sample size of 42 for a large effect size ( $f^2 = 1.05$ ; Cohen, 1988). This sample size was adequate for testing a regression model where the constructs were at least moderately correlated and the reliability of measures was adequate.

### **Mediation Analysis**

As a secondary analysis, I examined two independent variables that are under the control of rehabilitation counselors. For example, training can be provided to help counselors develop counseling skills to improve working alliance with their clients (e.g., motivational interviewing training). Counselors can also provide vocational training or college training services for their clients to improve their job performance competency as well as job-seeking competency. A serial multiple mediation (SMM) analysis was conducted to evaluate vocational competency (job seeking and job performance self-efficacy) and outcome expectancy as mediators in the relationship between working alliance and VR engagement. The SPSS PROCESS macro (Hayes, 2016) was used to estimate the total, direct, and indirect effects. The estimates of the indirect effects were for working alliance on VR engagement through vocational competency, through vocational outcome expectancy, and through both vocational competency and outcome expectancy. The following are key terms for the path coefficients used to describe the direct, indirect, and total effects:

Direct effect of working alliance:  $c'$

Specific indirect effect of working alliance through vocational competency:  $a_1b_1$

Specific indirect effect of working alliance through outcome expectancy:  $a_2b_2$

Specific indirect effect of working alliance through vocational competency and outcome expectancy:  $a_1d_{21}b_2$

Total indirect effect of working alliance:  $a_1b_1 + a_2b_2 + a_1d_{21}b_2$

Total effect of working alliance:  $c = c' + a_1b_1 + a_2b_2 + a_1d_{21}b_2$

The  $R^2$  for the SMM model was computed to be .48 ( $f^2 = .92$ ), indicating a large effect size. A graphical representation of this model and information for the standardized path coefficients are presented in Figure 4.1. As can be observed in Figure 4.1 that working alliance was associated with higher levels of VR engagement (Total effect: path  $c = .69$ , 95% CI [.60 - .78],  $p < .0001$ ). Working alliance was positively associated with vocational competency (path  $a_1 = .21$ , 95% CI [.09, .33],  $p = .0009$ ). Working alliance was also positively associated with vocational outcome expectancy after controlling for the effect of vocational competency (path  $a_2 = .30$ , 95% CI [.19, .41],  $p < .0001$ ). Vocational competency was positively linked to vocational outcome expectancy after controlling for the effect of working alliance (path  $d_{21} = .35$ , 95% CI [.24, .46],  $p < .0001$ ). Vocational competency was positively linked to VR engagement after controlling for the effect of working alliance and vocational outcome expectancy (path  $b_1 = .16$ , 95% CI [.06, .25],  $p < .001$ ). The relationship between vocational outcome expectancy and VR engagement was also significant after controlling for the effect of working alliance and vocational competency (path  $b_2 = .16$ , 95% CI [.06, .25],  $p < .001$ ). However, the total effect of the relationship between working alliance and VR engagement (Total effect:  $c = .69$ , 95% CI [.60, .78],  $p < .0001$ ) was still significant (Direct effect:  $c' = .61$ ,  $p < .0001$ , 95% CI [.52, .71]) after controlling for the effect of the serial multiple mediators (vocational competency →

vocational outcome expectancy). It is interesting to note that there is not much difference between coefficients  $c$  and  $c'$  in this model. Therefore, although the mediator paths are all significant, they do not account for much of the association between working alliance and VR engagement.

If the bias-corrected bootstrap confidence intervals (CI) for the products of these paths do not include zero, the specific indirect effects would be considered statistically significant (Preacher & Hayes, 2004; Hayes, 2009). Using the PROCESS procedure with 10,000 bootstrap samples revealed a significant indirect effect of working alliance on VR engagement through vocational competency (point estimate = .035, 95% CI: .000 to .084); through both vocational competency and vocational outcome expectancy (point estimate = .008, 95% CI: .001 to .027); and through vocational outcome expectancy (point estimate = .033, 95% CI: .007 to .082). Because the direct effect ( $C'$ ) was still statistically significant, the results indicated that vocational competency and vocational outcome expectancy were only partial mediators of the relationship between working alliance and VR engagement.

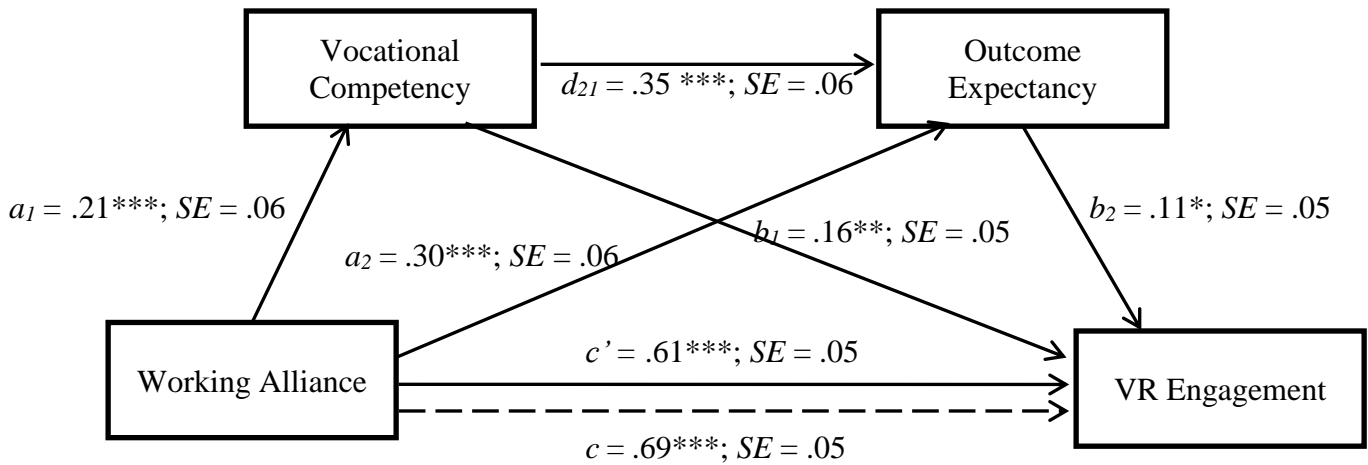


Figure 4.1. Path coefficients for serial multiple mediation analysis on VR engagement.

Note: Dotted line denotes the effect of working alliance on VR engagement when job competency and outcome expectancy are not included as serial multiple mediators.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

## CHAPTER FIVE

### SUMMARY AND IMPLICATIONS

#### Purpose

The purpose of the current study was to evaluate constructs based on SDT/SET as predictors of VR engagement in a sample of people with CID receiving VR services. Since treatment adherence and engagement are influenced by client motivation, research using theories of motivation to better understand people with CIDs' inspiration to engage in VR services will help inform rehabilitation counselors on how to integrate motivation factors into their professional practice. The present study included Deci and Ryan's (2008) SDT and Bandura's (1997) SET variables to identify predictors of VR engagement. Hierarchical regression analysis results indicated that controlling for the effect of demographic covariates and known P-E predictors, the majority of the SDT/SET variables remains as significant predictors of VR engagement, while the effects of demographic and P-E variables dissipated in the presence of SDT and SET variables. The results are consistent with SDT research that autonomous motivation (identified regulation and intrinsic regulation), competence/self-efficacy, and relatedness/working alliance predict persistence and adherence (Chan, Lonsdale, Ho, Yung, & Chan, 2009; Kennedy et al., 2004; Teixeira et al., 2012; Silva et al., 2008; Williams et al., 1998, 2006). Findings of the current study suggest that facilitating satisfaction of the basic psychological needs for competence, autonomy, and relatedness could enhance treatment adherence and engagement. Several major findings in the present study can be summarized below:

1. For demographic variables, age and benefits counseling were associated with VR engagement after controlling for other demographic covariates in the model. The effect sizes

for both variables were small to medium. No other demographic covariates were significant at the bivariate correlation or the beta levels. Overall, demographic covariates accounted for 8% of the variance in VR engagement, a small effect size. The findings indicated that people who had received benefits counseling were more motivated to engage in VR services than those who did not receive this service. In addition, age was positively associated with VR engagement. Clients who were older appeared to be more motivated to engage in VR services.

2. For the known P-E variables, only social functioning was associated with VR engagement after controlling for other P-E variables in the regression model. Overall, P-E variables accounted for 11% of the variance in VR engagement, a medium effect size. Social functioning refers to competence used to facilitate interaction and communication with others (Bosc, 2000). It appears that VR clients with higher level of social skills were more motivated to engage in VR services. Disability acceptance, agreeableness, resilience and perceived social support were significant at the bivariate correlation level but not significant at the beta level (i.e., the acceptance-engagement, agreeableness-engagement, resilience-engagement and perceived social support-engagement relationships were not significant after controlling for the effect of other P-E variables in the regression model). The effect of perceived social support on motivation to engage in VR services may be explained by the effect of social functioning. Disability acceptance is related to self-esteem and the effect of disability acceptance may be explained by other positive human traits such as social functioning, perceived social support, and agreeableness in the regression model.
3. For SDT/SET variables, working alliance/relatedness, and job performance self-efficacy/competency were associated with VR engagement after controlling for the Step 1

and Step 2 variables and other SDT/SET variables in the regression model. Overall, SDT/SET variables accounted for 51% of the variance in VR engagement, a large effect size. Working alliance was the strongest predictor for VR engagement, followed by job performance competency. Interestingly, all of the SDT/SET variables were significantly associated with VR engagement at the bivariate correlation level. Autonomy support, autonomous motivation, job seeking skills competency, and outcome expectancy were not significant in the regression model. It appears that working alliance with its large effect size may have mediated the effect of autonomy support and autonomous motivation, and job performance competency may have mediated the effect of job seeking competency along with other SDT/SET variables in the regression model. Since working alliance and vocational competency are both under the control of rehabilitation counselors, in-service training to increase the working alliance skills of counselors and vocational training to increase job skills competency could strengthen VR clients' motivation to engage in VR services designed to help achieve their VR goals.

