



# HHS Public Access

Author manuscript

*Psychiatr Rehabil J.* Author manuscript; available in PMC 2018 December 01.

Published in final edited form as:

*Psychiatr Rehabil J.* 2017 December ; 40(4): 344–353. doi:10.1037/prj0000284.

## Consumer Factors Predicting Level of Treatment Response to Illness Management and Recovery

**Dominique A. White, M.S.,**

Department of Psychology, Indiana University-Purdue University Indianapolis

**Alan B. McGuire, Ph.D.,**

Health Services Research and Development, Indiana University-Purdue University Indianapolis

**Richard L. Roudebush, VAMC,**

Department of Psychology, Indiana University-Purdue University Indianapolis

**Lauren Luther, M.S.,**

Department of Psychology, Indiana University Purdue University Indianapolis

**Adrienne Anderson, M.A.,**

Department of Psychology, Indiana University-Purdue University Indianapolis

**Peter Phalen, and**

School of Psychological Sciences, University of Indianapolis

**John H. McGrew, Ph.D.**

Department of Psychology, Indiana University-Purdue University Indianapolis

### Abstract

**Objective**—This study aims to identify consumer-level predictors of level of treatment response to Illness Management and Recovery (IMR) in order to target the appropriate consumers and aid psychiatric rehabilitation settings in developing intervention adaptations.

**Methods**—Secondary analyses from a multi-site study of IMR were conducted. Self-report data from consumer participants of the parent study ( $n = 236$ ) were analyzed for the current study. Consumers completed pre-post surveys assessing illness management, coping, goal-related hope, social support, medication adherence, and working alliance. Correlations and multiple regression analyses were run in order to identify self-report variables that predicted level of treatment response to IMR.

**Results**—Analyses revealed that goal-related hope significantly predicted level of improved illness self-management, ( $F(1, 164) = 10.93, p < .001, R^2 = .248, R^2 \text{ Change} = .05$ ). Additionally, we found that higher levels of maladaptive coping at baseline were predictive of higher levels of adaptive coping at follow-up, ( $F(2, 180) = 5.29, p < .02, R^2 = .38, R^2 \text{ Change} = .02$ ). Evidence did not support additional predictors.

**Conclusions and Implications for Practice**—Previously, consumer-level predictors of level of treatment response have not been explored for IMR. Although two significant predictors were identified, study findings suggest more work is needed. Future research is needed to identify additional consumer-level factors predictive of IMR treatment response in order to identify who would benefit most from this treatment program.

### Keywords

illness management and recovery; predictors; psychosocial intervention; severe mental illness; psychiatric rehabilitation

---

Understanding consumer factors that predict responsiveness to an intervention can facilitate targeting the intervention to the appropriate consumers as well as highlight ways in which the intervention may be modified in order to better treat neglected consumer populations. Indeed, consumer factors account for a substantial portion of variation in outcomes in psychotherapeutic interventions; in some cases, up to 40% of variations in outcomes are due to consumer factors (Beutler, Bongar, & Shurkin, 2000; Blow & Sprenkle, 2001; Duncan & Miller, 2000; Hamilton & Dobson, 2002; Tallman & Bohart, 1999). Reviews of the effectiveness of therapeutic interventions (Wampold, 2013) and self-management programs (Trappenburg et al., 2013) find that between-consumer variation within intervention types is much greater than differences between intervention types.

One area of consumer characteristics that consistently impacts treatment response is cognitive functioning (Heinssen, Liberman, & Kopelowicz, 2000; Mueser, Kosmidis, & Sayers, 1992; Silverstein, Menditto, & Stuve, 1999). Research suggests that cognitive processing difficulties can restrict individuals with severe mental illness (SMI)'s ability to learn and generalize new skills from psychosocial interventions (Corrigan, Wallace, Schade, & Green, 1995; Kern, Green, & Satz, 1992; Lysaker, Bell, Zito, & Bioty, 1995). Difficulties with sustained attention can impact group attendance, which in turn impacts treatment response (Kern et al., 1992; McKee, Hull, & Smith, 1997). Finally, verbal memory deficits have been shown to mediate skill learning in samples of individuals with schizophrenia (Silverstein, Schenkel, Valone, & Nuernberger, 1998; Smith, Hull, Romanelli, Fertuck, & Weiss, 1999). These findings suggest the degree of cognitive impairment may play an important role in responsiveness to treatment by impacting one's ability to learn and generalize the skills from an intervention.

Outside of cognitive functioning, consumer factors that impact treatment response have been found to vary based on the population and the targets of the intervention. For example, in medical studies focusing on illness self-management of diabetes, asthma, and epilepsy, consumer social support has been shown to be positively related to greater illness self-management at the end of treatment (Gallant, 2003; Rosland et al., 2008). Improved illness self-management outcomes have also been linked to higher patient activation and engagement (Hibbard & Greene, 2013; Hibbard, Mahoney, Stock, & Tusler, 2007; Kukla, Salyers, & Lysaker, 2013) and perceived quality of the patient-physician relationship (Heisler, Bouknight, Hayward, Smith, & Kerr, 2002). Lower levels of perceived hope and reduced use of active and adaptive coping strategies have been found to be predictive of

poorer treatment outcomes in consumers with schizophrenia (Hoffmann, Kupper, & Kunz, 2000). Explorations of positive treatment response in certain psychosocial interventions, such as cognitive-behavior therapy for schizophrenia and self-help groups, have found that demographic variables such as being female, having a diagnosis of schizophrenia, greater flexibility of delusional content, and higher education level act as predictors to treatment outcomes (Brabban, Tai, & Turkington, 2009; Garety et al., 1997; Powell, Yeaton, Hill, & Silk, 2001). Taken together, it is evident that the clinical and demographic consumer characteristics affecting treatment responsiveness appear to largely vary between different psychosocial interventions (Heinssen et al., 2000; Schaub, Behrendt, Brenner, Mueser, & Liberman, 1998). Thus, the primary aim of this study was to identify the specific consumer factors that impact treatment responsiveness for Illness Management and Recovery (IMR).

IMR is an evidence-based practice shown to be effective at teaching participants with SMI knowledge and skills for managing their disorder (Mueser et al., 2002; Mueser et al., 2006). IMR uses psychoeducation, motivational interviewing, and cognitive-behavioral strategies to improve self-management of mental illnesses by teaching participants how to set and achieve goals related to their personal recovery (Mueser et al., 2006; Salyers, Godfrey, Mueser, & Labriola, 2007). In addition to goal setting, IMR provides education about disorders, relapse prevention training, and establishes personalized coping skills to help participants manage persistent symptoms (McGuire et al., 2014; Salyers et al., 2009). The effectiveness of IMR at improving illness self-management and coping skills has been supported by four randomized controlled trials and numerous pre-post trials (RCTs; Färdig, Lewander, Melin, Folke, & Fredriksson, 2011; Hasson-Ohayon, Roe, & Kravetz, 2007; Levitt et al., 2009; Mueser et al., 2006; Salyers et al., 2009; Salyers et al., 2014; Salyers et al., 2010; Salyers, Rollins, Clendenning, McGuire, & Kim, 2011).

