Health, employment, and disability for individuals with co-occurring serious mental illness and chronic physical health conditions

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Abstract

Individuals with serious mental illness (SMI) experience high rates of chronic physical health conditions, unemployment, and disability receipt (i.e., Supplemental Security Income/Social Security Disability Insurance). While numerous barriers to employment exist, people with SMI generally express a desire to work. While it is known that a person's health affects their employment, little research has examined the contributions of physical health on employment outcomes for people with SMI. This study examined bivariate and multivariate relationships between healthcare utilization, health-related quality of life, employment, and disability, using a sample of individuals with SMI (N = 648), with special attention to those with co-occurring physical health conditions. Findings from structural equation modeling suggested that individuals with a co-occurring physical health condition had higher healthcare receipt and lower health-related quality of life compared to those with SMI only. Additionally, healthcare receipt and health-related quality of life mediated relationships between a physical health condition and employment status, and physical health-related quality of life had a stronger relationship with employment than mental health-related quality of life. Important implications for disability policies and programming are discussed.

Disclosures

The research reported herein was performed pursuant to a grant from Policy Research, Inc. as part of the U.S. Social Security Administration's (SSA's) Analyzing Relationships Between Disability, Rehabilitation and Work. The opinions and conclusions expressed are solely those of the author and do not represent the opinions or policy of Policy Research, Inc., SSA or any other agency of the Federal Government. Some of these findings, including a discussion of some of the results provided in this report in the context of social work practice and health policy, can be found in the dissertation by O'Neill (2018).

Background

Rising chronic physical health condition rates in the U.S. affect individual and public health (Ward & Schiller, 2013), and amplify concerns regarding increasing rates of disability income receipt in the U.S. (Insel, 2008). Adults with serious mental illness (SMI), for example those diagnosed with bipolar disorder, major depression, or schizophrenia, are at higher risk for chronic physical health conditions, including increased rates of multiple chronic physical health conditions (Lee, Black, & Held, 2016), and increased prevalence of specific conditions, such as obesity, diabetes mellitus, cardiovascular disease (CVD), coronary heart disease, stroke, and chronic obstructive pulmonary disease (COPD; DeHert et al., 2011; Razzano et al., 2015; Smith, Easter, Pollock, Pope, & Wisdom, 2013). People with SMI also have high rates of disability income receipt (e.g., Luciano, Nicholson, & Meara, 2014; Pratt, 2012), as well as high rates of unemployment (e.g. Luciano & Meara, 2014). Importantly, however, adults with SMI often express a desire to be employed (e.g., Westcott, Waghorn, McLean, Statham, & Mowry, 2015), and employment supports are available to many people with SMI. Given that a person's health is related to disability and employment outcomes, and that people with SMI are likely to have co-occurring chronic physical health conditions, it is critical that relationships between physical health conditions, employment, and disability receipt are examined for people with SMI.

Clinical healthcare services are one contributing factor to an individual's health, and co-occurring mental and physical health conditions are associated with increased healthcare costs and utilization (e.g., Choi, Lee, Matejkowski, & Baek, 2014; Shen, Sambamoorthi, & Rust, 2008). Healthcare spending in the U.S. amounted to $3.2 trillion in 2015, a 5.8 percent increase from 2014, and is expected to further increase by an average of 5.8 percent annually between 2015 and 2025 (Centers for Medicare and Medicaid Services [CMS], 2016). These mounting healthcare costs are attributed to advances in costly technology, worse health status (e.g., obesity), increased health insurance spending and access to specialty healthcare, and to a smaller extent, the aging population (Ginsburg, 2008). People can receive healthcare from a variety of sources, and available research suggests that co-occurring mental and physical health conditions are associated with higher utilization of emergency services (e.g., Egede, 2007; Shen et al., 2008), and higher overall healthcare expenditures (e.g., Choi et al., 2014; Lee, Rothbard, & Choi, 2015). These healthcare utilization and spending patterns increase individual and societal healthcare costs, however, higher utilization may produce good and stable health as well as improved employment success for individuals with SMI.

Employment is related to an individual's income, savings, and wealth potentials, and unemployment increases societal costs, such as the provision of unearned income (Chan, Hirai, & Tsoi, 2015; Leddy, Stefanovics, & Rosenheck, 2014). In addition to experiencing high rates of unemployment, individuals with SMI are less likely to transition out of unemployment, take more time off work, work fewer hours per week, and have lower incomes (e.g., Baldwin & Marcus, 2014; Ettner et al., 1997; Lanuza, 2013; Luciano & Meara, 2014). While reported unemployment rates for people with SMI vary in the literature, a recent nationally-representative U.S. study found that 54.4 percent of individuals with SMI were unemployed (Luciano and Meara, 2014). In addition to being desired by individuals with SMI (e.g., Westcott et al., 2015), employment can improve self-esteem and quality of life (Abraham, Ganoczy, Yosef, Resnick, & Zivin, 2014; Bond et al., 2001), reduce costs and utilization for outpatient and institutional

mental health services (Bush, Drake, Xie, McHugo, & Haslett, 2009), and decrease dependence on unearned income (Chan et al., 2015).

One key economic benefit for broader society that results from stable employment for persons with SMI, is the potential for reduced dependence on Social Security Disability Insurance (SSDI) or Supplemental Security Income (SSI). To qualify for either SSDI or SSI, individuals must demonstrate they are unable to work for a period of 12 months or more due to a medically-determinable impairment (SSA, 2016). However, important distinctions between SSDI and SSI are present. Excepting specific circumstances (e.g., those who qualify due to a deceased spouse or parent), to qualify for SSDI individuals must have worked a set number of quarters recently and in their lifetime, and the disability benefit provided to the individual varies, averaging approximately $1,200 per month (SSA, 2016). Individuals who do not meet the work requirement for SSDI can qualify to receive SSI, a means-tested program, which in 2018 provided a maximum benefit of $750 (SSA, 2016; 2018). Importantly, given that SSI is means-tested, qualified individuals are likely to be living in poverty which places them at increased risk for chronic physical health conditions (e.g., Braveman, 2012).

Persons with SMI are more likely to receive both SSI and SSDI compared to members of the U.S. population without SMI (Pratt, 2012), and this has consequences for both the individual (i.e., decreased income) and broader society. While only approximately 4% of the U.S. population is diagnosed with SMI (Center for Behavioral Health Statistics and Quality, 2016), persons with SMI represent approximately 26-28% of all SSDI beneficiaries (SSA, 2015a), and approximately 39% of all SSI beneficiaries (SSA, 2015b). These elevated rates of SSDI and SSI receipt result in high economic costs to society. Insel (2008) calculated that in 2002, disability benefits from SSI and SSDI accounted for an economic burden of approximately $24.3 billion among adults with SMI in the U.S., an increase from $16.4 billion ten years prior in 1992. Given this trend, it is likely the economic costs of SSI and SSDI have increased since 2002. The economic costs of disability income receipt for persons with SMI are further compounded by the fact that they tend to be younger than those with other beneficiaries (Livermore & Bardos, 2017), increasing potential lifetimes costs. Beneficiaries with SMI also are more likely to be female, have children, live alone, and to live in poverty, compared to those with other disabilities (Livermore & Bardos, 2017).

The Social Security Administration (SSA) offers support to assist individuals in returning to work, while allowing for retention of all or a portion of their disability income benefits and health insurance while participating in competitive employment (SSA, 2016). Work incentives have evolved over time (Kearney, 2005), but currently incentives are mainly provided through the Ticket to Work and Work Incentives Improvement Act (1999). This act established incentives and supports for individuals receiving SSDI or SSI to return to work, eliminated several disincentives that were previously in place, and expanded access to health insurance through continuation of Medicare or Medicaid benefits (Ticket to Work and Work Incentives Improvement Act, 1999). To this end, government-funded (SSA, 2016) and evidence-based (e.g., Drake, Bond, & Becker, 2012) employment interventions are available to improve employment outcomes, including return-to-work, for individuals with SMI who are SSI or SSDI beneficiaries.