4. A hierarchical regression analysis was performed to determine the contribution of the SDT/SET variables to additional variance in VR engagement scores after controlling for the demographic covariates and known P-E predictors. As expected, in Step 1, age and benefits counseling were significantly associated with VR engagement after controlling for the effect of other demographic covariates in Step 1. In Step 2, the effect of demographic variables on VR engagement dissipated in the presence of P-E variables. In Step 2, social functioning was the only significant variable after controlling for the effect of demographic covariates and other P-E variables. In Step 3, autonomy support, working alliance, and job performance self-efficacy were significant after controlling for demographic covariates and known P-E

predictors in the regression model. Clearly, SDT/SET variables provided significant additional theoretical explanation above and beyond demographic covariates and P-E variables on mechanisms affecting motivation to engage in VR services. Again, working alliance was found to be the strongest predictor of VR engagement.

### **Discussion of Findings**

Employment is an important public health intervention for people with CID (Chiu et al., 2015; Hall, Kurth, & Hunt, 2013; Iwanaga, Chan et al., 2017; Muller et al., 2017). Disability employment research has demonstrated that individuals with disabilities who have unsteady employment or who are unemployed tend to experience higher levels of mental and physical health problems, consume greater amounts of alcohol, and report lower self-esteem and well-being when compared to employed adults (Compton et al., 2014; Dutta et al., 2008; Krause et al., 2008; Murali & Oyeboode, 2004). Conversely, individuals who are employed, whether full or part-time, have better health and well-being outcomes than individuals who are not employed (Chiu et al., 2015; Muller et al., 2017). Employment, even at low levels, is associated with better overall functioning and health-related quality of life for people with CID (Chiu et al., 2015; Hall et al., 2013; Iwanaga, Chan et al., 2017; Muller et al., 2017).

Work is beneficial for people with CID because it increases financial security and access to higher quality health care, which in turn improves health status, social relationship, mental and physical health, and quality of life (Jackson, Iezzi, & Lafreniere, 1996; Reisine, Fifield, Walsh, & Forrest, 2008). State VR agencies with a success rate between 55% and 65% play an important role in helping people with disabilities find and retain employment. However, there are many reasons that people with CID may be ambivalent about finding employment, including fear of losing disability benefits, social isolation, and harassment in the workplace. To help people with



disabilities build career pathways to the middle class, it is important to explore factors that hinder or facilitate rehabilitation clients' engagement in VR services. In the present study, constructs of two theories of motivation (SDT/SET) were used to predict VR engagement. Findings of the study provided a strong theoretical understanding of factors influencing motivation of people with CID to engage in VR services, supporting the value of using theories of motivation to understand client motivation in rehabilitation counseling research. This approach is consistent with the current evidence-based movement of using theory-driven research to inform assessment and interventions in the professional practice of clinical rehabilitation counseling.

In the present study, there was a small but significant relationship between age and VR engagement; it appears that VR clients who were older were more motivated to engage in VR services. Work incentive and benefits counseling were also significantly associated with VR engagement. One reason for the high unemployment rate among people with CID is fear and confusion about the impact of work on their disability benefits (Nazarov, 2013; Tremblay, Smith, Xie, & Drake, 2006). Several studies have support the effect of work incentive and benefits counseling on employment outcomes of people with CID (Delin, Hartman, & Sell, 2012; Nazarov, 2013). For example, Nazarov (2013) analyzed the effect of benefits and work incentives counseling services on the labor market outcomes of SSI and SSDI beneficiaries participating in VR between 2003 and 2009 in New York State. He found a positive effect of benefits and work incentives counseling on the probability of successful case closure and a substantial positive effect on earnings and work hours at closure. Tremblay et al. compared a group of SSI/SSDI beneficiaries who received benefits counseling with a control group over four years, two years before and two years after the initiation of the intervention. Participants were people with psychiatric disabilities in VR. They found that the benefits counseling group

increased its adjusted average earnings by \$1,256 per year in comparison with the control group. Interestingly, although the real possibility of losing disability-related benefits including Social Security Benefits (i.e., SSI or SSDI) was one of the major barriers to gainful employment for people with severe disabilities (Hennessey, 1997), in this study, there were no effect of receiving SSI and SSDI on active engagement in VR services. In terms of functional disability, it is comforting to know that severity of disability was not associated with VR engagement.

For known P-E predictors, social functioning was significantly associated with VR engagement. Effective social interactions are essential to successful functioning at home, school, work, and social settings (Hansen, Nangle, & Meyer, 1998; Miller & Chan, 2008). Social functioning is also the building block for social support (Miller & Chan). Disability acceptance, resilience, social functioning, and agreeableness were associated with VR engagement at the bivariate correlation level. These positive human traits have been found to be related to higher level of community participation and life satisfaction (Smedema, Chan, & Phillips, 2014). Disability acceptance and resilience were highly related to social functioning and social support and their relationships with VR engagement were mediated by social functioning and agreeableness. However, it seems clear that clients with higher levels of positive human traits will be more motivated to engage in VR services. Although all of these predictors had a bivariate association with engagement (medium to high), only social functioning showed unique predictive power when the variables were entered as a set. Interestingly, “E” predictors (i.e., perceived social support and perceived social stigma) are no longer significant when the variables were entered as a set. It could be that if this study had used actual measures of “E” (environment), rather than perceived environment, these would correlate less strongly with the “P” predictors, and perhaps account for more variance in VR engagement. For SDT/SET

variables, working alliance and job performance competency were significant predictors of VR engagement. One of the most important SDT constructs, autonomy, was significantly associated with VR engagement at the bivariate correlation level but its effect was reduced after controlling for the effect of other SDT/SET variables. In the present study, working alliance was the strongest predictor of VR engagement. Job performance competency was also significant predictors of VR engagement. In addition, HRA was used to test SDT/SET variables as determinants of VR engagement above and beyond the contribution of demographic covariates and known P-E predictors. In the presence of SDT/SET variables, the demographic variables and P-E variables became not statistically significant. For the SDT/SET variables, autonomy support, working alliance, and job performance self-efficacy were statistically significant after controlling for other variables in the HRA model. A secondary analysis using serial multiple mediation analysis indicated that the relationship between working alliance and VR engagement can be partially mediated by total job competency and outcome expectancy. However, there is not much difference between coefficients of direct effect and total effect. Therefore, although the mediator paths are all significant, they do not account for much of the association between working alliance and engagement. In other words, even after controlling the effect of total job competency and outcome expectancy, working alliance still has strong influence on VR engagement. This shows that one benefit of a positive working alliance was that it had a (small) effect on consumers' attitudes (vocational self-efficacy and outcome expectancy), which in turn had a (small) effect on engagement. However, as working alliance emerged as clearly the major predictor of engagement in this study, there are likely other important mechanisms (i.e., other mediators) by which working alliance promotes engagement that were not studied in this model. In general, all SDT/SET variables provided significant explanatory information on how

motivation variables influence VR engagement above and beyond the contribution of demographic covariates and known P-E predictors.

Therefore, it is essential to consider what factors are likely to contribute to a positive working alliance in VR counseling. Some of these will likely be counselors factors (such as interpersonal skills) and others will likely be consumers factors. For example, in this study, social functioning was the strongest predictor of VR engagement in the P-E predictors set; however, it was no longer significant once working alliance was controlled, suggesting that client social functioning may predict working alliance and its effects on engagement are mediated by its association with working alliance. Importantly, working alliance and job competency are the variables over which counselors can intervene to increase, and it is important to consider effective interventions for increasing these variables which described in next implications section.

### **Implications of Findings**

First and foremost, it is clear that constructs related to SDT/SET provide better information on determinants of motivation to engage in VR services than the typical demographic covariates and known P-E predictors used in psychosocial and vocational adjustment research. In the era of evidence-based practice, it is important for rehabilitation and mental health professionals to use theory-driven research and scientific evidence to guide the development and validation of their interventions. The present study demonstrated the usefulness of conducting theory-driven research to inform the professional practice of rehabilitation and mental health counseling.

Findings of the present study also provide a useful case conceptualization framework for counselors to conduct their intake interviews, select assessment tools and instruments, formulate

clinical hypotheses, formulate individualized rehabilitation plans, and select evidence-based interventions to promote client involvement in the rehabilitation process and to improve rehabilitation and mental health counseling outcomes. Specifically, age was positively associated with VR engagement, with older clients more motivated to engage in VR services. State VR agencies can accept high school students with disabilities as young as 16 years old for secondary transition services. Rehabilitation counselors and transition specialists need to be aware of the higher levels of ambiguity towards work among high school students with disabilities that may affect their motivation to engage in VR and secondary transition employment services. Additionally, age was a significant predictor of VR engagement in the simultaneous regression analysis but not significant in HRA. It may be that age in the simultaneous regression analysis (RQ1) is a proxy for other variables (e.g., job performance competency) and when these are included as predictors in later models, there is no longer an age effect on VR engagement.

For clients who are still on the SSI/SSDI rolls, work incentives and benefits counseling is becoming a promising practice with several studies supporting the effectiveness of this intervention for SSI/SSDI beneficiaries who are receiving state VR services (Delin et al., 2012). These practices have successfully reduced disincentives to seeking employment and returning to work and provided informed choice about work. How much work a VR consumer chooses to do, resulting in higher employment rates for social security beneficiaries (Leahy, Chan, Sung, & Kim, 2013). In addition, there is evidence to support the effectiveness of state VR agencies in helping SSDI beneficiaries in returning to competitive employment (O'Neill et al., 2015). Providing work incentives and benefits counseling to SSDI beneficiaries could increase their motivation to participate in VR services leading to employment.

Emphasizing assets and strengths to promote health and well-being of people with CID is central to the professional practice of rehabilitation counseling (Chou et al., 2013). This rehabilitation counseling philosophy is based on Wright's (1983) constructive view that all individuals are worthy of dignity, respect, and encouragement, no matter how severe their disabilities. Rehabilitation and mental health counseling researchers have begun to apply positive psychology in rehabilitation services and have shown evidence of effectiveness of positive psychology interventions to promote the psychosocial adjustment for individuals with disabilities (e.g., Catalano et al., 2011; Chou et al., 2013; Langeland et al., 2006; Seligman, Steen, Park, & Peterson, 2005).