Despite robust evidence for overall treatment effects, consumers receiving IMR vary substantially in their responsiveness (McGuire et al., 2014). Moreover, in our recently completed multi-site trial (see Methods section for description), only 38% of consumers with SMI demonstrated a substantial increase in illness self-management (McGuire et al., 2016). Looking across other RCT studies of IMR, both sample characteristics and treatment effect sizes for the IMR condition have varied substantially. For instance, samples differed in diagnoses (80% vs 13% with a schizophrenia diagnosis; Hasson-Ohayon et al., 2007; Levitt et al., 2009), mean age (52.91 vs 33.92; Hasson-Ohayon et al., 2007; Levitt et al., 2009), and race (predominantly black samples vs. predominantly white samples; Levitt et al., 2007; Salyers et al., 2014;). These diverse settings and samples were associated with substantial variation in pre-post intervention improvement on illness self-management, ranging from 0.00 (Salyers et al., 2014) to 0.38 (Hasson-Ohayon et al., 2007).

Given the substantial variability in treatment responsiveness across samples and between consumers within the same sample who receive IMR, and the impact this variability can have on effectiveness of psychiatric rehabilitation services, the current study aims to examine the role of consumer factors in predicting higher levels of illness self-management upon completion of IMR. A primary focus of IMR is improving illness self-management as a means to support recovery (Hasson-Ohayon et al., 2007). Because higher levels of perceived social support (Gallant, 2003; Rosland et al., 2008), hope (Hoffmann et al., 2000),

and coping strategies (Hoffmann et al., 2000) have been tied to improved recovery and illness self-management in other intervention approaches, we hypothesized that *higher levels of perceived social support, hope, and coping at baseline would predict higher levels of illness self-management at the end of treatment (Hypothesis 1)*.

In addition to illness self-management, IMR aims to develop personalized adaptive coping skills for consumers to aid in recovery (McGuire et al., 2014; Salyers et al., 2009). Within chronically ill and SMI samples, research has demonstrated a positive relationship between perceived social support and the development of coping strategies (Luszczynska, Mohamed, & Schwarzer, 2005; Macdonald, Pica, McDonald, Hayes, & Baglioni Jr, 1998). Further, empirical work (Ashton et al., 2005) and theoretical models suggest that social support is a predictor of greater prospective coping (Schwarzer & Knoll, 2007; Valentiner, Holahan, & Moos, 1994). We therefore hypothesize that *higher levels of perceived social support at baseline (i.e., prior to IMR), and lower levels of maladaptive coping will predict higher levels of response to IMR as indicated by higher levels of adaptive coping (Hypothesis 2)*. As this is the first examination of consumer factors affecting treatment response to IMR, we also included exploratory analyses of additional consumer-level factors (e.g. medication adherence, working alliance, demographics) in order to inform areas of future study.

## Methods

### Setting and Sample

The current study is a secondary analysis of data collected for a larger, multi-site trial of IMR and has been described previously (McGuire et al., 2015). Briefly, participating sites, located in three states, provided IMR as part of routine practice. A total of 236 consumers participated in the study. The majority of consumers were non-Hispanic (75%) males (59%). Consumers average age was 45.2 ( $SD = 12.1$ ) years old. Most participants identified as Caucasian (55%); with 32% of participants identifying as African American, 12% as other (1% as Native American or Pacific Islander, 2% as American Indian or Alaska native, 7% as more than one race, and 2% as unknown) and 1% as Asian. Most were not in school (93%) and their highest level of education was high school (65%). The vast majority were not employed (83%) or married (93%). Self-reported diagnoses were not mutually exclusive (i.e. some consumers provided multiple responses) and included: psychotic disorders (44%), depression (34%), bipolar disorder (24%), posttraumatic stress disorder (PTSD; 11%), other anxiety disorders (5%), and other diagnoses (4%). A small percentage of consumers reported no diagnosis (8%).

### Procedures

The study team assigned each IMR provider three to four randomly selected IMR modules to complete, prior to completing the remainder of the IMR program. This was done to ensure all modules were covered within the study time period. While IMR does not have to be provided sequentially, including randomly assigned modules ensured the study team would obtain samples from all modules across the study. All providers were asked to conduct IMR according to the manual. Prior to the first IMR session, study team personnel met with potential consumers in person to obtain informed consent and administer baseline measures.

Consumers who were unable to attend this meeting were eligible for a telephone consent and baseline process. The study team obtained a waiver of written informed consent from the Institutional Review Board for these participants. Potential participants received a hard copy of all baseline measures from their IMR group leader prior to the telephone call. Study personnel reviewed the consent materials and answered any questions before asking the participant to verbally agree to participate. Consumers completed the baseline measures over the phone with the study team member. Follow-up surveys were completed in person and administered three months after their study start date. Consumers were given a gift-card for completing the study surveys. For additional study details see McGuire et al. (2015).

## Measures

### Primary outcome measures

**Illness self-management:** The 15-item Illness Management and Recovery Scale (IMRS) (Mueser et al., 2004) is designed to evaluate illness self-management outcomes based on the stress-vulnerability model (Lieberman et al., 1986; Zubin & Spring, 1977). The IMRS was selected as a widely used measure of recovery tailored specifically to the treatment targets of the IMR program (McGuire, Kean, Bonfils, Presnell, & Salyers, 2014; Scheyett, DeLuca, & Morgan, 2013). Illness self-management is a key outcome of the IMR intervention and accordingly, was used to assess level of treatment response. Each item is rated on a 5-point behaviorally anchored scale. Previous studies have found adequate internal consistency, test-retest reliability, and convergent validity for the measure in SMI samples (Färdig, Lewander, Fredriksson, & Melin, 2011). Similarly, internal consistency was good in the current sample ( $\alpha = 0.79$ ).

**Coping skills:** Brief COPE is 28-item scale designed to measure an individual's coping style. Coping strategies are a primary target of IMR and therefore are an indicator of treatment response. Items are rated using a 4-point likert scale ranging from 1 (*I haven't been doing this*) to 4 (*I've been doing this a lot*) for each indicated coping strategy. The Brief COPE is comprised of two subscales: adaptive and maladaptive coping strategies (SAMHSA, 2012). The adaptive coping subscale measures whether individuals utilize emotional support or planning skills to cope with problems that may arise. The maladaptive subscale measures whether an individual engages in self-blame or denial behaviors. Good reliability and internal consistency have been demonstrated with SMI populations (Drake et al., 1998; SAMHSA, 2012). In our sample, the internal consistency was good for the adaptive coping subscale ( $\alpha = 0.84$ ) but was lower for the maladaptive subscale ( $\alpha = 0.66$ ). This measure was selected for its ability to detect fine-grain improvements in coping strategies, which appear to have a unique association with the overall ability of people to cope with serious mental illness (Meyer, 2001).