Research suggests evidence-based employment interventions can be effective at improving employment outcomes, increasing individual income, and decreased governmental costs related to disability income and other social welfare programs, for individuals with mental health conditions (e.g., Bond, Xie, & Drake, 2007; Cook & Burke-Miller, 2017; Cook, Burke-

Miller, & Roessel, 2016; Drake, Skinner, Bond, & Goldman, 2009), including for both disability beneficiaries and non-beneficiaries. However, the expense of offering the service provides access barriers (Drake et al., 2009). Recently, SSA funded a time-limited Supported Employment Demonstration project, which provides evidence-based supported employment to persons with SMI who were denied SSDI, providing an opportunity for increased access to employment services (Karakus, Riley, & Goldman, 2017). A study by Livermore & Bardos (2017), found that disability income beneficiaries with SMI were more likely to use employment services and report a desire to work, however also reported more barriers to employment. Thus, barriers to employment for individuals with mental health conditions must be reduced to promote both individual and societal employment and economic benefits.

In addition to structural barriers to employment (e.g., transportation, ability to find appropriate job), research focused on predictors and barriers to employment for individuals with SMI has primarily focused on mental health-related clinical indicators (e.g. psychiatric hospitalization, symptomology, and substance abuse), medication, cognitive functioning, and education (e.g., Ellinson, Houck, & Pincux, 2007; Luciano & Meara, 2014; Luo, Cowell, Musuda, Novak, & Johnson, 2010). While these factors are clearly important, employment-research for individuals with SMI rarely considers factors related to physical health, even though research suggests that physical health is related to employment (e.g., Chirikos & Nestel, 1985; Kahn, 1998). Theoretical models also provide support for relationships between health, healthcare, and employment, which can be used to examine these same relationships for individuals with co-occurring mental and physical health conditions. The health as human capital model for the production of health and employment (Grossman, 1972; 2000) suggests that healthcare may improve health and employment outcomes for persons with co-occurring conditions. While empirical research provides support for Grossman's (1972) model among samples of individuals with mental or physical health conditions (e.g., Birch et al., 2000; Chirikos & Nestel, 1985; Ettner et al., 1997), the model has not been tested with individuals who have co-occurring mental and physical health conditions. At the same time, the social determinants of health (SDOH) framework (Solar & Irwin, 2010) describes mechanisms by which structural factors (e.g., race, gender, and SES) influence individual health and socioeconomic position, and the behavioral model of health service utilization (Andersen, 1995; Andersen & Newman, 1973) describes relationships between healthcare service need, access, and utilization.

Given rising chronic conditions rates, a heightened interest in healthcare access following the passage of the Affordable Care Act (2010) and current debates surrounding its possible repeal, and calls from Federal and State governments to decrease spending related to unemployment and unearned income, it is important to consider relationships between chronic physical health conditions, healthcare receipt, health-related quality of life (HRQOL), and employment. Empirical research suggests that individuals with co-occurring conditions have higher utilization of healthcare services, lower HRQOL, and poorer employment and disability outcomes. However, there is a need for research that examines whether healthcare produces better health, and in turn better employment outcomes, for adults with co-occurring physical and mental conditions. The SDOH framework (Solar & Irwin, 2010), behavioral model for healthcare utilization (Andersen, 1995; Andersen & Newman, 1973), and health as human capital model (Grossman, 1972; 2000) together provide a research framework to examine these relationships for individuals with co-occurring conditions. This study examined two broad research questions regarding health conditions, healthcare, HRQOL, and employment for

individuals with SMI: 1) What are the differences in healthcare receipt, HRQOL, employment, and disability income receipt for individuals with co-occurring physical health conditions, compared to individuals with SMI only?; 2) Do healthcare receipt, physical HRQOL, and mental HRQOL mediate relationships between the presence of a chronic physical health condition and employment, for individuals with SMI?

Methodology

Data Source

This study used data from panels 17, 18, and 19 of the Medical Expenditures Panel Survey (MEPS) Household Component, which included data collected between 2012 and 2015 (AHRQ, n.d.). The MEPS is a large nationally representative survey, conducted annually by the Agency for Healthcare Research and Quality (AHRQ) since 1996 (AHRQ, 2009). A stratified multistage probability sampling design is used, and sampling weights are provided (AHRQ, 2008). Data is collected from individuals and families at five points over a two-year period, and this panel design allows for temporal ordering among the variables included in this study.

Sample

The sample for this study included adults between 18 and 70 years of age who reported a SMI diagnosis (N=648). The full retirement age in the U.S. ranges between 65 and 67 years, depending on a person's birth year (Social Security Administration, n.d.). However, some individuals retire early, while others may need to work beyond the typical retirement age due to low wealth or insufficient/absent retirement benefits. Individuals over age 70 were excluded from the sample to minimize sample selection bias due to their being categorized as unemployed when they left the labor force due to retirement and no intent to return. The presence of SMI was measured using the ICD-9 codes 295, 296, and 298, which represent diagnoses of major depressive disorder, bipolar disorder, schizophrenia, and other psychotic disorder/psychosis (AHRQ, 2014; 2015; 2016; 2017).

Appendix B describes the sample characteristics. The sample was primarily female (59.7%), identified as Caucasian/white (68.1%), had public health insurance (56.6%), had a mean age of 42.82 years, and had an average educational level that fell within the GED/high school diploma category. Approximately 30% of study participants reported being employed at the beginning of the survey period. Among those unemployed, the vast majority reported not working due to illness/disability (69.9%), however only 43.8% of participants reported receiving disability income. Approximately 81% of individuals with SMI reported being diagnosed with at least one priority health condition; the five most common diagnoses reported were joint pain (49.9%), hypertension (44.0%), high cholesterol (41.6%), arthritis (38.9%), and asthma (24.6%) (see figure 1).

Variables

Priority health conditions. Presence of an AHRQ priority health condition in the first year of data collection was the exogenous variable. AHRQ priority conditions included: angina, heart attack, hypertension, high cholesterol, cancer, emphysema, chronic bronchitis, asthma, coronary heart disease, joint pain, other heart disease, stroke, diabetes, and arthritis (e.g., AHRQ, 2014, 2015). Each diagnosis was included in descriptive analyses of the sample. Additionally, a

variable that indicated whether a person had any (i.e., one or more) AHRQ priority health condition was computed.

Healthcare receipt. Healthcare receipt in year one of data collection was one of the endogenous variables in the model. Healthcare receipt was measured using four, self-report, continuous variables regarding number of office-based physician visits, office-based nurse/nurse practitioner visits, office-based physician assistant visits, and emergency room visits. An outlier of 362 was removed from the nurse/nurse practitioner indicator, and this value was replaced with a 46 (the next highest value). Univariate normality testing indicated violations to skewness and kurtosis for each of the four healthcare receipt indicators (Kendall & Stewart, 1958), thus logarithmic transformations were completed and used for hypothesis testing. After the log-transformations were performed, violations to normality were still noted for all specific healthcare receipt indicators, except physician visits, due to the large number of 'zero' responses.

CFA. A single latent variable, that was proposed to represent healthcare receipt, was tested using confirmatory factor analysis (CFA; see figure 2). Given that this proposed latent variable was exploratory, three CFA models were fit to the data that treated these indicators as continuous and categorical: 1) all four indicators included as continuous variables; 2) physician office visit measure included as continuous, all others included as three-level categorical variables; and 3) physician office visit measure included as continuous, all others included as two-level categorical variables. Physician office visit was left as continuous in all CFA models because normality was indicated following log transformation for this variable.