Positive human traits have long been emphasized in rehabilitation counseling and psychology (Chou et al., 2013; Dunn & Dougherty, 2005; Elliott, Kurylo, & Rivera, 2002; Wright, 1960, 1983). Positive psychology incorporated with positive human traits along with positive subjective experiences, positive emotions, and positive institutions to study its impact on well-being and personal fulfillment (Seligman et al., 2005). The present study clearly showed that people with CID who possess higher levels of positive human traits and receive support from a positive and supportive environment would more actively engage in VR services. Specifically, in the present study, social functioning skill was significant predictors of VR engagement. These findings are consistent with other positive psychology studies. Positive interpersonal relationships are associated with increased community participation, employment, and life satisfaction (Didehbani et al., 2012; Rossler, 2006; Seligman, 2011). Poor social functioning has been identified as one of the major impediments to vocational recovery and health-related quality of life for people with severe mental illness (Le Boutillier et al., 2014; Tschopp & Frain, 2009). Social relationships also are positively associated with disability

acceptance (Heinemann & Shontz, 1982; Linkowski & Dunn, 1974). Therefore, increase of social functioning could lead to increase other human traits that could further enhance the possibilities to engage VR services. Comparing to positive personality trait such as agreeableness, social functioning is more likely to be positively influenced through VR counseling intervention. For example, rehabilitation researchers are beginning to validate the U.S. Department of Labor's Skills to Pay the Bills curriculum for soft skills training with transition-age youth with disabilities. Therefore, a focus on providing prosocial skills training could enhance the motivation of young VR clients to engage in VR services. In addition, social functioning has been found to be the building block for social support (Miller & Chan, 2008).

Finally, it is clear that SDT/SET variables are the strongest predictors of VR engagement even after controlling for the effects of demographic covariates and known P-E predictors. Of all the SDT/SET variables, working alliance was found to be the strongest predictor of VR engagement. The relationship between motivational interviewing (MI) and self-determination theory has been documented (Markland, Ryan, Tobin, & Rollnick, 2005). It is an evidence-based therapy practice, and is consistent with rehabilitation counseling philosophy (Wagner & McMahon, 2004). There are several reasons why MI (Miller & Rollnick, 2002) can be used to strengthen working alliance between rehabilitation counselors and their clients. For example, the foundations of motivational interviewing are related to several principles that drive rehabilitation counseling practice including clients' sense of the importance of potential changes, their confidence that change can be successful, and their readiness to make changes (Moyers, 2014; Wagner & McMahon, 2004). Importantly, working alliance is a variable that can be directly influenced by the rehabilitation counselor. In recent years, several state VR agencies (e.g., Minnesota, Washington, and Wisconsin) have provided motivational interviewing to improve the

working alliance between rehabilitation counselors and their clients. In addition to working alliance, job performance self-efficacy, another variable that can be directly influenced by rehabilitation counselors, was found to be a significant predictor of VR engagement.

Rehabilitation counselors need to be more focused on helping rehabilitation clients develop appropriate job skills and job performance self-efficacy beliefs in order to increase their vocational rehabilitation outcome expectancy, leading to higher levels of VR engagement.

Although working alliance was found to strongly mediate the effect of self-determined work motivation on VR engagement, it does not diminish the importance of self-determination. Self-determination theory interventions that can be used to improve autonomous motivation should be considered as appropriate interventions to improve competence, outcome expectancy, VR engagement, and employment outcomes. In addition, providing in-service training (e.g., motivational interviewing) to increase working alliance skills and providing services to increase clients' vocational competency would increase their engagement in VR services and potentially lead to better employment outcomes.

### **Limitations**

There are several limitations in this study. First, a convenient sampling method was used to collect data from people with CID receiving services from state VR agencies from Alaska, Kentucky, Florida, Michigan, New Mexico, Texas, Utah, and Wisconsin. In addition, although participants could request to complete the survey used in person and in printed format, most of participants completed the assessment instruments online, which may have limited the sample to individuals who were higher functioning or with a higher level of educational attainment. A review of the responses on the functional impairment and educational attainment items indicate that the sample was indeed comprised of this subset of individuals with disabilities. For example,



more than 60% participants had level of education above a high school diploma, including “post-secondary education, no degree”, “associate degree or vocational/technical certificate” or “Bachelor's degree, Master's degree or higher.” In addition, individuals who did not complete the online survey may have limited access to the Internet, may not be familiar or comfortable with technology, or may be at the amotivation stage for employment or lower levels of VR engagement than the broader sample of individuals who did participate in the study. As a result, the findings of the current study may not be generalizable to the larger population of people with disabilities receiving services from state VR programs. Further, self-report instruments were used to measure all variables in the current study, which increases susceptibility to response bias (Antonak & Livneh, 1995). In addition, because this study is a descriptive correlational study, causality of the relationships between predictor variables and the outcome variable of VR engagement cannot be assumed. It should also be noted that the results of the present study may have been influenced by the use of measurement instruments that were modified, shortened, or not extensively validated. While this could be a concern, the Cronbach’s alpha that was calculated for most measures used in this study provided evidence in support of the internal consistency reliability of the scores for these measures. An additional concern is the potential for overlap and redundancy amongst the measurement instruments. Finally, working alliance, although conceptually related to SDT’s “relatedness,” is a specific construct that is well known to predict outcomes in many types of psychosocial interventions, so the finding that working alliance was the strongest predictor of VR engagement in the present study does not lend specific support to SDT as a model for intervention.

### **Future Research Direction**

The findings of this study suggested the primacy of working alliance in rehabilitation and counseling. Working alliance can be improved by some factors and some of factors will be likely to be consumers' factors such as social functioning skill and others will be counselors factors such as interpersonal skills. It is more efficient to intervene counselors to increase their skill to establish strong working alliance compared with dealing with diverse consumers. One of the evidence-based techniques that has the capacity to improve working alliance is MI (Miller & Rollnick, 2002). In order to demonstrate the specific benefits of MI on VR engagement outcomes, future research should continue to evaluate the efficacy of MI interventions on improving SDT/SET behaviors such as working alliance, self-determination/autonomous motivation, and outcome expectancy. In addition, SDT/SET research has provided guidance for developing evidence-based interventions to improve autonomous motivation, self-efficacy and outcome expectancy to perform target behaviors such as health promoting behavior and work behavior. These motivational interventions designed to enhance clients' motivation to change can be adapted and validated for clients' in medical and vocational rehabilitation settings.

Furthermore, it would be important to determine if working alliance and its associated mechanisms of change have the same positive impact on all the phases of employment process ranging for vocational identity development to job maintenance. Although an integrated SDT/SET model of VR engagement predicts VR engagement, it is not known whether the SDT/SET variables will predict employment outcomes or consumers' satisfaction about VR services. As there is emerging evidence to support the relationship between autonomous motivation and stages of change for employment, interventions to increase self-determined motivation to engage VR services should be developed and validated with randomized control

trial to further clarify the importance of this SDT construct in VR. Moreover, it is also essential to apply this model to predict actual employment outcomes as well as VR consumers' satisfaction about VR services using a longitudinal study.

When it comes to mechanism how working alliance influences VR engagement, as aforementioned, even though the relationship between working alliance and VR engagement was partially mediated by consumers' job competency and outcome expectancy, the effect of these variables was very small. Therefore, it is also essential to explore some of these other mechanisms as mediators between working alliance and VR engagement. For example, in psychotherapy research, Wampold (2015) indicated that all therapies are equally effective due to common factors such as goal consensus, empathy, working alliance, and positive regard. In his meta-analytic study, Wampold found that common factors account for at least 70% of the psychotherapeutic effect (Wampold, 2015; Wampold & Imel, 2015).

Given the initial findings of this study, extending this research with a more diverse group of individuals more typically served through state VR agencies is warranted. Specifically, extending this research with a group of lower functioning and less educated group of individuals with CID would appear to be important. Studies have found that working alliance is a powerful factor in rehabilitation outcomes even for lower functioning individuals. However, it would be important to determine if the cognitively mediated mechanisms of change identified in this study are equally robust mediators for individuals who have lower levels of cognitive functioning. In addition, since prior research has found working alliance to have a significant and positive impact on rehabilitation outcomes for low functioning individuals, there may be other mechanisms of change than those unidentified in the present study that may extend beyond the cognitive mediators. Identifying additional mechanisms of change for lower functioning

individuals may lead to broader intervention development and application that may be potentially more generalizable to diverse rehabilitation settings.

### **Conclusion**

Unemployment, poverty, and inequality are major causes of human adversity. People who are unemployed are vulnerable to depression and anxiety, substance abuse, and suicidal behavior and domestic violence. Unfortunately, the employment rate of people with CID is notoriously low. Recently, employment as a public health intervention for people with CID has received considerable attention in the health and disability service fields. The state–federal VR program plays an active role in helping people with CID to achieve their independent living and employment goals. In the present study, two popular theories of motivation (SDT/SET) were combined to predict VR engagement.

In the present study, SDT/SET variables accounted for a large percentage of the variance in VR engagement scores above and beyond the demographic covariates and known P-E contextual factors frequently used to predict community participation in rehabilitation counseling research. Specifically, working alliance and vocational self-efficacy, both SDT/SET factors that can be affected by rehabilitation counselors, were significant predictors of VR engagement. Based on findings of this study, in-service training (e.g., motivational interviewing training for rehabilitation counselors) to help counselors increase clients' motivation to engage in VR services can be developed and validated using randomized controlled trials. Vocational skills training can also be provided to rehabilitation clients to enhance their motivation to engage in VR services and to find and retain employment. Evidence-based interventions that are proven to be effective can be used to improve VR engagement and employment outcomes of people with CID.

Finally, research findings clearly indicate the omnipotence of constructs related to SDT/SET as predictors of VR engagement, supporting the new paradigm of using self-determination and self-efficacy to promote treatment adherence and engagement in medical and vocational rehabilitation. This study also demonstrated the usefulness of conducting theory-driven research to inform the professional practice of rehabilitation and mental health counseling as well as provided clarity in identifying specific interventions to improve client outcome.