**Predictor Measures**—All predictor measures were self-report measures collected at baseline along with the participants' consent. A member of the research team was available throughout the completion of the measures to respond to any questions participants' had in filling out the self-report items.

**Demographics:** Consumers were asked to report on age, sex, race, ethnicity, birth date, diagnosis, education background, marital status, employment status, their living arrangements, and if they participated in volunteer activities. Additionally, participants were asked if they had ever participated in IMR before.

**Beliefs about IMR:** Consumers were asked to answer three questions related the beliefs about their participation in IMR. The questions asked whether consumers believed coming to IMR would be helpful, whether participation in IMR was important to their recovery and whether their believed their attendance to IMR would be consistent. Each question was rated by the consumer on a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

**Medication adherence:** The Medication Adherence Rating Scale (MARS) is a 10 item self-report measure developed to measure an individual's adherence to their prescribed medication regimen (Thompson, Kulkarni, & Sergejew, 2000). Each item is rated dichotomously with 1 "yes" and 0 "no." The scale has been found to have moderate internal consistency ( $\alpha = 0.60$ ) (Hackman et al., 2007; Thompson et al., 2000). In our sample internal consistency was acceptable ( $\alpha = .75$ )

**Goal-related hope:** The Adult State Hope Scale (Snyder et al., 1996) is a six item measure containing two subscales: pathways ("I energetically pursue my goals") and agency ("There are lots of ways around any problem") (Snyder et al., 1996). Each subscale contains three questions that are rated on a 4-point scale ranging from 1 (*Definitely False*) to 4 (*Definitely True*). The scale has previously shown to have good internal consistency, high levels of convergent and discriminant validity, and sensitivity (Snyder et al., 1996). The measure was found to be appropriate for SMI populations (McGrew, Johannesen, Griss, Born, & Vogler, 2004). Good internal consistency was found for our sample ( $\alpha = 0.85$ ).

**Social support:** The Multidimensional Scale of Perceived Social Support (MSPSS) is a 12 item measure used to assess one's current level of perceived social support. Respondents indicate the degree to which they agree with each statement on a 7-point likert scale ranging from 1 ("Very Strongly Disagree") to 7 ("Very Strongly Agree"). The MSPSS has previously demonstrated high test-retest reliability and internal consistency in a schizophrenia sample (Zimet, Dahlem, Zimet, & Farley, 1988). The scale was found to be appropriate and reliable in a sample of persons diagnosed with schizophrenia (Cecil, Stanley, Carrion, & Swann, 1995). Internal consistency for this sample was excellent ( $\alpha = 0.95$ ).

**Working alliance:** The Working Alliance Inventory Short Form (WAI-S) Client Version is a 12 item measure used to assess the working alliance between the clinician and consumer. Each item is rated on a 7-point likert scale ranging from 1 ("Very Strongly Disagree") to 7 ("Very Strongly Agree"). This measure has been found to be appropriate for SMI populations (Busseri & Tyler, 2003; Gehrs & Goering, 1994; Horvath & Greenberg, 1989; Tracey & Kokotovic, 1989) and to have good reliability and validity (Horvath & Greenberg, 1989; Tracey & Kokotovic, 1989). Internal consistency was good within our sample ( $\alpha = 0.84$ ).

## Statistical Analyses

To test our hypotheses and exploratory analyses, we performed a series of analyses to determine if self-reported variables were associated with higher levels of response to IMR. Treatment response was measured using three-month follow-up scores from the IMRS and the Adaptive Coping Subscale of the Brief COPE. Due to well-known statistical and conceptual problems associated with binary responder analyses (Snapinn & Jiang, 2007; Uryniak et al., 2011), all analyses in this study used untransformed continuous scores rather than artificially dichotomized variables.

First, as individual consumer data for this sample was nested within clinicians' IMR groups, an intercepts only model was run. The model parameter estimate was not significant, indicating that significant differences in participants' response to treatment were not accounted for at the clinician level. Treatment responses across individual participants did not vary based on the clinician providing the IMR intervention. With these results in mind, the researchers opted to not run analyses as multilevel models. Additionally, correlations and regressions were analyzed using the change scores for each treatment outcome measure, as well as the follow-up scores for these measures. We have opted to report on the residual follow-up scores, while controlling for baseline scores for each of the treatment outcomes, as change scores do not take into account imbalanced baseline samples, which our data had (Allison, 1990; Vickers & Altman, 2001). Additionally, with our data, due to varying levels of baseline scores from participants, utilizing change scores as the dependent variable results in regression to the mean (Bland & Altman, 1994a, 1994b; Vickers & Altman, 2001).

The following procedure was used to determine baseline factors associated with higher levels of treatment response. All analyses were conducted as to reduce Type I error, given the large number of self-report variables being assessed. First, to test our hypothesis that higher levels of perceived social support, hope, and coping at baseline would predict higher levels of illness self-management and to explore additional baseline self-report variables that may act as predictors to treatment response as defined by higher scores on the IMRS, Pearson bivariate correlations were conducted between IMRS follow-up scores and baseline self-report variables. Self-report variables significantly associated ( $p < .05$ ) with the IMRS follow-up scores, including those hypothesized as significant predictors, were then entered together into a multiple regression model in which IMRS follow-up scores were entered as the dependent variable and baseline scores for the IMRS were entered as a covariate to control for baseline levels of illness self-management. Multiple regression analyses were performed, and only variables significantly adding to the model ( $p < .05$ ) were retained. To test our hypothesis that higher levels of perceived social support at baseline and lower levels of maladaptive coping would predict higher treatment response to IMR as defined by higher follow-up scores for adaptive coping and to explore baseline self-report variables that may act as additional predictors to treatment response as defined by higher scores on the Adaptive Coping Subscale, the same procedure was repeated using the BC Adaptive Coping Subscale as the dependent variable.

As predictor variables had the potential to be correlated with one another, multicollinearity was assessed for each of regression model. Correlation matrices of the self-report variables were examined, and variables that were moderately or highly correlated were identified.

These variables were further examined upon inclusion in the regression models. Within the regression models, when all self-report variables significantly correlated with the dependent variable were added, the Variance Inflation Factor (VIF) was examined for each independent variable to determine the likelihood of multicollinearity (Dormann et al., 2013; Stine, 1995). As lower VIF scores indicate less likelihood of multicollinearity problems (Alin, 2010), any variable that received a VIF score greater than five (the common threshold for detecting multicollinearity) was removed from the regression model as it was likely correlating so highly with other independent variables that it was undermining statistical significance of the model (Craney & Surlles, 2002; Dormann et al., 2013; Stine, 1995).