Both general (chi-square, CFI/TLI, RMSEA) and specific (examination of residuals) fit indices were examined to determine the adequacy of fit for these measurement models, and parameters were examined in terms of statistical significance. Model 1, with all indicators included as continuous variables, did not converge at 1,000 iterations. While models 2 and 3 indicated good general fit with the data, none of the parameters were statistically significant. Given these results, and that the specification of a latent construct was exploratory, healthcare receipt was included as an observed variable, with all sources of healthcare receipt summed together. Additionally, a log-transformed version of the variable was used in all analyses due to unacceptable levels of skewness and kurtosis.

HRQOL. HRQOL is a multidimensional construct that includes perceptions of health-related physical, mental, emotional, and social functioning (Centers for Disease Control and Prevention, 2016; Office of Disease Prevention and Health Promotion, 2017), and is the preferred health status variable in developed countries (Currie & Madrian, 1999) and commonly used in social and behavioral sciences research (e.g., Calvert, Isaac, & Johnson, 2012; Carlozzi & Tulsky, 2013). HRQOL was measured with the Medical Outcomes Survey Short-Form 12 (SF-12; Ware, Kosinski, & Keller, 1996), a widely-used instrument for assessing HRQOL (Morris, Devlin, Parkin, & Spencer, 2012). The SF-12 includes twelve questions that ask about a respondent's general health, physical and emotional limitations, and physical and emotional health characteristics, and has been validated with various samples (Ware et al., 1996), including individuals with SMI (Chum et al., 2016; Salyers et al., 2000). MEPS participants completed the SF-12 in both the first and second year of data collection. SF-12 data collected during the first year were used for descriptive analyses, while data collected during round four (i.e., second year) were used for hypothesis testing.

Measurement research has varied for the SF-12, with some research suggesting two correlated latent factors, other research suggesting two uncorrelated latent factors, and some research suggesting correlated unique factors and a cross-loading (e.g. Anagnostopoulos, Niakas,

& Tountas, 2009; Chum et al., 2016; Ware et al., 1998; Wilson, Tucker, & Chittleborough, 2002). Using data from a sample of individuals with SMI, Chum and colleagues (2016) tested four measurement models that progressively added parameters to reflect the varying research, and found that a correlated two factor model, with correlated unique factors, and the general health indicator cross-loading on both latent factors, had the best fit with the data. Due to the varying measurement research, this process was replicated to identify the best measurement model for HRQOL in this study.

CFA. The following models were tested: 1) two uncorrelated factors; 2) two correlated factors; 3) two correlated factors with correlated error residuals among selected indicators; and 4) two correlated factors with correlated error residuals as specified in model three, and the first indicator cross-loading on both factors. After assessing the model fit statistics (see table 1), model 4 with two correlated latent factors, correlated indicator errors, and a cross-loading on x1 (see figure 3) was chosen for inclusion in the full SEM model. This finding was also consistent with the measurement research by Chum et al. (2016). While chi-square and RMSEA indicated concerns with model fit, CFI, TLI, the small number of absolute residuals > .1, and the chi-square difference test suggested model 4 provided the best fit with the data (see table 1). Additionally, all factor loadings were statistically significant (see figure 3), and indicators that loaded on only one factor had high standardized factor loadings (Cohen, 1969).

Table 1. General and specific model fit indicators for SF-12 CFA (n=590)

Model	**Chi-Square X^2, df, p**	**X^2 Diff. Test**	**RMSEA**	**CFI**	**TLI**	**# Absolute Residuals >.1**
Model 1	5564.101, 54, p<.001	--------	.416	.668	.619	37
Model 2	709.360, 53, p<.001	845.239, 1, p<.001	.145	.963	.954	10
Model 3	548.064, 49, p<.001	139.312, 4, p<.001	.131	.972	.962	5
Model 4	498.728, 48, p<.001	33.359, 1, p<.001	.126	.974	.965	3

Note: Chi-square difference test completed using the DIFFTEST function in Mplus. Statistic provided includes the difference in chi-square value and degrees of freedom between the two nested models, and the p-value of this difference.

Employment. The final endogenous variable in the model was employment, and was measured using a categorical employment status variable. Those who reported they were not employed at the time of the interview date were categorized as unemployed. For descriptive analyses, baseline employment status data were used; for hypothesis testing, employment status (i.e., employed vs. unemployed) data from the final round of data collection were used.

Covariates. Several variables were included as covariates due to their relationships with health, healthcare, and employment (Andersen, 1995; Andersen & Newman, 1973; Birch et al., 2000; Chirikos & Nestel, 1985; Grossman, 1972; 2000; Solar & Irwin, 2010). Baseline data from the first round of data collection were used for all covariates: sex (male or female), race/ethnicity (Hispanic, White only, Black only, Asian only, and other race or multi-race; categorized as White/non-White in SEM model), age (continuous), education (six-level categorical, treated a continuous), health insurance status (any public, any private, uninsured; yes/no in SEM model), and disability income status (SSI only, SSDI only, SSI and SSDI, or no disability income; yes/no in SEM model).

Analysis Plan

Descriptive and bivariate analyses (chi-square, t-test, or ANOVA, as appropriate) were completed in SPSS to describe the sample and examine group differences in healthcare receipt, HRQOL, and employment, between those with and without co-occurring physical health conditions. Then, structural equation modeling (SEM), chosen for its ability to test theoretical models and include latent variables (Kline, 2016), was completed in Mplus Version 7 to examine pathways between co-occurring physical health conditions, healthcare receipt, HRQOL, and employment, for individuals with SMI.

WLSMV was used as the estimator for SEM path analysis due to it being the preferred estimator for analyzing non-normal data and categorical indicators with fewer than five categories (Beauducel & Herzberg, 2006; Rhemtulla et al., 2012). The default method of pairwise deletion was used in the case of missing data. The variables with the most missing data were those derived from the SF-12 measure, however, only 9% of the sample was missing data for this measure (n=590 vs. N=648). Missingness was not allowed in terms of priority health condition and covariates, thus the full sample size for the analyses excluded participants missing data on any of these indicators (Muthén & Muthén, 2017). The final sample size for the SEM analysis was 645, a loss of only 3 participants.

Direct relationships. Direct relationships are analyzed using probit and linear regression coefficients. Probit regression coefficients are reported for relationships involving a categorical outcome (i.e., employment), while linear regression coefficients are reported for relationships with a continuous outcome (i.e., healthcare receipt and HRQOL). The probit regression coefficients can provide information regarding strength and direction of a relationship, however they cannot be meaningfully interpreted in the same way as other types of regression coefficients (e.g., linear, logistic), because the coefficients refer to a latent variable computed by Mplus to represent the binary outcome (Muthén & Asparouhov, 2015).

Mediation analyses: Partial mediation was hypothesized and tested using SEM. Hypothesis testing was completed using two methods: Sobel testing and bias-corrected (BC) bootstrapped confidence intervals. While the Sobel test is often used to test statistical significance of indirect effects in mediation analyses, it provides biased results due to non-normality of the indirect effect (MacKinnon, Fairchild, & Fritz, 2007). BC bootstrapped confidence intervals provide accurate confidence intervals and improves statistical power for detecting indirect effects without increasing the risk for Type I errors (MacKinnon, Lockwood, & Williams, 2004), however survey weights cannot be included. Thus, the SEM model was tested using the Sobel method with survey weights, and BC bootstrapped confidence intervals without survey weights, and compared for differences/similarities.

Results

Bivariate Relationships

Healthcare Receipt and HRQOL. Differences in healthcare receipt and HRQOL were examined for adults with co-occurring conditions, compared to adults with SMI only. Table 2 displays the sample means and results of independent t-tests of each category of healthcare receipt, total healthcare receipt, and for each component of HRQOL, by the presence of at least one priority health condition. Results indicated that a priority condition was associated with more total healthcare visits ($t = -6.214$, $p<.001$), and each specific type of healthcare, except for

nurse/nurse practitioner. The sample had a mean SF-12 PCS of 43.54, and a mean SF-12 MCS of 39.26. Independent t-test results indicated that participants with a priority health condition had lower physical HRQOL (t = 10.524, p<.001) and mental HRQOL (t = 3.466, p<.01) scores.