## References

- Akin, A., & Basören, M. (2015). Algılanan Empatik Öz-Yeterlik ve Sosyal Öz-Yeterlik Ölçeğinin Türkçe Formunun Geçerlik ve Güvenirligi. The validity and reliability of Turkish version of the Perceived Empathic and Social Self-Efficacy Scale. *Bartın Üniversitesi Eğitim Fakültesi Dergisi*, 4, 603-610.
- Alfonso, V., Geller, J., Bermbach, N., Drummond, A., & Montaner, J. S. (2006). Becoming a "treatment success": What helps and what hinders patients from achieving and sustaining undetectable viral loads. *AIDS Patient Care & STDs*, 20, 326-334.
- Antonak, R. F., & Livneh, H. (1995). Direct and indirect methods to measure attitudes toward persons with disabilities, with an exegesis of the error-choice test method. *Rehabilitation Psychology*, 40(1), 3-24.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior*, 31, 143-164.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497-529.
- Belle, D., & Bullock, H. E. (2017). The psychological consequences of unemployment. Society for the Psychological Study of Social Issues. Retrieved from <https://www.spssi.org/index.cfm?fuseaction=page.viewpage&pageid=1457>
- Bolton, B. F., Bellini, J. L., & Brookings, J. B. (2000). Predicting client employment outcomes from personal history, functional limitations, and rehabilitation services. *Rehabilitation Counseling Bulletin*, 44, 10-21.

- Bordin, E. S. (1979). The generalizability of the psychoanalytic concept of the working alliance. *Psychotherapy: Theory, Research & Practice, 16*, 252-260.
- Bosc M (2000). Assessment of social functioning in depression. *Comprehensive Psychiatry, 41*, 63-69.
- Bosc, M. (2000). Assessment of social functioning in depression. *Comprehensive Psychiatry, 41*(1), 63-69.
- Calsyn, R.J., Morse, G.A., Tempelhoff, B., Smith, R., & Allen, G. (1995). Homeless mentally ill clients and the quality of life. *Evaluation and Program Planning, 18*, 219–225.
- Caprara, G.V., Luengo Kanacri, B.P., Gerbino, M., Zuffiano, A., Alessandri, G., Vecchio, G.,...Bridglall, B. (2014). Positive effects of promoting prosocial behavior in early adolescence: Evidence from a school-based intervention. *International Journal of Behavioral Development, 38*, 386-396.
- Caspard, H., Chan, A. K., & Walker, A. M. (2005). Compliance with a statin treatment in a usual-care setting: Retrospective database analysis over 3 years after treatment initiation in health maintenance organization enrollees with dyslipidemia. *Clinical Therapeutics, 27*(10), 1639-46.
- Catalano, D., Chan, F., Wilson, L., Chiu, C. Y., & Muller, V. R. (2011). The buffering effect of resilience on depression among individuals with spinal cord injury: a structural equation model. *Rehabilitation Psychology, 56*, 200-211.
- Chan, D. K., Lonsdale, C., Ho, P. Y., Yung, P. S., & Chan, K. M. (2009). Patient motivation and adherence to post-surgery rehabilitation exercise recommendations: The influence of physiotherapists' autonomy-supportive behaviors. *Archives of Physical Medicine and Rehabilitation, 90*, 1977-1982.

- Chan, F., Cheing, G., Chan, J. Y. C., Rosenthal, D. A., & Chronister, J. (2006). Predicting employment outcomes of rehabilitation clients with orthopedic disabilities: A CHAID analysis. *Disability and Rehabilitation, 28*, 257-270.
- Chan, F., Iwanaga, K, Umucu, E., Yaghmaian, R., Wu, J.R., Bengtson, K., & Chen, X. (2017). Evidence-based practice and research utilization. In V. M. Tarvydas & M. T. Hartley (Eds.), *The professional practice of rehabilitation counseling* (pp. 359-380). New York: Springer Publishing Company.
- Chan, F., McMahon, B. T., Shaw, L. R., & Lee, G. (2004). Psychometric validation of the Expectations about Rehabilitation Counseling Scale: A preliminary study. *Journal of Vocational Rehabilitation, 20*, 127-133.
- Chan, F. & Tansey, T. N. (2017a). The *Multidimensional Acceptance of Loss Scale –Brief*. Madison, WI: Rehabilitation Research and Training Center.
- Chan, F. & Tansey, T. N. (2017b). The *Normative Belief Scale*. Madison, WI: Rehabilitation Research and Training Center.
- Chan, F., Tarvydas, V., Blalock, K., Strauser, D., & Atkins, B. J. (2008). Unifying and elevating rehabilitation counseling through model-driven, diversity-sensitive evidence-based practice. *Rehabilitation Counseling Bulletin, 52*, 114-119.
- Chatterjee, S., & Hadi, A. S. (1986). Influential observations, high leverage points, and outliers in linear regression. *Statistical Science, 1*(3), 379-393.
- Chatterjee, S., & Hadi, A. S. (2009). *Sensitivity analysis in linear regression* (Vol. 327). Hoboken, NJ. John Wiley & Sons.
- Cheing, G., Vong, S., Chan, F., Ditchman, N., Brooks, J., & Chan, C. (2014). Testing a path-analytic mediation model of how motivational enhancement physiotherapy improves



- physical functioning in patients with chronic low back pain. *Journal of Occupational Rehabilitation*, 24, 798-805.
- 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.
- Choi-Kwon, S., Kwon, S. U., & Kim, J. S. (2005). Compliance with risk factor modification: early-onset versus late-onset stroke patients. *European Neurology*, 54(4), 204-211.
- Chou, C. C., Chan, F., Yui Chung Chan, J., Phillips, B., Ditchman, N., & Kaseroff, A. (2013). Positive Psychology Theory, Research, and Practice: A Primer for Rehabilitation Counseling Professionals. *Rehabilitation Research, Policy & Education*, 27(3), 131-153.
- Chou, C. C., Ditchman, N., Pruett, S. R., Chan, F., & Hunter, C. (2009). Applications of social cognitive theory in psychosocial interventions. In F. Chan, E. Cardoso & J. Chronister (Eds.), *Understanding psychosocial adjustment to chronic illness and disability: A handbook for evidence-based practitioners in rehabilitation* (pp. 243-276). New York: Springer.
- Chouinard, M. C., & Robichaud-Ekstrand, S. (2007). Predictive value of the transtheoretical model to smoking cessation in hospitalized patients with cardiovascular disease. *European Journal of Cardiovascular Prevention & Rehabilitation*, 14(1), 51-58.
- Chronister, J. (2009). Social support and rehabilitation: Theory, research and measurement. In F. Chan, E. Cardoso & J. Chronister (Eds.), *Understanding psychosocial adjustment to chronic illness and disability: A handbook for evidence-based practitioners in rehabilitation* (pp. 149-183). New York: Springer.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation*

- analysis for the behavioral sciences*. New Jersey: Lawrence Erlbaum.
- Cohen, S., Mermelstein, R., Kamarck, T., Hoberman, H., Sarason, I. G., & Sarason, B. R. (1985). Social support: Theory, research and applications. *Measuring the functional components of social support*. *The Hague: Martinus Nijhoff*, 73-94.
- Compton, W. M., Gfroerer, J., Conway, K. P., & Finger, M. S. (2014). Unemployment and substance outcomes in the united states 2002–2010. *Drug and Alcohol Dependence*, *142*, 350-353.
- Cook, D. W. (2004). Counseling people with physical disabilities. In F. Chan, N. L. Berven, & K. R. Thomas (Eds.), *Counseling theories and techniques for rehabilitation health professionals* (pp. 328-341). New York, NY: Springer.
- Corrigan, P. W., Angell, B., Davidson, L., Marcus, S. C., Salzer, M. S., Kottsieper, P., & Stanhope, V. (2012). From adherence to self-determination: Evolution of a treatment paradigm for people with serious mental illnesses. *Psychiatric Services*, *63*(2), 169-173.
- Corrigan, P. W., Larson, J. E., & Rusch, N. (2009). Self-stigma and the “why try” effect: Impact on life goals and evidence-based practices. *World Psychiatry*, *8*, 75-81.
- Curb Cuts to the Middle Class Initiative (2015). *Recruiting, hiring, retaining, and promoting people with disabilities: A resource guide for employers*. Washington, DC: Equal Employment Opportunity Commission. Retrieved from [https://www.whitehouse.gov/sites/default/files/docs/employing\\_people\\_with\\_disabilities\\_toolkit\\_february\\_3\\_2015\\_v4.pdf](https://www.whitehouse.gov/sites/default/files/docs/employing_people_with_disabilities_toolkit_february_3_2015_v4.pdf)
- Davidson, L., & Chan, K. K. (2014). Common Factors: Evidence-Based Practice and Recovery. *Psychiatric Services*, *65*(5), 675–677.

- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality, 62*(1), 119-142.
- Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality, 19*(2), 109-134.
- Deci, E.L., & Ryan, R.M. (2000). The “what” and the “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268.
- Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. University Rochester Press.
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie Canadienne, 49*(3), 182-185.
- Deci, E. L., & Ryan, R. M. (2010). *Self-determination*. DeKalb, IL: John Wiley & Sons, Inc.
- Deci, E. L., & Ryan, R. M. (2012). Motivation, personality, and development within embedded social contexts: An overview of self-determination theory. *The Oxford Handbook of Human Motivation, 85-107*.
- Delin, B.S., Hartman, E.C., & Sell, C.W. (2012). The impact of work incentive benefits counseling on employment outcomes: Evidence form two return-to-work demonstrations. *Journal of Vocational Rehabilitation, 36*, 97-107.
- Di Giunta, L., Eisenberg, N., Kupfer, A., Steca, P., Tramontano, C., & Caprara, G. V. (2010). Assessing perceived empathic and social self-efficacy across countries. *European Journal of Psychological Assessment, 26*(2), 77–86.
- Didehbani, N., Shad, M.U., Tamminga, C.A., Kandalaft, M.R., Allen, T.T., Chapman, S.B., & Krawczyk, D.C. (2012). Insight and empathy in schizophrenia. *Schizophrenia Research,*

142, 246-247.