## Results

### Correlations

Significant Pearson bivariate correlations between baseline self-report variables and follow-up scores for both IMRS and Brief COPE Adaptive Coping Subscale can be found in Table 1. The correlations between the baseline self-report variables can be found in Table 2. Of the variables tested, 11 significantly correlated with the IMRS follow-up scores, including the hypothesized hope subscales (Goal State Hope Pathways Subscale  $r = .36, p < .001$ ; Goal State Hope Agency Subscale  $r = .40, p < .001$ ), adaptive coping (Brief COPE Adaptive Subscale  $r = .37, p < .001$ ) and perceived social support (MSPSS  $r = .34, p < .001$ ). In terms of our second hypothesis, there were 12 variables that significantly correlated with Brief COPE Adaptive Coping Subscale follow-up scores, including perceived social support (MSPSS  $r = .21, p < .05$ ) and maladaptive coping (Brief COPE Maladaptive Subscale  $r = .61, p < .001$ ). No demographic variables, and no variables related to Working Alliance (WAI-S) were significantly correlated with either outcome measure and thus were not included in multiple regressions. The 11 variables that significantly correlated with IMRS follow-up scores and the 12 variables that significantly correlated with Brief COPE Adaptive Subscale follow-up scores were then entered into a multiple regression predicting either IMRS follow-up scores or Brief COPE Adaptive Subscale follow-up scores respectively.

### Multicollinearity Analyses

The correlation matrix of predictor variables (see Table 2) was examined for extremely high correlations between independent variables. Most variables had a low to moderate correlation with one another, except for Goal Scale Total Score, which was highly correlated with both Goal Scale subscales (Goal Scale Pathways Subscale  $r = .90, p < .001$ ; Goal Scale Agency Subscale  $r = .92, p < .001$ ). Because highly correlated variables may undermine the independent variables within a regression model (Alin, 2010; Lin, 2008; Stine, 1995), both subscales were excluded, and only the Goal Scale Total Score was used in future analyses.

The initial regression models for both dependent variables included all the remaining predictor variables that has significantly correlated with each dependent variable. The tolerance and VIF statistics were examined within these first models to determine whether multicollinearity was problematic. As Table 3 and Table 4 illustrate, no predictor variable had a VIF score reaching five or greater, thus we determined multicollinearity to not be a concern in either model.

## Predictors of Treatment Response (Hypotheses 1 and 2)

Our first hypothesis that higher levels of perceived social support, hope, and adaptive coping at baseline would predict higher levels of illness self-management at follow-up was only partially supported. After controlling for baseline illness self-management (IMRS), only hope (Goal Scale Total Score) explained a significant amount of variance in the IMRS scores at follow-up, ( $F(1, 179) = 11.52, p < .001, R^2 = .26, R^2 \text{ Change} = .05$ ; See Table 5), while neither perceived social support (MSPSS) nor adaptive coping (Brief COPE Adaptive Subscale) significantly predicted illness self-management at follow-up.

Our second hypothesis that higher levels of perceived social support and lower levels of maladaptive coping (Brief COPE Maladaptive Subscale) at baseline would be associated with increases in adaptive coping at follow-up was not supported. In fact, analyses suggested that after controlling for baseline adaptive coping, *higher* levels of maladaptive coping at baseline predicted higher levels of adaptive coping at follow-up, ( $F(2, 180) = 5.29, p < .02, R^2 = .38, R^2 \text{ Change} = .02$ ; See Table 6).

## Exploratory Analyses

Follow-up scores on the IMRS significantly correlated with 8 baseline variables in addition to the three hypothesized variables, and follow-up scores on the Brief COPE Adaptive Coping subscale significantly correlated with 10 baseline variables in addition to the two hypothesized variables (see Table 1 for all significant correlations); these variables were entered, along with the hypothesized predictors, into the multiple regression predicting IMRS follow-up scores or Brief COPE Adaptive subscale follow-up scores, respectively. However, none of these variables significantly predicted either IMRS or Brief COPE Adaptive subscale at follow-up after controlling for baseline levels of the IMRS and Brief COPE

## Discussion

Improved understanding of consumer factors that predict level of treatment response can help to identify consumers who may receive the most benefit from a specific treatment, inform ways to adapt treatments, and highlight individuals who may need increased support to be successful with an intervention. Therefore, the study attempted to understand consumer-level factors that predict level of treatment response to IMR.

## Engagement in Recovery and Response to IMR

Although study hypotheses were partially supported, a revised picture of the importance of specific baseline variables emerged from the results. Study results point to the role of individuals' levels of hope and engagement in illness self-management and recovery. Two results highlight this role. First, as hypothesized, increased hope at baseline predicted increased treatment response as defined by improved illness self-management at follow-up. This finding is consistent with theories of recovery and previous empirical findings. Indeed, hope is often described as a major turning point for recovery within severe mental illness (Deegan, 1988; Lovejoy, 1984) and is a positive quality of life factor for individuals in this population (Kylmä, Juvakka, Nikkonen, Korhonen, & Isohanni, 2006). Second, empirical

studies have revealed that hope is predictive of improved outcomes in medical rehabilitation (Kortte, Stevenson, Hosey, Castillo, & Wegener, 2012) and is linked to better functional outcomes for individuals with schizophrenia (Hoffmann & Kupper, 2002; Hoffmann et al., 2000; Hoffmann, Kupper, Zbinden, & Hirsbrunner, 2003; Lysaker, Campbell, & Johannesen, 2005; Regenold, Sherman, & Fenzel, 1999). Second, higher levels of maladaptive coping successfully predicted improved adaptive coping at follow-up. IMR may allow for the re-direction or teaching of new ways to channel coping strategies, allowing individuals who were coping in maladaptive ways at baseline to cope more adaptively as they progress through the intervention. It is easier to capitalize on motivation to use *any* coping skills than to overcome hopelessness, apathy, lack of motivation or an unwillingness to cope.

Taken together, hope and maladaptive coping both represent openness to and continued attempts at self-management of illness. Conceptually, hope may be necessary for individuals to summon the motivation and sufficiently engage personal resources to benefit from self-management interventions such as IMR. Maladaptive coping may be tied to overall attempts to cope (Zeidner & Saklofske, 1996), thus, those who engage in maladaptive coping may benefit more from IMR, as they have identified that a problem exists and may not be aware of more adaptive ways to cope with the problem. Although not measured in the current study, hope and maladaptive coping may tap into core motivational factors (e.g., individuals' self-efficacy, autonomy, and expectancy) which may be necessary to meaningfully engage in an active self-management intervention. Therefore, identifying individuals who have higher levels of hope and pathways to managing their illness may allow for more successful IMR. In contrast, individuals with lower levels of hope may require additional supports, such as peer services which have shown to increase hope, prior to engaging in self-management programs such as IMR (Davidson, Bellamy, Guy, & Miller, 2012; Sledge et al., 2011). Similarly, those who have higher levels of maladaptive coping skills prior to treatment may also be good candidates for IMR.