Table 2. Independent t-tests of healthcare receipt and HRQOL, by presence of a priority condition (n=648)

Variable name	Full Sample $\bar{x}$	No Priority Condition $\bar{x}$	Priority Condition $\bar{x}$	t
Physician Visits	7.95	4.17	8.82	-5.805***
Nurse/NP Visits	1.26	3.35	.79	-1.445
Phys. Assist. Visits	.18	.06	.21	-2.806**
Emergency Room	.63	.31	.70	-4.488***
Total all visits	9.54	5.27	10.52	-6.214***
SF-12 PCS	43.54	52.59	41.62	10.524***
SF-12 MCS	39.26	43.31	38.40	3.466**

Note. Priority condition and healthcare receipt data collected during the first year; SF-12 data collected during second year.
* p<.05, **p<.01, ***p<.001

Employment and Disability Receipt. Differences in employment status and disability income receipt for adults for co-occurring conditions, compared to adults to SMI only, were also examined. Table 3 displays crosstab and Pearson's chi-square test results for employment status and receipt of disability income, by the presence of at least one priority health condition.

Table 3. Crosstabs of employment and disability receipt[1] (N = 648)

Variable name	No Physical Condition N(%)	Physical Condition N(%)
Employment Status	X^2=4.249*	
Employed	48 (40.7%)	159 (30.8%)
Unemployed	70 (59.3%)	357 (69.2%)
Received any Disability Income	X^2=18.400***	
Yes	32 (26.4%)	252 (47.9%)
No	89 (73.6%)	274 (52.1%)
Received SSI	X^2=1.553	
Yes	26 (21.5%)	142 (27.0%)
No	95 (78.5%)	384 (73.0%)
Received SSDI	X^2=21.344***	
Yes	9 (7.4%)	143 (27.2%)
No	112 (92.6%)	383 (72.8%)
Received both SSI and SSDI	X^2=2.695	
Yes	3 (2.5%)	33 (6.3%)
No	118 (97.5%)	493 (93.7%)

Note. Number of missing not included in the calculation of number, percent, or mean. Bivariate differences calculated using Pearson's Chi-Square or Independent Sample t-test, as appropriate.
* p<.05, **p<.01, ***p<.001
[1]Employment data based on information collected during the final round of data collection. Disability income data reflect status during their first year of participation.

Results indicated participants with at least one priority condition were significantly more likely to be unemployed (X^2=4.249, p<.05), more likely to receive disability income from any source (X^2=18.400, p<.001), and specifically more likely to receive SSDI (X^2=21.344, p<.001). The presence of at least one priority health condition was not, however, significantly related to receipt of SSI or receipt of both SSI and SSDI. Congruent with health condition findings for the entire SMI sample, hypertension (58.8%), joint pain (53.9%), high cholesterol (51.4%), arthritis (48.6%), asthma (29.6%), and diabetes (23.2%) were the most prevalent conditions reported by those with SMI who received any type of disability income, however the incidence rates were higher than those for the full sample. Notably, the incidence rates of these most common conditions were all higher for those who received SSDI, except for asthma, which was higher for those who received SSI (results not shown in table). Given that the SSI program is means-tested, this finding may be related to the increased incidence of asthma among those living in poverty due to environmental conditions (e.g., Corburn, Osleeb, & Porter, 2006).

Multivariate SEM Findings

To examine the direct and indirect relationships between the variables, a path model controlling for sex, race/ethnicity, age, health insurance status, and disability receipt was fit to the data. General model fit indices were examined for both analysis methods, and were similar between methods. While the chi-square test of model fit suggested poor fit (Weighted X^2=434.549, p<.001; Unweighted X^2=528.499, p<.001), good model fit was reflected in the RMSEA (Weighted RMSEA=.058; Unweighted RMSEA=.066), CFI (Weighted CFI=.97; Unweighted CFI=.978), and TLI (Weighted TLI=.969; Unweighted TLI=.969) fit indices. The chi-square test penalizes larger sample sizes (Kenny, 2015; Kline, 2016), thus it is not surprising that the chi-square results for the full SEM models were statistically significant, and given that the other fit measures were within acceptable boundaries the specified theoretical model is determined to have acceptable fit with the data.

Factor loadings for the latent factors representing physical HRQOL and mental HRQOL were all statistically significant, and mirrored loadings found in the measurement model, with only very slight differences noted. Differences were similarly noted between the weighted and unweighted models for direct path coefficients, and in some cases differences in statistical significance were found. Approximately 54% of the variance in employment status (R^2=.541), 29% of the variance in physical HRQOL (R^2=.286), 13% of the variance in mental HRQOL (R^2=.125), and 15% of the variance in healthcare receipt (R^2=.145) was explained by the model.

Direct effects. Weighted standardized and unstandardized coefficients are provided for the direct effects in appendix C, and figure 4 displays unstandardized weighted path coefficients on the theoretical path model. Statistically significant direct effects were found for all variable-relationships depicted in the theoretical path model. A priority condition was positively related to healthcare receipt (β = .157, *b* = .366, p<.001) and employment (β = .346, *b* = .279, p<.05), and was negatively related to physical HRQOL (β = -.333, *b* = -.753, p<.001) and mental HRQOL (β = -.516, *b* = -.564, p<.001). A priority health condition had the strongest direct

relationship with physical HRQOL, and the weakest relationship with employment status. These results provide support for the hypothesized relationships between a priority condition and healthcare receipt, physical HRQOL, and mental HRQOL, however not for the hypothesized negative relationship between a priority condition and employment.

Healthcare receipt was negatively related to physical HRQOL (β = -.192, *b* = -.186, p<.001), mental HRQOL (β = -.317, *b* = -.149, p<.001), and employment (β = -.246, *b* = -.085, p<.05). Additionally, physical HRQOL (β = .829, *b* = .297, p<.01) and mental HRQOL (β = .271, *b* = .200, p<.05) were each positively related to employment. Relationships between physical HRQOL, mental HRQOL and employment provide support for those hypothesized, however the hypothesized positive relationships between healthcare receipt with each physical HRQOL, mental HRQOL, and employment, were not supported. Statistical significance was also found in many, but not all, covariate relationships (see appendix C). Of note, individuals who received disability income had higher healthcare receipt (β = .140, *b* = .325, p<.01), lower physical HRQOL (β = -.134, *b* = -.301, p<.01) and mental HRQOL (β = -.190, *b* = -.208, p<.01), and had a lower probability of employment (β = -.784, *b* = -.633, p<.001). Additionally, health insurance was only significantly related to healthcare receipt (β = .167, *b* = .388, p<.01).

Indirect effects. Indirect effect estimates (i.e., mediation analyses) using the Sobel method and BC bootstrapped confidence intervals are contained in tables 4 and 5. Eight specific indirect effects were tested. Weighted analyses that used Sobel testing, indicated statistical significance for all specific indirect effects except the path between a priority condition and employment that included both healthcare receipt and mental HRQOL. Unweighted analyses that used BC bootstrapped confidence intervals to test indirect effects indicated that all specific indirect paths were statistically significant, in that no confidence interval contained zero.