- Diette, T. M., Goldsmith, A. H., Hamilton, D., & Darity Jr, W. (2012). Causality in the relationship between mental health and unemployment. In Appelbaum, L. D. (Eds.), *Reconnecting to Work: Policies to Mitigate Long-term Unemployment and Its Consequences* (pp. 63-94). WE Upjohn Institute.
- Dooley, D., Catalano, R., & Hough, R. (1992). Unemployment and alcohol disorder in 1910 and 1990: Drift versus social causation. *Journal of Occupational and Organizational Psychology*, 65(4), 277-290.
- Dunn, D. S., & Dougherty, S. B. (2005). Prospects for a Positive Psychology of Rehabilitation. *Rehabilitation Psychology*, 50(3), 305-311.
- Dutta, A., Chan, F., Kundu, M. M., Kaya, C., Brooks, J., Sánchez, J., & Tansey, T. N. (2016). Assessing Vocational Rehabilitation Engagement of People With Disabilities A Factor-Analytic Approach. *Rehabilitation Counseling Bulletin*, 52(2), 114-119.
- Dutta, A., Gerve, R., Chan, F., Chou, C. C., & Ditchman, N. (2008). Vocational rehabilitation services and employment outcomes for people with disabilities: A United States study. *Journal of Occupational Rehabilitation*, 18(4), 326-334.
- Emmons, K. M., Barbeau, E. M., Gutheil, C., Stryker, J. E., & Stoddard, A. M. (2007). Social influences, social context, and health behaviors among working-class, multi-ethnic adults. *Health Education & Behavior*, 34(2), 315-334.
- Elliott, T. R., Kurylo, M., & Rivera, P. (2002). Positive growth following acquired physical disability. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 687-698). New York, NY, US: Oxford University Press.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using

- G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149-1160.
- Ferrin, J. M., Chan, F., Chronister, J., & Chiu, C. Y. (2011). Psychometric validation of the multidimensional acceptance of loss scale. *Clinical Rehabilitation*, 25(2), 166-174.
- Fitzgerald, S., Chan, F., Deiches, J., Umucu, E., Hsu, S. T., Lee, H. L., Bezyak, J., & Iwanaga, K. (2015). Assessing work motivation in people with severe mental illness: A factor-analytic approach. *Australian Journal of Rehabilitation Counseling*, 21, 123-136.
- Fitzgerald, S., Deiches, J., Umucu, E., Brooks, J., Muller, V., Wu, J. R., & Chan, F. (2016). Psychometric properties of the Vocational Rehabilitation Engagement Scale when used with people with mental illness in clubhouse settings. *Rehabilitation Research, Policy, and Education*, 30(3), 276-285.
- Fodor, G. J., Kotrec, M., Bacskai, K., Dorner, T., Lietava, J., Sonkodi, S., ... & Turton, P. (2005). Is interview a reliable method to verify the compliance with antihypertensive therapy? An international central-European study. *Journal of Hypertension*, 23(6), 1261-1266.
- Fortier, M. S., Sweet, S. N., O'Sullivan, T. L., & Williams, G. C. (2007). A self-determination process model of physical activity adoption in the context of a randomized controlled trial. *Psychology of Sport and Exercise*, 8(5), 741-757.
- Gamble, D., & Moore, C. L. (2003). The relation between VR services and employment outcomes of individuals with traumatic brain injury. *Journal of Rehabilitation*, 69(3), 31-38.
- Ghods, A. J., & Nasrollahzadeh, D. (2003). Noncompliance with immunosuppressive medications after renal transplantation. *Experimental and Clinical Transplantation: Official Journal of the Middle East Society for Organ Transplantation*, 1(1), 39-47.

- Ginis, K. M., Hicks, A. L., Latimer, A. E., Warburton, D. E. R., Bourne, C., Ditor, D. S., ... & Pomerleau, P. (2011). The development of evidence-informed physical activity guidelines for adults with spinal cord injury. *Spinal Cord*, *49*(11), 1088-1096.
- Gómez, W., Flentje, A., Schustack, A., Ramirez-Forcier, J., Andrews, B., Dilworth, S. E., ... & Carrico, A. W. (2016). Navigating barriers to vocational rehabilitation for HIV-positive persons. *AIDS and Behavior*, *20*(5), 1132-1142.
- Gosling, S. D. (2017). *Ten Item Personality Measure (TIPI)*. Austin, TX: Retrieved from <https://gosling.psy.utexas.edu/scales-weve-developed/ten-item-personality-measure-tipi/>
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*(6), 504-528.
- Graziano, W. G., Bruce, J., Sheese, B. E., & Tobin, R. M. (2007). Attraction, personality, and prejudice: Liking none of the people most of the time. *Journal of Personality and Social Psychology*, *93*(4), 565-582.
- Hagger, M. S., & Chatzisarantis, N. L. (2009). Assumptions in research in sport and exercise psychology. *Psychology of Sport and Exercise*, *10*(5), 511-519.
- Hansen, D. J., Nangle, D. W., & Meyer, K. A. (1998). Enhancing the effectiveness of social skills interventions with adolescents. *Education and Treatment of Children*, *21*, 489-513.
- 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*(2), 100-106.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, *76*(4), 408-420.
- Hayes, A. F. (2016). The PROCESS macro for SPSS and SAS. Retrieved from <http://www.processmacro.org/index.html>

- Heinemann, A. W., & Shontz, F. C. (1982). Acceptance of disability, self-esteem, sex-role identity, and reading aptitude in deaf adolescents. *Rehabilitation Counseling Bulletin*, 25(4), 197-203.
- Hennessey, J. C. (1997). Factors affecting the work efforts of disabled-worker beneficiaries. *Social Security Bulletin*, 60, 3-20.
- Heppner, P. P., Wampold, B. E., & Kivlighan, D. M., Jr. (2008). *Research design in counseling* (3 Ed.). Belmont, CA: Thomson Brooks/Cole.
- Hertz, R. P., Unger, A. N., & Lustik, M. B. (2005). Adherence with pharmacotherapy for type 2 diabetes: a retrospective cohort study of adults with employer-sponsored health insurance. *Clinical Therapeutics*, 27(7), 1064-1073.
- Hibbard, J. H., Stockard, J., Mahoney, E. R., & Tusler, M. (2004). Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers. *Health Services Research*, 39, 1005-1026.
- Hogan, J., & Hogan, R. (1989). How to measure employee reliability. *Journal of Applied Psychology*, 74(2), 273-279.
- Horvath, A. O., & Greenberg, L. S. (1989). Development and validation of the Working Alliance Inventory. *Journal of Counseling Psychology*, 36(2), 223-233.
- Hough, L. M. (1992). The 'Big Five' personality variables--construct confusion: Description versus prediction. *Human Performance*, 5(1-2), 139-155.
- Hoyt, W. T., Imel, S. E., & Chan, F. (2008). Regression and correlation techniques: Recent controversies and best practices. *Rehabilitation Psychology*, 53, 321-339.
- Hoyt, W. T., Leierer, S., & Millington, M. J. (2006). Analysis and interpretation of findings using multiple regression techniques. *Rehabilitation Counseling Bulletin*, 49(4), 223-233.

- Hsu, Y. T., Buckworth, J., Focht, B. C., & O'Connell, A. A. (2013). Feasibility of a Self-Determination Theory-based exercise intervention promoting Healthy at Every Size with sedentary overweight women: Project CHANGE. *Psychology of Sport and Exercise, 14*(2), 283-292.
- Iwanaga, K., Chan, F., Tansey, T. N., Strauser, D., & Bishop, M. (2017). *Working alliance and readiness for employment of vocational rehabilitation consumers*. Concurrent session at the ARCA 60<sup>th</sup> anniversary conference, American Rehabilitation Counseling Association, (ARCA), Orlando, FL.
- Iwanaga, K., Umucu, E., Wu, J. R., Yaghmaian, R., Lee, H. L., Fitzgerald, S., & Chan, F. (2017). Assessing vocational outcome expectancy in individuals with serious mental illness: a factor-analytic approach. *Journal of Mental Health*, Advance online publication. DOI: 10.1080/09638237
- 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.
- Jin, J., Sklar, G. E., Oh, V. M. S., & Li, S. C. (2008). Factors affecting therapeutic compliance: A review from the patient's perspective. *Therapeutics and Clinical Risk Management, 4*(1), 269-286.
- Kaona, F. A., Tuba, M., Siziya, S., & Sikaona, L. (2004). An assessment of factors contributing to treatment adherence and knowledge of TB transmission among patients on TB treatment. *BMC Public Health, 4*(1), 68-76.
- Kardas, P., Lewek, P., & Matyjaszczyk, M. (2013). Determinants of patient adherence: a review of systematic reviews. *Frontiers in Pharmacology, 4*-9.



- Kasl, S. V., Rodriguez, E., & Lasch, K. E. (1998). The impact of unemployment on health and well-being. In B. P. Dohrenwend (Ed.), *Adversity, stress, and psychopathology* (pp. 111-131). New York: Oxford University Press.
- Kaye, H. S. (1998). *Vocational rehabilitation in the United States* (No. 20). US Department of Education, National Institute on Disability and Rehabilitation Research (NIDRR).
- Kennedy, S., Goggin, K., & Nollen, N. (2004). Adherence to HIV medications: Utility of the theory of self-determination. *Cognitive Therapy and Research, 28*(5), 611-628.
- Kortte, K. B., Falk, L. D., Castillo, R. C., Johnson-Greene, D., & Wegener, S. T. (2007). The Hopkins rehabilitation engagement rating scale: development and psychometric properties. *Archives of Physical Medicine and Rehabilitation, 88*(7), 877-884.
- Krause, J. S., Carter, R. E., Pickelsimer, E. E., & Wilson, D. (2008). A prospective study of health and risk of mortality after spinal cord injury. *Archives of Physical Medicine and Rehabilitation, 89*(8), 1482-1491.
- Kumpfer, K. L. (1999). Factors and processes contributing to resilience: The resilience framework. In M. D. Glantz & J. L. Johnson (Eds.), *Resilience and development: Positive life adaptations* (pp. 179–224). Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Kyngäs, H., & Lahdenperä, T. (1999). Compliance of patients with hypertension and associated factors. *Journal of Advanced Nursing, 29*(4), 832-839.
- Langeland, E., Riise, T., Hanestad, B. R., Nortvedt, M. W., Kristoffersen, K., & Wahl, A. K. (2006). The effect of salutogenic treatment principles on coping with mental health problems: A randomised controlled trial. *Patient Education and Counseling, 62*(2), 212-219.