Adaptive coping at baseline and perceived social support at baseline were hypothesized to predict level of treatment response, yet no significant relationship was found to illness self-management at follow-up. It is possible that individuals with high levels of adaptive coping at the start of IMR, are already utilizing many of the strategies taught within the intervention. If this is the case, these individuals may not benefit as much from the IMR material covered. An alternative explanation may be that increasing adaptive coping skills and social support are both targets of IMR, thus baseline levels of these consumer factors are irrelevant, as the program itself creates an environment in which these factors can grow. Although both of these variables have been shown to be predictive of level of treatment response for other interventions (Gallant, 2003; Hoffmann et al., 2000; Rosland et al., 2008), it appears they may not be requisites for success in IMR. This may further expand the range of individuals IMR is appropriate for.

### Study Limitations

Results should be considered with a few limitations in mind. No measures of symptoms were available for inclusion in these analyses. Given that negative symptoms may impact treatment engagement (Saperstein & Medalia, 2015) and the development and utilization of

social support and coping strategies, future studies should also seek to examine whether these symptoms also impact IMR treatment response. Diagnoses, which have been a predictive factor in other interventions, were self-reported in our study and multiple diagnoses could be provided, making it difficult to determine primary diagnoses and potentially resulting in imprecise reporting of the variable. Finally, the intervention period itself was brief, as participants only received three months of IMR. While treatment response was detected, it is possible that a longer duration of intervention would have allowed for a greater degree of treatment response, increasing the ability to detect significant relationships.

### **Implications for Psychiatric Rehabilitation**

Results from the current study point towards a potential staged referral and intervention process within psychiatric rehabilitation settings that would include distinguishing consumers who would most benefit from immediate participation in IMR from those who may need additional support. Findings from the current study indicate those who are more hopeful upon starting IMR, or those who have any coping skills, including maladaptive ones, may see better results with IMR. Thus, a staged referral process could be implemented using consumer's baseline levels of hope, or existing coping skills, to identify those individuals ready to begin IMR. Potential IMR participants could be pre-screened with a short baseline assessment to gather information on these characteristics. Individuals with higher levels of hope or those utilizing a greater number of coping skills could advance directly to IMR, while those who screened lower for these variables, could receive targeted interventions that increase these characteristics prior to starting IMR (e.g. motivational interviewing to increase treatment engagement, peer support to increase hope, preliminary development of coping skills). Such a process could benefit consumers by reducing time spent in ineffective programming and better personalizing services to their individual needs. Meanwhile the process could benefit psychiatric rehabilitation settings by maximizing the percentage of IMR recipients who benefit from the intervention, reducing staff inefficiencies and reducing costly program dropouts.

### **Future Directions and Conclusions**

The current study highlights the need for additional work to establish what makes level of response to IMR different across individuals. Self-report variables from this study were largely unsuccessful at explaining the variance in treatment response. While the current work provides a starting point for individuals who may be best served through IMR, it is not yet clear who else may benefit from this intervention. Future research identifying additional consumer-level variables that predict level of response to IMR is needed. Utilizing both self-report and observer-rated measures may allow for stronger predictors to be identified. Identifying these consumer factors will aid psychiatric rehabilitation settings in tailoring IMR interventions, creating more precise referral processes, and better allocating valuable resources.

In conclusion, although substantial variability is observed in outcomes between consumers receiving IMR services, self-reported consumer factors assessed at baseline were largely unsuccessful in predicting responsiveness. Hope at baseline does emerge as predictive and should be the focus of additional pre-IMR assessment and support (e.g., peer services).

Future research should focus on theoretically-derived factors like motivation that may affect responsiveness, as well as factors outside of the consumer which may affect responsiveness such as clinician factors or treatment environment.

## Acknowledgments

This work was funded by National Institute of Mental Health 4R33MH096835-03. The preparation of this article was supported by an award from the National Institute of Mental Health (4R33 MH096835-03).

## References

- Ashton E, Vosvick M, Chesney M, Gore-Felton C, Koopman C, O'shea K, Flamm J. Social support and maladaptive coping as predictors of the change in physical health symptoms among persons living with HIV/AIDS. *AIDS Patient Care & STDs*. 2005; 19(9):587–598. DOI: 10.1089/apc.2005.19.587 [PubMed: 16164385]
- Beutler, LE., Bongar, BM., Shurkin, JN. *A consumer's guide to psychotherapy: A Complete Guide to Choosing the Therapist and Treatment that's Right for You*. New York, NY: Oxford University Press; 2000.
- Blow AJ, Sprenkle DH. Common factors across theories of marriage and family therapy: A modified Delphi study. *Journal of marital and family therapy*. 2001; 27(3):385–402. doi.org/10.1111/j.1752-0606.2001.tb00333.x. [PubMed: 11436430]
- Brabban A, Tai S, Turkington D. Predictors of outcome in brief cognitive behavior therapy for schizophrenia. *Schizophrenia bulletin*. 2009; 35(5):859–864. doi.org/10.1093/schbul/sbp065. [PubMed: 19571248]
- Busseri MA, Tyler JD. Interchangeability of the Working Alliance Inventory and Working Alliance Inventory, Short Form. *Psychological Assessment*. 2003; 15(2):193–197. DOI: 10.1037/1040-3590.15.2.193 [PubMed: 12847779]
- Cecil H, Stanley MA, Carrion PG, Swann A. Psychometric properties of the MSPSS and NOS in psychiatric outpatients. *Journal of Clinical Psychology*. 1995; 51(5):593–602. doi.org/10.1002/1097-4679(199509)51:5%3C593::AID-JCLP2270510503%3E3.0.CO;2-W. [PubMed: 8801234]
- Deegan PE. Recovery: The lived experience of rehabilitation. *Psychosocial Rehabilitation Journal*. 1988; 11(4):11.
- Drake RE, McHugo GJ, Clark RE, Teague GB, Xie H, Miles K, Ackerson TH. Assertive community treatment for patients with co-occurring severe mental illness and substance use disorder: A clinical trial. *American Journal of Orthopsychiatry*. 1998; 68(2):201–215. DOI: 10.1037/h0080330 [PubMed: 9589759]
- Duncan, BL., Miller, SD. *The heroic client: Doing client-directed, outcome-informed therapy*. San Francisco, CA: Jossey-Bass; 2000.
- Färdig R, Lewander T, Fredriksson A, Melin L. Evaluation of the Illness Management and Recovery Scale in schizophrenia and schizoaffective disorder. *Schizophrenia Research*. 2011; 132:157–164. DOI: 10.1016/j.schres.2011.07.001 [PubMed: 21798718]
- Färdig R, Lewander T, Melin L, Folke F, Fredriksson A. A randomized controlled trial of the illness management and recovery program for persons with schizophrenia. *Psychiatric Services*. 2011; 62(6):606–612. doi.org/10.1176/ps.62.6.pss6206\_0606. [PubMed: 21632728]
- Gallant MP. The influence of social support on chronic illness self-management: a review and directions for research. *Health Education & Behavior*. 2003; 30(2):170–195. doi.org/10.1177/1090198102251030. [PubMed: 12693522]
- Garety P, Fowler D, Kuipers E, Freeman D, Dunn G, Bebbington P, Jones S. London-East Anglia randomised controlled trial of cognitive-behavioural therapy for psychosis. II: Predictors of outcome. *The British Journal of Psychiatry*. 1997; 171(5):420–426. doi.org/10.1192/bjp.171.5.420. [PubMed: 9463599]
- Gehrs M, Goering P. The relationship between the working alliance and rehabilitation outcomes of schizophrenia. *Psychosocial Rehabilitation Journal*. 1994; 18(2):43–54. DOI: 10.1037/h0095517