Table 4. Indirect effects using Sobel method-Any priority health condition, with survey weights (n=645)

Indirect Paths	Unstandardized		Standardized	
	Estimate	S.E.	Estimate	S.E.
Condition→ Healthcare→ Physical HRQOL	-.030**	.011	-.068**	.022
Condition→ Healthcare→Mental HRQOL	-.050*	.020	-.055*	.022
Condition→ Physical HRQOL→ Employment	-.277**	.100	-.223**	.081
Condition→ Mental HRQOL→ Employment	-.140*	.065	-.113*	.053
Condition→ Healthcare→Physical HRQOL→ Employment	-.025*	.012	-.020*	.010
Condition→ Healthcare→ Mental HRQOL→ Employment	-.014	.008	-.011	.006
Sum of indirect effects Condition →Employment	*-.455***	*.080*	*-.367***	*.066*
Healthcare→ Physical HRQOL→ Employment	-.159*	.065	-.055*	.023
Healthcare→ Mental HRQOL→ Employment	-.086*	.043	-.030*	.015
Sum of indirect effects Healthcare →Employment	*-.245***	*.060*	*-.085***	*.022*

Note. Weighted using the stratification and cluster variables provided by the MEPS. Indirect paths that included the priority health condition variable are standardized only in terms of the endogenous variables. Significance testing completed using Wald-z tests. S.E.=Standard Error. *p<.05, **p<.01, ***p<.001

Table 5. Indirect effects using bias-corrected bootstrapped confidence intervals-Any priority health condition, no survey weights (n=645)

Indirect Paths	Unstandardized		Standardized	
	Est.	95% C.I.	Est.	95% C.I.
Condition→ Healthcare→ Physical HRQOL	-.031	-.064, -.010	-.068	-.131, -.023
Condition→ Healthcare→ Mental HRQOL	-.050	-.103, -.013	-.054	-.113, -.015
Condition→Physical HRQOL→Employment	-.275	-.545, -.076	-.222	-.447, -.064
Condition→Mental HRQOL→Employment	-.145	-.326, -.013	-.117	-.259, -.016
Condition→ Healthcare→ Physical HRQOL→Employment	-.025	-.063, -.006	-.020	-.052, -.005
Condition→Healthcare→ Mental HRQOL→Employment	-.014	-.040, -.001	-.011	-.033, -.001
Sum of indirect effects Condition →Employment	*-.458*	*-.656, -.298*	*-.370*	*-.543, -.246*
Healthcare→ Physical HRQOL→ Employment	-.158	-.346, -.044	-.055	-.120, -.017
Healthcare→ Mental HRQOL→ Employment	-.087	-.225, -.011	-.030	-.080, -.004
Sum of indirect effects Healthcare → Employment	*-.244*	*-.395, -.124*	*-.085*	*-.138, -.044*

Note. Indirect paths that included the priority health condition variable are standardized only in terms of the endogenous variables. Statistical significance is indicated if the 95% confidence interval (C.I.) does not include zero.

Healthcare receipt partially mediated the relationship between a priority condition and physical HRQOL (approximately 8% of the total effect) and mental HRQOL (approximately 9% of the total effect). Partial mediation was also indicated for the indirect effect of healthcare receipt on employment. The specific indirect path that included physical HRQOL accounted for approximately 32% of the total effect, and the path that included mental HRQOL accounted for approximately 18% of the total effect. Notably, while the direct effect of a priority condition on employment indicated that a priority condition increased employment, mediation analyses indicated that that a priority condition was negatively related to employment. The addition of the mediators reversed the direction of the relationship between a priority condition and employment, suggesting inconsistent mediation (MacKinnon, Krull, & Lockwood, 2000). The vast majority of this change in relationship was due to the indirect path that included physical HRQOL only (approximately 60% of the sum of the indirect effect) and mental HRQOL only (approximately 31% of the sum of the indirect effect). Given that BC bootstrapped confidence intervals are preferable for testing indirect effects (MacKinnon et al., 2004), statistically significant mediation was indicated for all specific indirect paths and provides support for the relationships hypothesized.

Discussion and Implications

Given the theoretical and empirical literature on health, employment, and disability for people with SMI, this study was conducted to examine relationships between physical health conditions and healthcare receipt, disability income receipt, HRQOL, and employment. The findings provided partial support for the tested conceptual model and the theoretical frameworks that informed the specification of the model. Additionally, the findings provided important

descriptive information regarding trends in disability income receipt for individuals with the added burden of a physical health condition.

Healthcare and HRQOL for Individuals with Co-Occurring Conditions

As hypothesized, findings from this study indicate that physical health conditions are related to higher receipt of healthcare and lower physical and mental HRQOL, for persons with SMI. In agreement with prior research (Egede, 2007; Shen et al., 2008), those with physical health conditions had higher receipt of total healthcare, and higher physician, physician assistant, and emergency department use. These findings, however, present a new dimension from which to consider healthcare receipt for people with SMI, by using SMI only as the reference group. While higher healthcare use is associated with higher costs, not using needed healthcare may also be detrimental for individual health, and also for efforts to reduce healthcare costs in the event that emergency services are used instead of preventive or maintenance care. Thus, while the combination of SMI and physical health conditions is associated with more healthcare receipt, the increased receipt should not necessarily be viewed negatively. More research is needed to better understand these relationships, with attention to other important aspects of healthcare use (e.g., reason, quality, diagnosis-specific use standards).

Findings also indicate that co-occurring physical health conditions are associated with lower physical and mental HRQOL, adding to research by Salyers et al. (2000) by demonstrating these relationships in a multivariate context. Importantly, the findings regarding HRQOL show a connection between physical and mental health: the presence of a physical health condition was not only related to lower physical HRQOL, but also to lower mental HRQOL. While a causal relationship is not implied by these findings, it is possible that efforts to prevent or eliminate physical health conditions for persons with SMI will not only improve physical HRQOL, but also mental HRQOL, and perhaps even symptoms of their mental health condition.

This study also examined the relationship between healthcare and HRQOL and, informed by the health as human capital framework (Grossman, 1972; 2000), social determinants of health framework (Solar & Irwin, 2010), and the behavioral model for health service utilization (Andersen, 1995; Andersen & Newman, 1973), it was hypothesized that higher receipt of healthcare would be associated with higher post-receipt HRQOL. Findings, however, indicated that higher healthcare receipt was associated with lower post-receipt HRQOL. This finding is not completely surprising given empirical research that suggests a negative relationship (e.g., Salyers et al., 2000), and theoretical literature that suggests that more severe illness (i.e., lower HRQOL) is associated with higher healthcare receipt (Andersen, 1995; Andersen & Newman, 1973). It is possible that the time period between receipt of healthcare and HRQOL was too short to show the hypothesized health improvements, or that non-clinical healthcare (e.g., personal health behaviors) were important components of a person's HRQOL.

Relationships between Health, Disability Income, and Employment

Consistent with the existing literature (e.g., Luciano & Meara, 2014; Pratt, 2012; SSA, 2015a; 2015b), individuals with SMI in the current study had a high rate of unemployment (approximately 70%) and receipt of any disability income (approximately 44%). Additionally, findings indicated that individuals with a co-occurring physical health condition were more likely to report receiving any type of disability income, as well as SSDI specifically. Individuals with SMI who received any type of disability income were also found to have more total healthcare visit, lower physical and mental HRQOL, and not surprisingly, a lower probability of

being employed. Notably, while nearly 70% of unemployed persons indicated being unable to work due to illness or disability, only 43.8% of participants reported receiving disability income. Some of these individuals who are not receiving disability income may have an application in process or may have been denied due to not meeting the disability requirements. It is possible that intervening to assist these individuals to improve their health as well as to obtain employment supports, could ameliorate their health barriers to employment.