- Leahy, M. J., Chan, F., Sung, C., & Kim, M. (2013). Empirically derived test specifications for the certified rehabilitation counselor examination. *Rehabilitation Counseling Bulletin*, 56, 199-214.
- Le Boutillier, C., Leamy, M., Bird, V.J., Davidson, L., Williams, J., & Slade, M. (2014). What does recovery mean in practice? A qualitative analysis of international recovery-oriented practice guidance. *Psychiatric Services*, 62, 1470–1476.
- Lenze, E. J., Munin, M. C., Quear, T., Dew, M. A., Rogers, J. C., Begley, A. E., & Reynolds, C. F. (2004). The Pittsburgh Rehabilitation Participation Scale: reliability and validity of a clinician-rated measure of participation in acute rehabilitation. *Archives of Physical Medicine and Rehabilitation*, 85(3), 380-384.
- Lindowski, D. C., & Dunn, M. A. (1974). Self-concept and acceptance of disability. *Rehabilitation Counseling Bulletin*. 18, 28-32.
- Luciano, J. V., Ayuso-Mateos, J. L., Fernández, A., Serrano-Blanco, A., Roca, M., & Haro, J. M. (2010). Psychometric properties of the twelve item World Health Organization Disability Assessment Schedule II (WHO-DAS II) in Spanish primary care patients with a first major depressive episode. *Journal of Affective Disorders*, 121(1), 52-58.
- Manthey, T, Brooks, J., Chan, F., Hedenblad, L., & Ditchman, N. (2015). Motivational interviewing in rehabilitation health settings. In F. Chan, N. Berven, & K. Thomas (Eds.), *Counseling theories and techniques for rehabilitation health professionals* (2<sup>nd</sup> ed., pp. 247-278). New York: Springer Publishing Company.
- Markland, D., & Tobin, V. (2004). A modification to the behavioural regulation in exercise questionnaire to include an assessment of amotivation. *Journal of Sport and Exercise Psychology*, 26(2), 191-196.

- Markland, D., Ryan, R. M., Tobin, V. J., & Rollnick, S. (2005). Motivational interviewing and self-determination theory. *Journal of Social and Clinical Psychology, 24*(6), 811-831.
- Marrone, J., & Golowka, E. (1999). If work makes people with mental illness sick, what do unemployment, poverty, and social isolation cause?. *Psychiatric Rehabilitation Journal, 23*(2), 187-193.
- Martin, R., West-Evans, K., & Connelly, J. (2010). Vocational rehabilitation: Celebrating 90 years of careers and independence. *American Rehabilitation, 34*(1), 15-18.
- McCrae, R. R., & Costa, P. T. (2010). NEO Inventories professional manual. *Lutz, FL: Psychological Assessment Resources.*
- Miller, S. M., & Chan, F. (2008). Predictors of life satisfaction in individuals with intellectual disabilities. *Journal of Intellectual Disability Research, 52*, 1039-1047.
- Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change* (2nd ed.). New York, NY, US: Guilford Press.
- Moser, E. N. (2017). *Person-environment contextual factors contribute to resilience in young adults with epilepsy*. Unpublished PhD Dissertation, University of Wisconsin-Madison.
- Mount, M. K., Barrick, M. R., & Stewart, G. L. (1998). Five-factor model of personality and performance in jobs involving interpersonal interactions. *Human Performance, 11*(2-3), 145-165.
- Moyers, T. B. (2014). The relationship in motivational interviewing. *Psychotherapy, 51*(3), 358-363.
- Muller, V., Peebles, M. C., Chiu, C. Y., Iwanaga, K., Tang, X., Brooks, J., Eagle, D., & Chan, F. (2017). Association of employment and health and well-being in fibromyalgia. *Journal of Rehabilitation, 83*(3), 37-43.

- Munder, T., Wilmers, F., Leonhart, R., Linster, H. W., & Barth, J. (2010). Working alliance Inventory-Short revised (WAI-SR): Psychometric properties in outpatients and inpatients. *Clinical Psychology & Psychotherapy, 17*(3), 231-239.
- Murali, V., & Oyebode, F. (2004). Poverty, social inequality and mental health. *Advances in Psychiatric Treatment, 10*(3), 216-224.
- National Council on Disability (2007). *A Perspective from Youth with Disabilities: Benefits in a World of Employment*. Washington, DC. Retrieved from <https://www.ncd.gov/publications/2007/March2007>
- Nazarov, Z. E. (2013). Can benefits and work incentives counseling be a path to future economic self-sufficiency for SSI/SSDI beneficiaries? Boston: MA: Center for Retirement Research at Boston College. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.645.7152&rep=rep1&type=pdf>
- Ng, J. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts: A meta-analysis. *Perspectives on Psychological Science, 7*, 325-340.
- O'Neill, J., Mamun, A. A., Potamites, E., Chan, F., & da Silva Cordoso, E. (2015). Return to work of disability insurance beneficiaries who do and do not access state vocational rehabilitation agency services. *Journal of Disability Policy Studies, 26*(2), 111-123.
- Phillips, B. N., Deiches, J., Morrison, B., & Kaseroff, A. A. (2016). Social Effectiveness: A 30-Year Review of the Rehabilitation Counseling Literature. *Rehabilitation Counseling Bulletin, 60*(1), 16-26.
- Piedmont, R. L. (1993). A longitudinal analysis of burnout in the health care setting: The role of personal dispositions. *Journal of Personality Assessment, 61*(3), 457-473.

- Piedmont, R. L., & Weinstein, H. P. (1994). Predicting supervisor ratings of job performance using the NEO Personality Inventory. *The Journal of Psychology, 128*(3), 255-265.
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*(4), 717-731.
- Rossler, W. (2006). Psychiatric rehabilitation today: An overview. *World Psychiatry, 5*, 151-157.
- Reeve, J., Nix, G., & Hamm, D. (2003). Testing models of the experience of self-determination in intrinsic motivation and the conundrum of choice. *Journal of Educational Psychology, 95*(2), 375-392.
- 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.
- Rosenthal, D. A., Chan, F., Wong, D. W., Kundu, M., & Dutta, A. (2006). Predicting employment outcomes based on race, gender, disability, work disincentives, and vocational rehabilitation service patterns. *Journal of Rehabilitation Administration, 29*, 223-243.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78.
- Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on self-determination theory. *The European Health Psychologist, 10*(1), 2-5.

- Ryan, R. M., Plant, R. W., & O'Malley, S. (1995). Initial motivations for alcohol treatment: Relations with patient characteristics, treatment involvement, and dropout. *Addictive Behaviors, 20*(3), 279-297.
- Sánchez, J., Pfaller, J. S., Iwanaga, K., Chan, F., Sung, C., Bezyak, J. L., & Chen, S. M. (2016). Factorial Validity of the Perceived Empathic and Social Self-Efficacy Scale for Adults with Serious Mental Illness: A Brief Report. *The Australian Journal of Rehabilitation Counselling, 22*(2), 135-146.
- Sánchez, J., Rosenthal, D. A., Chan, F., Brooks, J., & Bezyak, J. L. (2016). Relationships between world health organization international classification of functioning, disability and health constructs and participation in adults with severe mental illness. *Rehabilitation Research, Policy, and Education, 30*(3), 286-304.
- Sarason, B. R., Pierce, G. R., Shearin, E. N., Sarason, I. G., Waltz, J. A., & Poppe, L. (1991). Perceived social support and working models of self and actual others. *Journal of Personality and Social Psychology, 60*(2), 273-287.
- Senior, V., Marteau, T. M., Weinman, J., & Genetic Risk Assessment for FH Trial (GRAFT) Study Group. (2004). Self-reported adherence to cholesterol-lowering medication in patients with familial hypercholesterolaemia: the role of illness perceptions. *Cardiovascular Drugs and Therapy, 18*(6), 475-481.
- Seligman, M. E. (2011). *Flourish*. North Sydney, N.S.W.: Random House Australia.
- Seligman, M. E., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: empirical validation of interventions. *American Psychologist, 60*(5), 410-421.
- Silva, M. N., Markland, D., Minderico, C. S., Vieira, P. N., Castro, M. M., Coutinho, S. R., ...Teixeira, P. J. (2008). A randomized controlled trial to evaluate self-determination

- theory for exercise adherence and weight control: Rationale and intervention description. *BMC Public Health*, 8, 1-13.
- Smedema, S. M., Chan, J. Y., & Phillips, B. (2014). Core self-evaluations and Snyder's hope theory in persons with spinal cord injuries. *Rehabilitation Psychology*, 59(4), 399-406. doi: 10.1037/rep0000015
- Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: assessing the ability to bounce back. *International Journal of Behavioral Medicine*, 15(3), 194-200.
- Soto, C. J. (2015). Is happiness good for your personality? Concurrent and prospective relations of the Big Five with subjective well-being. *Journal of Personality*, 83, 44-55.
- Spikmans, F. J. M., Brug, J., Doven, M. M. B., Kruizenga, H. M., Hofsteenge, G. H., & Bokhorst- van der Schueren, V. (2003). Why do diabetic patients not attend appointments with their dietitian?. *Journal of Human Nutrition and Dietetics*, 16(3), 151-158.
- Sweet, S. N., Fortier, M. S., Strachan, S. M., & Blanchard, C. M. (2012). Testing and integrating self-determination theory and self-efficacy theory in a physical activity context. *Canadian Psychology/Psychologie Canadienne*, 53(4), 319-327.
- Tabachnick, B.G., & Fidell, L.S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn & Bacon.
- Tansey, T. N. & Chan, F. (2016). *The RRTC Brief Social Support Scale*. Madison, WI: Rehabilitation Research and Training Center.