- Hackman A, Brown C, Yang Y, Goldberg R, Kreyenbuhl J, Lucksted A, Dixon L. Consumer satisfaction with inpatient psychiatric treatment among persons with severe mental illness. *Community Mental Health Journal*. 2007; 43(6):551–564. doi.org/10.1007/s10597-007-9098-3. [PubMed: 17641972]
- Hamilton KE, Dobson KS. Cognitive therapy of depression: pretreatment patient predictors of outcome. *Clinical psychology review*. 2002; 22(6):875–893. doi.org/10.1016/S0272-7358(02)00106-X. [PubMed: 12214329]
- Hasson-Ohayon I, Roe D, Kravetz S. A randomized controlled trial of the effectiveness of the illness management and recovery program. *Psychiatric Services*. 2007; 58(11):1461–1466. doi.org/10.1176/ps.2007.58.11.1461. [PubMed: 17978257]
- Heisler M, Bouknight RR, Hayward RA, Smith DM, Kerr EA. The Relative Importance of Physician Communication, Participatory Decision Making, and Patient Understanding in Diabetes Self-management. *Journal of General Internal Medicine*. 2002; 17(4):243–252. [PubMed: 11972720]
- Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health affairs*. 2013; 32(2):207–214. doi.org/10.1377/hlthaff.2012.1061. [PubMed: 23381511]
- Hibbard JH, Mahoney ER, Stock R, Tusler M. Do Increases in Patient Activation Result in Improved Self-Management Behaviors? *Health services research*. 2007; 42(4):1443–1463. [PubMed: 17610432]
- Hoffmann H, Kupper Z. Facilitators of psychosocial recovery from schizophrenia. *International Review of Psychiatry*. 2002; 14(4):293–302. DOI: 10.1080/0954026021000016932
- Hoffmann H, Kupper Z, Kunz B. Hopelessness and its impact on rehabilitation outcome in schizophrenia-an exploratory study. *Schizophrenia Research*. 2000; 43(2):147–158. [PubMed: 10858633]
- Hoffmann H, Kupper Z, Zbinden M, Hirsbrunner H-P. Predicting vocational functioning and outcome in schizophrenia outpatients attending a vocational rehabilitation program. *Social Psychiatry and Psychiatric Epidemiology*. 2003; 38(2):76–82. [PubMed: 12563549]
- Horvath AO, Greenberg LS. Development and validation of the Working Alliance Inventory. *Journal of counseling psychology*. 1989; 36(2):223. doi.org/10.1037/0022-0167.36.2.223.
- Kortte KB, Stevenson JE, Hosey MM, Castillo R, Wegener ST. Hope predicts positive functional role outcomes in acute rehabilitation populations. *Rehabilitation psychology*. 2012; 57(3):248. doi.org/10.1037/a0029004. [PubMed: 22946612]
- Kukla M, Salyers MP, Lysaker PH. Levels of patient activation among adults with schizophrenia: associations with hope, symptoms, medication adherence, and recovery attitudes. *The Journal of nervous and mental disease*. 2013; 201(4):339–344. doi.org/10.1097/NMD.0b013e318288e253. [PubMed: 23538980]
- Kylmä J, Juvakka T, Nikkonen M, Korhonen T, Isohanni M. Hope and schizophrenia: an integrative review. *Journal of psychiatric and mental health nursing*. 2006; 13(6):651–664. doi.org/10.1111/j.1365-2850.2006.01012.x. [PubMed: 17087667]
- Levitt A, Mueser K, DeGenova J, Lorenzo J, Bradford-Watt D, Barbosa A, Chernick M. Randomized controlled trial of illness management and recovery in multiple-unit supportive housing. *Psychiatric Services*. 2009; 60(12):1629–1636. doi.org/10.1176/ps.2009.60.12.1629. [PubMed: 19952153]
- Lieberman RP, Mueser KT, Wallace CJ, Jacobs HE, Eckman T, Massel HK. Training skills in the psychiatrically disabled: Learning coping and competence. *Schizophrenia bulletin*. 1986; 12:631–647. doi.org/10.1093/schbul/12.4.631. [PubMed: 3810067]
- Lovejoy M. Recovery from schizophrenia: A personal odyssey. *Psychiatric Services*. 1984; 35(8):809–812. doi.org/10.1176/ps.35.8.809.
- Luszczynska A, Mohamed NE, Schwarzer R. Self-efficacy and social support predict benefit finding 12 months after cancer surgery: The mediating role of coping strategies. *Psychology, Health & Medicine*. 2005; 10(4):365–375. doi.org/10.1080/13548500500093738.
- Lysaker PH, Campbell K, Johannesen JK. Hope, awareness of illness, and coping in schizophrenia spectrum disorders: evidence of an interaction. *The Journal of nervous and mental disease*. 2005; 193(5):287–292. doi.org/10.1097/01.nmd.0000161689.96931.0f. [PubMed: 15870611]