One of the primary purposes of this study was to examine relationships between healthcare, health, and employment for people with SMI and co-occurring physical health conditions, using a conceptual model informed by the health as human capital model (Grossman, 1972; 2000). Consistent with prior empirical and theoretical literature (e.g., Chirikos & Nestel, 1985; Ettner et al., 1997; Grossman, 1972; 2000), results of this study suggest that an individual's physical health conditions and physical and mental HRQOL are related to their employment status. At the bivariate level, the presence of at least one co-occurring physical health condition was associated with unemployment, and controlling for structural and illness severity factors, physical HRQOL and mental HRQOL were each directly related to employment status for the full sample of adults with SMI. Importantly, physical HRQOL had a stronger relationship with employment for persons with SMI than mental HRQOL. Additionally, physical and mental HRQOL mediated the relationship between priority health conditions and employment, and physical HRQOL accounted for the greatest percentage of the total indirect effect. These findings stress the importance of physical health to employment for individuals with SMI, advancing an understanding of important components of health that may improve employment for people with SMI, as well as for people with co-occurring physical health conditions. Additionally, it seems that considering the presence of physical health conditions in isolation is not the best indicator of health-related employment barriers for persons with SMI, and instead, comprehensive measures of health (i.e., HRQOL), are important predictors of employment. Thus, programming that strives to improve employment outcomes for people with SMI should assess for HRQOL, not just diagnosed health conditions.

Implications

The findings from this research suggest some important implications for disability policies and programming. In particular, the results point to a need for broad inclusion of physical health components in evidence-based employment interventions for people with SMI. Research has consistently shown that evidence-based employment interventions are effective for people with SMI, including for those currently receiving disability income who want to return to work (e.g., Bond et al., 2007; Cook & Burke-Miller, 2017; Cook et al., 2016; Drake et al., 2009; Gao et al., 2010). Individual Placement and Support (IPS) is the most common evidence-based employment intervention used with individiuals with SMI. As part of the IPS intervention, participants complete a career profile form that assesses a variety of barriers and facilitators to employment, including both mental and physical health (IPS Employment Center, 2018). The physical health assessment asks individuals about health problems and functional impairments (e.g., standing, sitting, climbing stairs). A strength of this assessment is the inclusion of physical health that includes diagnoses as well as possible ways that their physical health might impact their ability to work. However, notably, there are no questions regarding engagement in physical healthcare (e.g., identifying unmet needs), or medications for physical health conditions. Additionally, while the open-ended questions enable participants to share details about their health that may not be captured by quantitative questions, the reliance on open-ended questions

puts the onus on the clinician (e.g., employment specialist) completing the assessment to appropriately probe for further information. Given that the emphasis of IPS is on mental health symptoms and needs, employment specialists may not be as comfortable, or knowledgable, in assessing for physical health. Using IPS as an example, the findings of this study suggest that employment interventions that target, or include, people with SMI should ensure: 1) the intervention-workforce is competent to assess and intervene in terms of physical health and healthcare (specifically as it relates to individuals with SMI), in addition to their mental health and healthcare needs; 2) assessment procedures and documents comprehensively include physical health; and 3) treatment planning includes unmet physical health or healthcare needs that may affect an individual's HRQOL.

A benefit for disability recipients is the provision of comprehensive medical insurance coverage through Medicaid and/or Medicare. Following the enactment of the ACA, there has been a nationwide push for healthcare that integrates physical and mental health. The findings of the current study demonstrated a strong connection between mental and physical health for people with SMI, and support the provision of integrated physical and mental healthcare. Integrated physical and mental healthcare should be available to disability recipients to reduce access barriers to clinical healthcare, helping to improve the individual's health and possibly their return to work. Additionally, results from this study demonstrated a strong connection between health insurance coverage and receipt of healthcare. Health insurance is typically needed in the U.S. to gain financial access to clinical healthcare services, thus it is important that individuals with SMI and co-occurring physical health conditions have access to health insurance. SSA currently provides continuation of health insurance coverage for disability recipients that are attempting to return to work (SSA, 2016). While this study did not find that healthcare receipt was related to improved health, given the theoretical literature that supports this relationship, and the connection between health and employment for people with SMI demonstrated by the current study, it is vital that people with SMI have access to health insurance. Considering findings from the current study and the available theoretical and empirical literature, the connections between health insurance, healthcare access, health, and employment support the provision of insurance continuation for those returning to work. Importantly, ensuring access to stable and comprehensive health insurance for people with SMI who were denied disability benefits could help to reduce barriers to good health, and in turn improve employment outcomes and eliminate the need for future disability income.

Limitations

While this study adds to the literature on health and employment for individuals with SMI and physical health conditions, it is not without limitations. Importantly, this study does not establish causal links between the variables, assumes unidirectional relationships as proposed by Grossman (1972), and does not account for changes in employment or health over time. Data were collected via self-report and the time periods between data collection points for the variables may not have been long enough to detect a relationship or may not accurately reflect the strength of the relationship, which could affect reliability of the results. This study also excludes other important aspects of an individual's health such as symptom severity or the presence of co-occurring substance abuse, and healthcare receipt data does not provide details regarding the primary reason for the healthcare visit and only included four sources of healthcare. Thus, healthcare receipt data may include usage due to acute illnesses or injuries unrelated to priority health conditions. Also, there are healthcare system factors that are related

to healthcare access and utilization, but these factors were not part of the dataset. These systems factors are important to capture in future research.

The current study is also limited in terms of choice and measurement of included covariates. While covariates were carefully selected and included because of strong theoretical and empirical research that suggested relationships with the mediating and outcome variables, other factors related to these variables are not represented in the tested model. It is also important to note that categorical covariates were dichotomized due to statistical power concerns, as well as low percentages of participants in some categories. Notably, this study dichotomized race/ethnicity to reflect structural distributions of power (i.e., white vs. non-white), but this measurement method does not reflect differences that likely exist between non-white categories. Also, disability receipt was included as a dichotomous variable in the SEM model, which does not allow for important distinctions to be made between SSDI and SSI. Future research should take this into account given the differences in eligibility and benefits.

Conclusion

Many people with SMI express a desire to work, but encounter health-related barriers to obtaining and maintaining employment. As a consequence, a large percentage of those with SMI qualify for diability income benefits, which at best provide a modest income to meet daily needs, and do so at a high cost to U.S. society. People with SMI also experience high rates of co-occurring chronic physical health conditions and those physical conditions complicate their employment. Thus, in the quest to improve overall employment outcomes for people with SMI, special efforts should be made to elevate the assessment and intervention strategies regarding their physical health, including for disability beneficiaries with SMI who are trying to return to work.

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Appendix A
List of Acronyms

ACA	Affordable Care Act
AHRQ	Agency for Healthcare Research and Quality
ANOVA	Analysis of Variance
BC	Bias Corrected
CFA	Confirmatory Factor Analysis
COPD	Chronic Obstructive Pulmonary Disease
CVD	Cardiovascular Disease
CFI	Comparative Fit Index
CMS	Centers for Medicare and Medicaid Services
GED	General Equivalency Diploma
HRQOL	Health-Related Quality of Live
ICD-9	International Classification of Diseases, 9th Revision
IPS	Individual Placement and Support
MCS	Mental Component Scale (of the SF-12)
MEPS	Medical Expenditures Panel Survey
PCS	Physical Component Scale (of the SF-12)
RMSEA	Root Mean Square Error of Approximation
SDOH	Social Determinants of Health
S.E.	Standard Error
SEM	Structural Equation Modeling
SES	Socioeconomic Status
SF-12	Short Form-12
SMI	Serious Mental Illness
SSA	Social Security Administration
SSI	Supplemental Security Income
SSDI	Social Security Disability Insurance
TLI	Tucker Lewis Index
U.S.	United States
WLSMV	Weighted Least Squares Means and Variances

Appendix B. Demographic, health, and employment characteristics of sample (N = 648)

Variable name	Number (Percent)
Sex	
Male	261 (40.3%)
Female	387 (59.7%)
Race/Ethnicity	
Caucasian/White	348 (53.7%)
African American/Black	149 (23.0%)
Asian	9 (1.4%)
Other or Multiple Races	29 (4.5%)
Hispanic	113 (17.4%)
Health Insurance	
Private Health Insurance	205 (31.6%)
Public Health Insurance	367 (56.6%)
No Insurance	76 (11.7%)
Disability Income Status	
Any disability income	284 (43.8%)
Received SSI	168 (25.9%)
Received SSDI	152 (23.5%)
Received both SSI and SSDI	36 (5.6%)
Physical Health Condition	
Yes (At least one)	526 (81.3%)
Employment Status	
Employed	191 (29.6%)
Reason for Not Working	
Could not find work	31 (10.6%)
Retired	20 (6.8%)
Unable to work because of illness/disability	204 (69.9%)
Going to school	7 (2.4%)
Taking care of home or family	20 (6.8%)
Wanted some time off	1 (.3%)
Maternity/paternity leave	1 (.3%)
On temporary layoff	2 (.7%)
Other	6 (2.1%)

Continuous Variables

Variable Name	*Skewness*	*Kurtosis*	$\bar{x}$	Median	*SD*
Age	-.057	-1.014	42.82	43.00	13.34
Education[1]	.085	-.172	2.43	2	1.153

Note. Number of missing not included in the calculation of number, percent, or mean. Demographic data based on information collected in round 1 of data collection.