- Tansey, T. N., Iwanaga, K., Bezyak, J., & Ditchman, N. (2017). Testing an Integrated Self-Determined Work Motivation Model for People With Disabilities: A Path Analysis. *Rehabilitation Psychology*. Advance online publication. DOI: 10.1037/rep0000141.
- Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 1-30.
- Thompson, H. S., Littles, M., Jacob, S., & Coker, C. (2006). Posttreatment breast cancer surveillance and follow-up care experiences of breast cancer survivors of African descent: an exploratory qualitative study. *Cancer Nursing*, 29(6), 478-487.
- Todd, J. L., & Worell, J. (2000). Resilience In Low Income, Employed, African American Women. *Psychology of Women Quarterly*, 24(2), 119-128.
- Tracey, T. J., & Kokotovic, A. M. (1989). Factor structure of the working alliance inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, 1(3), 207-210.
- Tremblay, T., Smith, J., Xie, H., & Drake, R. E. (2006). Effects of benefits counseling on employment outcomes of people with psychiatric disabilities. *Psychiatric Services*, 57(6), 816-821.
- Tschopp, M. K., & Frain, M. (2009). Psychiatric rehabilitation. In Chan, F., Cardoso, E. S., & Chronister, J. (Eds.), *Understanding psychosocial adjustment to chronic illness and disability: A handbook for evidence-based practitioners in rehabilitation* (pp 371-398). New York: Springer.



- U.S. Department of Labor, Bureau of Labor Statistics (2017). *Persons with a Disability: Labor Force Characteristics Summary*. Washington, DC: Retrieved  
<https://www.bls.gov/news.release/disabl.nr0.htm>
- U.S. Government Accountability Office [GAO] (2005). *Better Measures and Monitoring Could Improve the Performance of the VR Program*. Washington, DC: Retrieved from  
<http://www.gao.gov/products/GAO-05-865>
- U.S. Senate Committee on Health, Education, Labor and Pensions (2012). *Unfinished business: Making hiring people with disabilities a national priority*. Washington, DC: Author.  
Retrieved from <http://www.harkin.senate.gov/documents/pdf/500469b49b364.pdf>
- U.S. Department of Education (2016), Annual report, fiscal year 2013, Report on federal activities under the Rehabilitation Act. Washington, D.C.: Office of Special Education and Rehabilitative Services, Rehabilitation Services Administration. Retrieved from  
<https://www2.ed.gov/about/reports/annual/rsa/2013/rsa-2013-annual-report.pdf>
- Umucu, E., Iwanaga, K., Fitzgerald, S., Thompson, K., Moser, E., Sánchez, J., ... & Brooks, J. (2016). Assessing Vocational Competency of People with Serious Mental Illness through Self-Report: A Brief Clinical Measure. *Journal of Applied Rehabilitation Counseling*, 47(3), 22-28.
- United Nations (1948). Universal Declaration of Human Rights; General Assembly (3rd sess.: 1948–1949); United Nations: Paris, France.
- United Nations. (2006). Convention on the Rights of Persons with Disabilities. Retrieved from  
<http://www.un.org/disabilities/convention/conventionfull.shtml>.

- United Nations Human Rights Office of the High Commissioner (2008). *Combating discrimination against persons with disabilities*. Retrieved from [http://www.ohchr.org/EN/Issues/Discrimination/Pages/discrimination\\_disabilities.aspx](http://www.ohchr.org/EN/Issues/Discrimination/Pages/discrimination_disabilities.aspx)
- Üstün, T. B. (Ed.). (2010). *Measuring health and disability: Manual for WHO disability assessment schedule WHODAS 2.0*. World Health Organization.
- Van den Broeck, A., Vansteenkiste, M., De Witte, H., Soenens, B., & Lens, W. (2010). Capturing autonomy, competence, and relatedness at work: Construction and initial validation of the work-related basic need satisfaction scale. *Journal of Occupational and Organizational Psychology*, 83(4), 981-1002.
- Ventura, M., Salanova, M., & Llorens, S. (2015). Professional self-efficacy as a predictor of burnout and engagement: The role of challenge and hindrance demands. *The Journal of Psychology*, 149(3), 277-302.
- Višlā, A., Constantino, M. J., Newkirk, K., Ogradniczuk, J. S., & Söchting, I. (2016). The relation between outcome expectation, therapeutic alliance, and outcome among depressed patients in group cognitive-behavioral therapy. *Psychotherapy Research*, 1-11.
- Vong, S. K., Cheing, G. L., Chan, F., So, E. M., & Chan, C. C. (2011). Motivational enhancement therapy in addition to physical therapy improves motivational factors and treatment outcomes in people with low back pain: A randomized controlled trial. *Archives of Physical Medicine and Rehabilitation*, 92, 176-183.
- Wagner, C. C., & McMahon, B. T. (2004). Motivational interviewing and rehabilitation counseling practice. *Rehabilitation Counseling Bulletin*, 47(3), 152-161.
- Wampold, B. E. (2015). How important are the common factors in psychotherapy? An update. *World Psychiatry*, 14(3), 270-277.

- Wampold, B. E., & Imel, Z. E. (2015). *The great psychotherapy debate: The evidence for what makes psychotherapy work*. London, UK: Routledge.
- Weich, S., & Lewis, G. (1998). Poverty, unemployment, and common mental disorders: population based cohort study. *British Medical Journal*, *317*(11), 115-119.
- Wild, M. R., Engleman, H. M., Douglas, N. J., & Espie, C. A. (2004). Can psychological factors help us to determine adherence to CPAP? A prospective study. *European Respiratory Journal*, *24*(3), 461-465.
- Williams, G. C., Gagné, M., Ryan, R. M., & Deci, E. L. (2002). Facilitating autonomous motivation for smoking cessation. *Health Psychology*, *21*(1), 40-50.
- Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology*, *70*(1), 115-126.
- Williams, G. C., Lynch, M. F., McGregor, H. A., Ryan, R. M., Sharp, D., & Deci, E. L. (2006). Validation of the " Important Other" Climate Questionnaire: Assessing Autonomy Support for Health-Related Change. *Families, Systems, & Health*, *24*(2), 179.
- Williams, G. C., McGregor, H. A., Zeldman, A., Freedman, Z. R., & Deci, E. L. (2004). Testing a self-determination theory process model for promoting glycemic control through diabetes self-management. *Health Psychology*, *23*(1), 58-66.
- Williams, G. C., Niemiec, C. P., Patrick, H., Ryan, R. M., & Deci, E. L. (2009). The importance of supporting autonomy and perceived competence in facilitating long-term tobacco abstinence. *Annals of Behavioral Medicine*, *37*, 315-324.

- Williams, G. C., Rodin, G. C., Ryan, R. M., Grolnick, W. S., & Deci, E. L. (1998). Autonomous regulation and long-term medication adherence in adult outpatients. *Health Psychology, 17*(3), 269-276.
- World Health Organization (WHO). (2005). Bridging the “Know-Do” gap: Meeting on knowledge translation in global health. Retrieved from <https://www.measureevaluation.org/resources/training/capacity-building-resources/high-impact-research-training-curricula/bridging-the-know-do-gap.pdf>
- Wright, B. A. (1960). *Physical disability-A psychological approach*. New York, NY: Harper & Row.
- Wright, B. A. (1983). *Physical disability-A psychosocial approach*. New York, NY: Harper Collins Publishers.
- Zhang, Y., Graffigna, G., Bonanomi, A., Choi, K. C., Barello, S., Mao, P., & Feng, H. (2017). Adaptation and validation of a Chinese version of Patient Health Engagement Scale for patients with chronic disease. *Frontiers in Psychology, 8*, 1-9

**APPENDIX A**  
**INSTITUTIONAL REVIEW BOARD NOTICE OF APPROVAL**



**Education and Social/Behavioral Science IRB**

**Submission ID Number:** 2017-0759  
**Title:** Evaluating Self-determination as a paradigm for vocational rehabilitation engagement: A hierarchical regression analysis  
**Principal Investigator:** Fong Chan  
**Point-of-contact:** Kanako Iwanaga  
**IRB Staff Reviewer:** Laura Conger  
**Date of Determination:** 6/26/2017

The IRB has reviewed the study indicated above. Please review the determination indicated below and any additional guidance provided by the IRB. If you have questions about this determination, please contact the staff reviewer listed above. For additional information about this application, please log into your ARROW account at [arrow.wisc.edu](http://arrow.wisc.edu).

**Determination**

- Further IRB review is not required because, in accordance with federal regulations, your project:
- does NOT constitute research as defined under 45 CFR 46.102(d)
  - does NOT involve human subjects as defined under 45 CFR 46.102(f)
  - involves ONLY protocol development activities (PDA) that do not involve human subjects research pursuant to 45 CFR 46.102(d) and 46 CFR 46.102(f)

Additional information:

- Your study qualifies for exemption under category:
- 45 CFR 46.101(b)(1): Research in educational settings
  - 45 CFR 46.101(b)(2): Research involving the use of educational tests, surveys, interviews
  - 45 CFR 46.101(b)(3): Research involving the use of educational tests, surveys, interviews with public officials or required by federal statute
  - 45 CFR 46.101(b)(4): Research involving existing data or specimens
  - 45 CFR 46.101(b)(5): Demonstration projects
  - 45 CFR 46.101(b)(6): Taste and food quality evaluation

Although your study is exempt from federal regulations, UW-Madison Human Research Protection Program policy requires that all human subjects research be conducted in accordance with the highest ethical standards/Belmont Report.

Additional information:

## APPENDIX B

### STUDY QUESTIONNAIRE

#### Demographic Information

<b>1</b>	<b>Age</b>	<i>How old are you?</i> [            ]
<b>2</b>	<b>Gender (dummy)</b>	<input type="checkbox"/> Male <input type="checkbox"/> Female
<b>3</b>	<b>Race/ethnicity</b>	<i>Please indicate your race</i> <input type="checkbox"/> White <input type="checkbox"/> Hispanic <input type="checkbox"/> Black or African American <input type="checkbox"/> American Indian or Alaska Native <input type="checkbox"/> Asian <input type="checkbox"/> Native Hawaiian or Other Pacific Islander
<b>4</b>	<b>Educational attainment</b>	<i>What is the highest level of education?</i> <input type="checkbox"/> No formal schooling <input type="checkbox"/> Elementary education (grades 1-8) <input type="checkbox"/> Secondary education, no high school diploma (grades 9-12) <input type="checkbox"/> Special education certificate of completion/diploma or in attendance <input type="checkbox"/> High school graduate or equivalency certificate (regular education students) <input type="checkbox"/> Postsecondary education, no degree <input type="checkbox"/> Associate degree or Vocational/Technical Certificate <input type="checkbox"/> Bachelor's degree <input type="checkbox"/> Master's degree or higher
<b>5</b>	<b>Marital status</b>	<i>What is your marital status?</i> <input type="checkbox"/> Married <input type="checkbox"/> Cohabiting <input type="checkbox"/> Single <input type="checkbox"/> Divorced <input type="checkbox"/> Widowed <input type="checkbox"/> Separated
<b>6</b>	<b>SSI/ SSDI</b>	<i>If you receive any of the following forms of monthly public support, can you please provide the approximate amount that you receive?</i> [            ] Social Security Disability Insurance [            ] Supplemental Security Income (SSI) for the Aged, Blind or Disabled [            ] Temporary Assistance for Needy Families (TANF) [            ] Veteran's Disability Benefits [            ] Workers' Compensation [            ] Other Public Support

<b>7</b>	<b><i>Benefit counseling</i></b>	<i>Have you received benefit-counseling services?</i> <input type="checkbox"/> Yes <input type="checkbox"/> No
----------	--------------------------------------	--

## Vocational Rehabilitation Engagement

Using the scale below, indicate your level of agreement with each of the following statements.