- Macdonald E, Jackson H, Hayes R, Baglioni A, Madden C. Social skill as a determinant of social networks and perceived social support in schizophrenia. *Schizophrenia Research*. 1998; 29(3): 275–286. doi.org/10.1016/S0920-9964(97)00096-0. [PubMed: 9516669]
- Macdonald EM, Pica S, McDonald S, Hayes RL, Baglioni AJ Jr. Stress and coping in early psychosis: Role of symptoms, self-efficacy, and social support in coping with stress. *The British Journal of Psychiatry*. 1998
- McGrew, JH., Johannesen, JK., Griss, ME., Born, D., Vogler, T. Paper presented at the National Conference of the Association of Persons in Supported Employment. Indianapolis, IN: 2004. Results-based Funding in Indiana: Process, Outcomes and Caveats.
- McGuire AB, Kean J, Bonfils K, Presnell J, Salyers MP. Rasch analysis of the illness management and recovery scale-clinician version. *Journal of Evaluation in Clinical Practice*. 2014; 20(4):383–389. DOI: 10.1111/jep.12140 [PubMed: 24813979]
- McGuire AB, Kukla M, Green A, Gilbride D, Mueser KT, Salyers MP. Illness Management and Recovery: A Review of the Literature. *Psychiatric services (Washington, D.C.)*. 2014; 65(2):171–179. DOI: 10.1176/appi.ps.201200274
- McGuire AB, Bartholomew T, Anderson AI, Bauer SM, McGrew JH, White DA, Salyers MP. Illness management and recovery in community practice. *Psychiatric Rehabilitation Journal*. 2016
- McGuire AB, White DA, Bartholomew T, Flanagan ME, McGrew JH, Rollins AL, Salyers MP. The Relationship Between Provider Competence, Content Exposure, and Consumer Outcomes in Illness Management and Recovery Programs. *Administration and Policy in Mental Health and Mental Health Services Research*. 2015:1–11. doi.org/10.1007/s10488-015-0701-6. [PubMed: 24718647]
- Meyer B. Coping with Severe Mental Illness: Relations of the Brief COPE with Symptoms, Functioning, and Well-Being. *Journal of Psychopathology and Behavioral Assessment*. 2001; 23(4):265–277. DOI: 10.1023/A:1012731520781
- Mueser KT, Corrigan PW, Hilton DW, Tanzman B, Schaub A, Gingerich S, Vogel-Scibilia S. Illness management and recovery: a review of the research. *Psychiatric Services*. 2002; 53(10):1272–1284. doi.org/10.1176/appi.ps.53.10.1272. [PubMed: 12364675]
- Mueser, KT., Gingerich, S., Salyers, MP., McGuire, AB., Reyes, RU., Cunningham, H. The Illness Management and Recovery (IMR) Scale. Concord, NH: New Hampshire-Dartmouth Psychiatric Research; 2004.
- Mueser KT, Meyer PS, Penn DL, Clancy R, Clancy DM, Salyers MP. The illness management and recovery program: rationale, development, and preliminary findings. *Schizophrenia bulletin*. 2006; 32(suppl 1):S32–S43. doi.org/10.1093/schbul/sbl022. [PubMed: 16899534]
- Powell TJ, Yeaton W, Hill EM, Silk KR. Predictors of psychosocial outcomes for patients with mood disorders: The effects of self-help group participation. *Psychiatric Rehabilitation Journal*. 2001; 25(1):3. doi.org/10.1037/h0095056. [PubMed: 11529450]
- Regenold M, Sherman MF, Fenzel M. Getting back to work: Self-efficacy as a predictor of employment outcome. *Psychiatric Rehabilitation Journal*. 1999; 22(4):361–367. DOI: 10.1037/h0095214
- Rosland A-M, Kieffer E, Israel B, Cofield M, Palmisano G, Sinco B, Heisler M. When is social support important? The association of family support and professional support with specific diabetes self-management behaviors. *Journal of General Internal Medicine*. 2008; 23(12):1992–1999. doi.org/10.1007/s11606-008-0814-7. [PubMed: 18855075]
- Salyers MP, Godfrey J, McGuire AB, Gearhart T, Rollins AL, Boyle C. Implementing the illness management and recovery program for consumers with severe mental illness. *Psychiatric Services*. 2009; 60(4):483–490. doi.org/10.1176/ps.2009.60.4.483. [PubMed: 19339323]
- Salyers MP, Godfrey JL, Mueser KT, Labriola S. Measuring illness management outcomes: a psychometric study of clinician and consumer rating scales for illness self management and recovery. *Community Mental Health Journal*. 2007; 43(5):459–480. DOI: 10.1007/s10597-007-9087-6 [PubMed: 17514504]
- Salyers MP, Hicks LJ, McGuire AB, Baumgardner H, Ring K, Kim H-W. A pilot to enhance the recovery orientation of assertive community treatment through peer-provided illness management

- and recovery. *American Journal of Psychiatric Rehabilitation*. 2009; 12(3):191–204. doi.org/10.1080/15487760903066305.
- Salyers MP, McGuire AB, Kukla M, Fukui S, Lysaker PH, Mueser KT. A Randomized Controlled Trial of Illness Management and Recovery With an Active Control Group. *Psychiatric Services*. 2014; 65(8):1005–1011. DOI: 10.1176/appi.ps.201300354 [PubMed: 24733680]
- Salyers MP, McGuire AB, Rollins AL, Bond GR, Mueser KT, Macy VR. Integrating assertive community treatment and illness management and recovery for consumers with severe mental illness. *Community Mental Health Journal*. 2010; 46(4):319–329. doi.org/10.1007/s10597-009-9284-6. [PubMed: 20077006]
- Salyers MP, Rollins AL, Clendenning D, McGuire AB, Kim E. Impact of illness management and recovery programs on hospital and emergency room use by Medicaid enrollees. *Psychiatric services*. 2011; 62(5):509. doi.org/10.1176/ps.62.5.pss6205\_0509. [PubMed: 21532077]
- SAMHSA, S. A. a. M. H. S. A. SAMHSA's working definition of recovery: 10 guiding principles of recovery. 2012. p. 1-8. Retrieved from <https://store.samhsa.gov/shin/content/PEP12-RECDEF/PEP12-RECDEF.pdf> website: <https://store.samhsa.gov/shin/content/PEP12-RECDEF/PEP12-RECDEF.pdf>
- Scheyett A, DeLuca J, Morgan C. Recovery in severe mental illnesses: A literature review of recovery measures. *Social Work Research*. 2013; 37(3):286–303. doi.org/10.1093/swr/svt018.
- Schmand B, Kuipers T, Van der Gaag M, Bosveld J, Bulthuis F, Jellema M. Cognitive disorders and negative symptoms as correlates of motivational deficits in psychotic patients. *Psychological medicine*. 1994; 24(04):869–884. [PubMed: 7892355]
- Schwarzer R, Knoll N. Functional roles of social support within the stress and coping process: A theoretical and empirical overview. *International Journal of Psychology*. 2007; 42(4):243–252. doi.org/10.1080/00207590701396641.
- Snapinn SM, Jiang Q. Responder analyses and the assessment of a clinically relevant treatment effect. *Trials*. 2007; 8(1):31. doi.org/10.1186/1745-6215-8-31. [PubMed: 17961249]
- Snyder CR, Sympton SC, Ybasco FC, Borders TF, Babyak MA, Higgins RL. Development and validation of the State Hope Scale. *Journal of Personality and Social Psychology*. 1996; 70(2):321. doi.org/10.1037/0022-3514.70.2.321. [PubMed: 8636885]
- Tallman, K., Bohart, AC. *The client as a common factor: Clients as self-healers*. Washington, DC: American Psychological Association; 1999.
- Thompson K, Kulkarni J, Sergejew A. Reliability and validity of a new Medication Adherence Rating Scale (MARS) for the psychoses. *Schizophrenia Research*. 2000; 42(3):241–247. doi.org/10.1016/S0920-9964(99)00130-9. [PubMed: 10785582]
- Tracey TJ, Kokotovic AM. Factor structure of the Working Alliance Inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*. 1989; 1(3):207–210. DOI: 10.1037/1040-3590.1.3.207
- Trappenburg J, Jonkman N, Jaarsma T, van Os-Medendorp H, Kort H, de Wit N, Schuurmans M. Self-management: one size does not fit all. *Patient education and counseling*. 2013; 92(1):134–137. doi.org/10.1016/j.pec.2013.02.009. [PubMed: 23499381]
- Uryniak T, Chan IS, Fedorov VV, Jiang Q, Oppenheimer L, Snapinn SM, Zhang J. Responder analyses —a PhRMA position paper. *Statistics in Biopharmaceutical Research*. 2011; 3(3):476–487.
- Valentiner DP, Holahan CJ, Moos RH. Social support, appraisals of event controllability, and coping: An integrative model. *Journal of Personality and Social Psychology*. 1994; 66(6):1094. doi.org/10.1037/0022-3514.66.6.1094.
- Wampold, BE. *The great psychotherapy debate: Models, methods, and findings*. Vol. 9. New York, NY: Routledge; 2013.
- Zeidner M, Saklofske D. *Adaptive and maladaptive coping*. 1996
- Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *Journal of Personality Assessment*. 1988; 52:30–42.
- Zubin J, Spring B. Vulnerability: A new view of schizophrenia. *Journal of Abnormal Psychology*. 1977; 86:103–126. doi.org/10.1037/0021-843X.86.2.103. [PubMed: 858828]