[1]Measured on a scale of 0-5. Mean and median fall within the "GED or HS Diploma" category.

Appendix C. Direct path coefficients-Any priority health condition, weighted (n=645)

	Unstandardized		Standardized	
	Coefficient	S.E.	Coefficient[1]	S.E.
Healthcare Receipt[2]				
Priority Condition	.157***	.044	.366***	.100
Sex	.102**	.035	.238**	.082
Age	.003*	.001	.104*	.045
Health Insurance	.167**	.050	.388**	.114
Education	.026	.016	.070	.043
Race/Ethnicity	-.044	.038	-.101	.087
Disability Receipt	.140**	.043	.325**	.097
Physical HRQOL				
Priority Condition	-.333***	.062	-.753***	.098
Healthcare Receipt[2]	-.192***	.048	-.186***	.036
Sex	-.074*	.037	-.167*	.081
Age	-.005**	.002	-.154**	.049
Health Insurance	.060	.061	.134	.138
Education	.034	.018	.088	.045
Race/Ethnicity	-.026	.035	-.059	.079
Disability Receipt	-.134**	.041	-.301***	.086
Mental HRQOL				
Priority Condition	-.516***	.095	-.222***	.040
Healthcare Receipt[2]	-.317***	.090	-.149***	.042
Sex	-.174*	.084	-.191*	.091
Age	.003	.003	.049	.048
Health Insurance	.134	.143	.146	.156
Education	.079*	.037	.100*	.046
Race/Ethnicity	-.014	.071	-.015	.078
Disability Receipt	-.190*	.076	-.208*	.083
Employment Status				
Physical HRQOL	.829**	.297	.297**	.101
Mental HRQOL	.271*	.118	.200*	.088
Healthcare Receipt[2]	-.246*	.123	-.085*	.043
Priority Condition	.346*	.166	.279*	.135
Sex	.037	.102	.030	.082
Age	.000	.004	-.004	.045
Health Insurance	.089	.175	.072	.141
Education	.234***	.054	.218***	.049
Race/Ethnicity	-.283*	.123	-.229*	.099
Disability Receipt	-.784***	.120	-.633***	.088

Note. Weighted using the stratification and cluster variables provided by the MEPS. Probit regression coefficients provided when employment is the outcome variable. All other coefficients are linear regression coefficients. S.E.=Standard Error. *p<.05, **p<.01, ***p<.001

[1]Relationships with a binary x-variable are standardized only in terms of y.

[2]Healthcare receipt estimates are in terms of the log-transformed variable.