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>
1	I strive to complete assignments and rehabilitation activities agreed upon with my rehabilitation counselor.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
2	I communicate with my rehabilitation counselor regularly.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
3	I show up for appointments related to my rehabilitation program.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
4	I understand and accept the need for vocational rehabilitation services.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
5	I recognize the benefits of participating in vocational rehabilitation activities.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
6	I am determined to complete all the services identified in my individualized plan for employment	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
7	I get along with my rehabilitation counselor.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
8	I am actively involved in planning of my rehabilitation program with my counselor.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>



## Functional Disability

*Think back over the past 30 days and answer these questions, thinking about how much difficulty you had doing the following activities. For each question, please select only one response.*

*In the past 30 days, how much difficulty did you have in:*

		None	Mild	Moderate	Severe	Extreme or cannot do
1	Standing for long periods such as 30 minutes?	1	2	3	4	5
2	Walking a long distance such as a kilometre [or equivalent]?	1	2	3	4	5
3	Washing your whole body?	1	2	3	4	5
4	Getting dressed?	1	2	3	4	5
5	Taking care of your household responsibilities?	1	2	3	4	5
6	Dealing with people you do not know?	1	2	3	4	5
7	Maintaining a friendship?	1	2	3	4	5
8	How much of a problem did you have joining in community activities (for example, festivities, religious or other activities) in the same way as anyone else can?	1	2	3	4	5
9	Concentrating on doing something for ten minutes?	1	2	3	4	5
10	Your day-to-day work?	1	2	3	4	5
11	How much have you been emotionally affected by your health problems?	1	2	3	4	5
12	Learning a new task, for example, learning how to get to a new place?	1	2	3	4	5

*Personal Factors***Disability Acceptance**

*Please indicate the extent to which you agree with each of the following statements:*

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>
1	I am a person of value even though I have a disability.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
2	Although I have functional/cognitive limitations, I can manage my daily tasks.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
3	I do not think about what I have lost as a result of my disability.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
4	Compared to other people, I am just as good as they are.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
5	Regardless of how others see me, I know that I have personal strengths.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
6	I may be different from other people, but I am not any better or worse than they are.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
7	I value my personal abilities and character strengths, and I don't need to compare myself to others.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
8	My disability is just one part of me and it does not represent all aspects of myself.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

## Resilience

*Please indicate the extent to which you agree with each of the following statements:*

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>
1	I tend to bounce back quickly after hard times.	1	2	3	4	5
2	It does not take me long to recover from a stressful event.	1	2	3	4	5
3	I usually come through difficult times with little trouble	1	2	3	4	5
4	r_I have a hard time making it through stressful events.	1	2	3	4	5
5	r_It is hard for me to snap back when something bad happens.	1	2	3	4	5
6	r_I tend to take a long time to get over set-backs in my life.	1	2	3	4	5

## Social Functioning

Please rate how certain you are that you can do each of the activities described below.

		Not well at all			Very well	
1	Express your opinion to people who are talking about something of interest to you?	1	2	3	4	5
2	Work or study well with others?	1	2	3	4	5
3	Help someone new become part of a group to which you belong?	1	2	3	4	5
4	Share an interesting experience you had with other people?	1	2	3	4	5
5	Actively participate in group activities?	1	2	3	4	5

## Agreeableness

Here are a number of personality traits that may or may not apply to you. Please indicate the extent to which you agree or disagree with each statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other. I see myself as:

		Strongly disagree	Disagree	Unsure	Agree	Strongly agree
1	r_“Critical, quarrelsome.”	1	2	3	4	5
2	“Sympathetic, warm. “	1	2	3	4	5

***Environment Factors*****Perceived Social Support**

*Please rate the following items using the scale provided.*

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>
1	My friends/family have helped out with responsibilities at home	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
2	My friends/family are available to talk to me about my work-related problems	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
3	My friends/family would help if I needed transportation	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
4	My friends/family care about what happens to me	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
5	My friends/family would help me if I was having problems due to my disability.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

## Perceived Social Stigma

*Please rate the following statements using the following rating scale.*

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>
1	Employers are uncomfortable hiring individuals with disabilities	1	2	3	4	5
2	Employers often make the assumption that people with disabilities require extra time to learn new work tasks.	1	2	3	4	5
3	Employers assume people with disabilities will have trouble getting their work done on time and often needs others to help them finish the job.	1	2	3	4	5
4	Employers frequently assume people with disabilities will be sick more often than other workers due to their disabilities.	1	2	3	4	5
5	Employers think that people with disabilities are not reliable.	1	2	3	4	5

*SDT and SET Variables***Autonomy Support**

*Please use the following rating scale to choose the rating that best describes your opinion.*

		<b>Extremely unlikely</b>		<b>Neither unlikely or likely</b>			<b>Extremely likely</b>	
1	My close friends think that I should try to get a job.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
2	My family members think that I should find a job.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
3	My counselors thinks that I I should try to find a job.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
4	Most people whose opinions I value think that I need to go to work.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
5	My family and friends believe strongly about the values of hard work.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>

**Autonomy (Intrinsic and identified)**

*Using the scale below, indicate your level of agreement with each of the following statements.*

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>
1	I want to work because I get a pleasant satisfied feeling after a hard day at work. [Intrinsic]	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
2	I want to work because it is fun [intrinsic]	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
3	I want to work because I value the social and financial benefits of work. [identified]	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
4	I want to work because it is important to make the effort to go to work. [identified]	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>



## Working Alliance

*This brief scale is used to gauge your current relationship with your counselor. The following sentence describes some different ways you may feel or think about your counselor. Using the following seven-point scale, respond to every item quickly with your first impression.*

		Never	Rarely	Occasionally	Sometimes	Often	Very often	Always
1	The counselor and I agree about steps to be taken to improve the VR process. (Task)	1	2	3	4	5	6	7
2	The counselor and I both feel confident that our current activity in the VR process is helpful. (Task)	1	2	3	4	5	6	7
3	I believe this counselor likes me. (Bond)	1	2	3	4	5	6	7
4	I have doubt about what are trying to accomplish in the rehabilitation plan. (Goal)	1	2	3	4	5	6	7
5	I am confident in the counselor's ability to help me. (Bond)	1	2	3	4	5	6	7
6	We are working toward mutually agreed upon goals. (Goal)	1	2	3	4	5	6	7
7	I appreciate this counselor as a person. (Bond)	1	2	3	4	5	6	7
8	We agree on what is important for me to work on. (Task)	1	2	3	4	5	6	7
9	The counselor and I have built mutual trust. (Bond)	1	2	3	4	5	6	7
10	The counselor and I have different ideas regarding what is important in the rehabilitation plan. (Goal)	1	2	3	4	5	6	7
11	We have established a good understanding between us regarding the kind of changes that would be good for me. (Goal)	1	2	3	4	5	6	7
12	I believe the way we are working with my problem is correct. (Task)	1	2	3	4	5	6	7

### Job Performance Self-efficacy

*Please rate how certain you are that you can do each of the activities described below. Please rate your degree of confidence by checking a number from 0 to 5 using the scale given below*

		<b>Strongly disagree</b>	<b>Disagree</b>	<b>Unsure</b>	<b>Agree</b>	<b>Strongly agree</b>
1	I have the physical stamina for a full-time job.	0	1	2	3	4
2	I know how to maintain regular work attendance on the job.	0	1	2	3	4
3	I know how to get along with supervisors.	0	1	2	3	4
4	I know how to be a team player at work.	0	1	2	3	4
5	I know how to maintain appropriate attention and concentration on the job.	0	1	2	3	4
6	I know how to maintain good personal hygiene at work.	0	1	2	3	4
7	I know how to accept criticism from supervisors.	0	1	2	3	4
8	I know how to manage my emotions on the job.	0	1	2	3	4
9	I know when to seek help at work when needed.	0	1	2	3	4
10	I know how to cope with discouragements from people who are important to me.	0	1	2	3	4
11	I can determine what is appropriate to wear to work.	0	1	2	3	4

### Job Seeking Self-efficacy

*Please rate how certain you are that you can do each of the activities described below. Please rate your degree of confidence by checking a number from 0 to 5 using the scale given below*

		Strongly disagree	Disagree	Unsure	Agree	Strongly agree
1	I know how to prepare for jobs that is of interest to me.	0	1	2	3	4
2	I know my skills and abilities and how they related to jobs I am interested in.	0	1	2	3	4
3	I know how to prepare a cover letter and resume.	0	1	2	3	4
4	I know how to talk about my skills and abilities in a job interview.	0	1	2	3	4

### Outcome Expectancy (Positive)

*Using the scale below, please indicate the extent to which you agree or disagree with each of the following statements.*

*Completing my vocational rehabilitation program will likely allow me to:*

		Strongly disagree	Disagree	Unsure	Agree	Strongly agree
1	have a job that is good for my lifestyle	1	2	3	4	5
2	do work that I would find satisfying	1	2	3	4	5
3	find a job that I can do well	1	2	3	4	5
4	work for an employer who would be supportive of individuals with disabilities	1	2	3	4	5
5	have a job with good pay and benefits	1	2	3	4	5
6	go into a field with high employment demand	1	2	3	4	5