Figure 1: Percentage of sample participants with each physical health condition

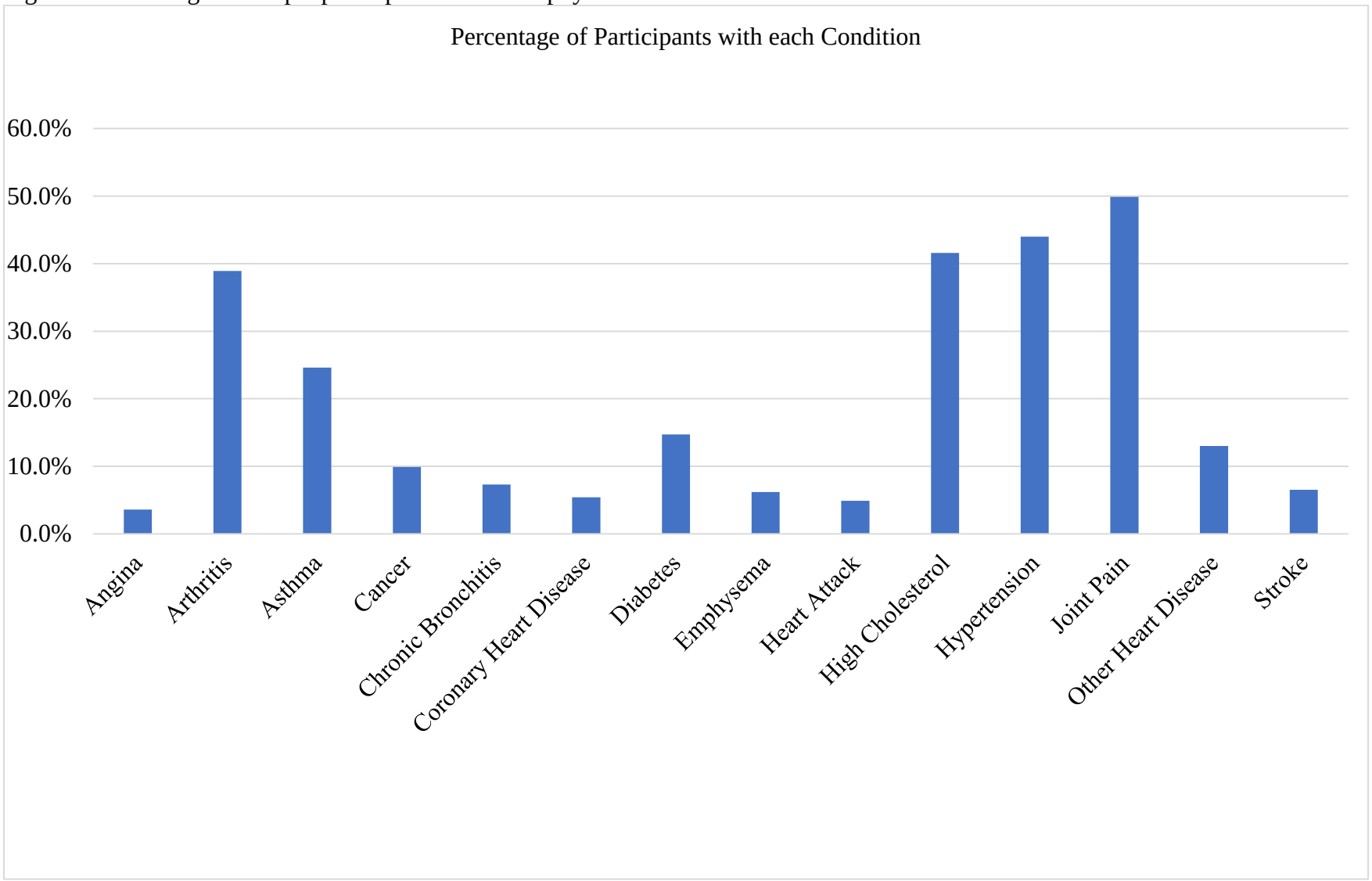


Figure 2. Healthcare receipt measurement model

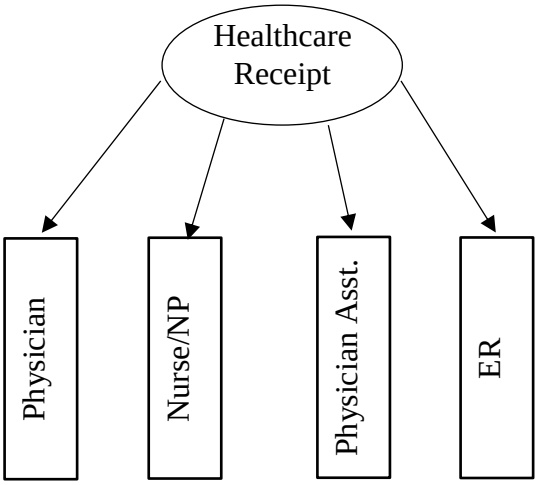
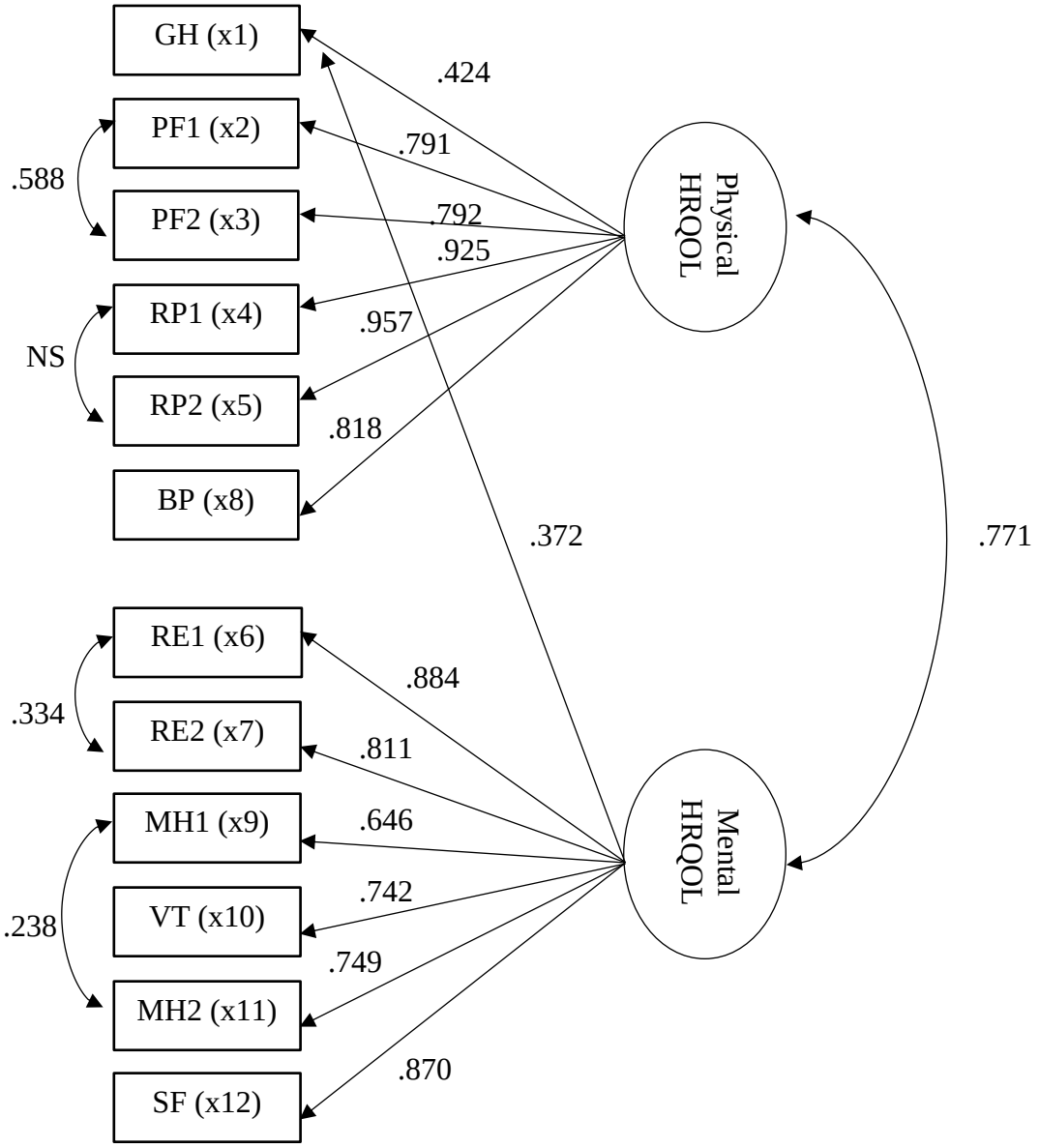
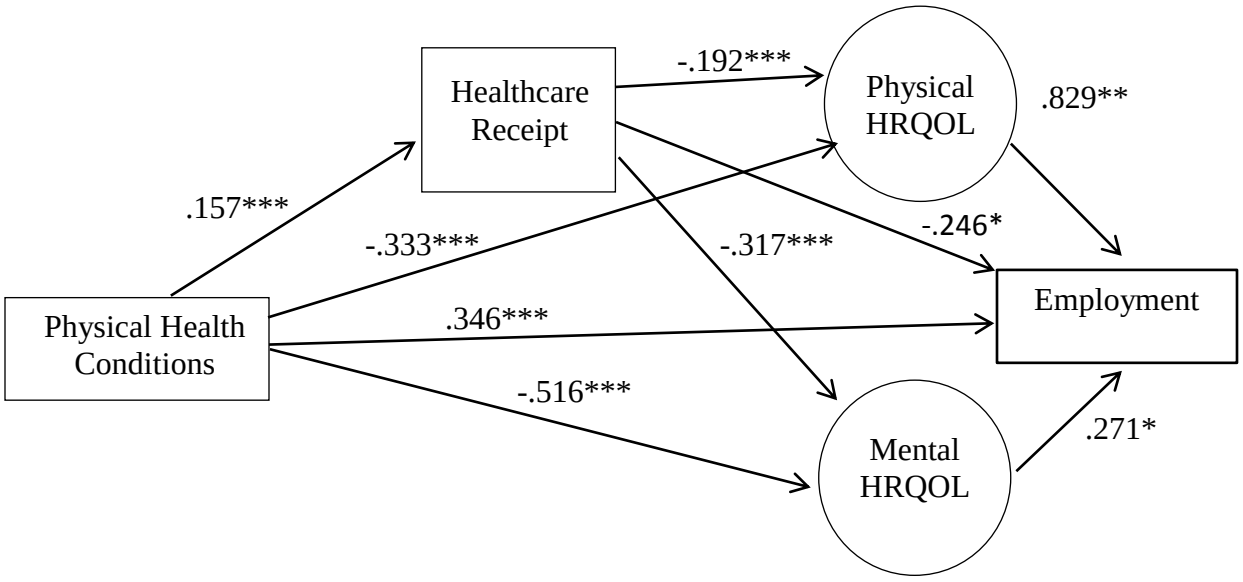


Figure 3. SF-12 CFA, two correlated latent factors with correlated errors and cross-loading



Notes: Standardized parameter statistics are provided, and all are statistically significant unless noted otherwise. NS-Not statistically significant. GH-General Health; PF1-Physical Functioning, moderate activities; PF2-Physical Functioning, climbing several flights of stairs; RP1-Role Functioning (physical), accomplished less; RP2-Role Functioning (physical), limited in the kind of work or other activities; BP8-Bodily Pain; RE1-Role Functioning (emotional), accomplished less; RE2-Role Functioning (emotional), less carefully than usual; MH1-Mental Health, calm and peaceful; VT-Vitality, energy; MH2-Mental Health, downhearted and depressed; SF-Social Functioning.

Figure 4. Unstandardized coefficients for theoretical paths in full SEM model, with survey weights



[1]Model controls for sex, race/ethnicity, age, health insurance, education, and disability receipt.
*p<.05, **p<.01, ***p<.001