**Table 1**

Means, Standard Deviations and Correlations for Variables at Baseline

Self-Report Variables at Baseline	M (SD)	Outcome Measures at Follow Up	
		IMRS	Adaptive Coping
Belief IMR Will Be Helpful	3.97 (1.16)	0.28 **	0.36 **
Belief Coming to IMR Is Important	4.12 (1.13)	0.22 **	0.37 **
Belief IMR Attendance Will Be Consistent	4.27 (1.12)	0.17 *	0.32 **
IMRS	3.55 (.64)	0.46 **	0.32 **
MARS	2.45 (1.86)	-0.21 **	-0.18 *
Goal Scale Agency Subscale	9.20 (2.30)	0.36 **	0.15 *
Goal Scale Pathways Subscale	9.21 (2.06)	0.4 **	0.15 *
Goal Scale Total Score	18.41 (3.96)	0.42 **	0.17 *
MSPSS	4.94 (1.67)	0.34 **	0.21 *
WAI	5.65 (.99)	0.27 **	0.3 **
Adaptive Coping	5.64 (1.35)	0.37 **	0.61 **
Maladaptive Coping	4.46 (1.17)	-	.448 **

Notes: M= Mean, SD = Standard Deviation, IMR = Illness Management and Recovery, the intervention being studied; IMRS = Illness Management and Recovery Scale; MARS = Medication Adherence Rating Scale; MSPSS = Multidimensional Scale of Perceived Social Support; WAI = Working Alliance Inventory.

\*  
=  $p < .05$ ;

\*\*  
=  $p < .001$

**Table 2**

**Correlation Matrix of Significant Predictor Variables at Baseline**

	1	2	3	4	5	6	7	8	9	10	11
1											
2	.79**										
3	.62**	.71**									
4	.33**	.23**	.19*								
5	-.30**	-.22*	-.19*	-.21*							
6	.32**	.23**	.17*	.50**	-.17*						
7	.29**	.21*	.13*	.41**	-.06	.65**					
8	.34**	.24**	.17*	.50**	-.13*	.92**	.90**				
9	.21**	.18*	.14*	.49**	-.26**	.31**	.22*	.30**			
10	.34**	.38**	.29**	.18*	-.11	.24*	.30**	.30**	.20**		
11	.38*	.36**	.33**	.41**	-.17*	.41**	.39**	.44**	.37**	.29**	
12	.18*	.24**	.21*	.02	.13	.05	.12	.09	.16*	.14	.52**

1 = Belief IMR will be helpful

2 = Believe coming to IMR is important

3 = Belief IMR attendance will be consistent

4 = Illness Management and Recovery Scale (IMRS)

5 = Medication Adherence Rating Scale (MARS)

6 = Goal Scale Agency Subscale

7 = Goal Scale Pathways Subscale

8 = Goal Scale Total Score

9 = Multidimensional Scale of Perceived Social Support (MSPSS)

10 = Working Alliance Inventory (WAI)

11 = Brief COPE Adaptive Coping Subscale

12 = Brief COPE Maladaptive Coping Subscale

100 >  $d$  =  
\*\*  
50 >  $d$  =  
\*

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

**Table 3**

Multicollinearity Statistics for Initial Multiple Regression Model for Illness Management and Recovery Scale at Follow-Up

Predictor	Tolerance	VIF
Belief IMR Will Be Helpful	.31	3.27
Belief Coming to IMR Is Important	.24	4.20
Belief IMR Attendance Will Be Consistent	.41	2.41
IMRS	.48	2.10
MARS	.84	1.21
Goal Scale Total Score	.58	1.71
MSPSS	.59	1.71
WAI	.77	1.30
Adaptive Coping	.58	1.73

Notes: IMRS = Illness Management and Recovery Scale; MARS = Medication Adherence Rating Scale; MSPSS = Multidimensional Scale of Perceived Social Support; WAI = Working Alliance Inventory.

**Table 4**

Multicollinearity Statistics for Initial Multiple Regression Model for Adaptive Coping Subscale at Follow-Up

<b>Predictor</b>	<b>Tolerance</b>	<b>VIF</b>
Belief IMR Will Be Helpful	.31	3.27
Belief Coming to IMR Is Important	.23	4.27
Belief IMR Attendance Will Be Consistent	.41	2.41
IMRS	.48	2.10
MARS	.78	1.29
Goal Scale Total Score	.57	1.80
MSPSS	.58	1.71
WAI	.77	1.30
Adaptive Coping	.41	2.43
Maladaptive Coping	.56	1.74

Notes: IMRS = Illness Management and Recovery Scale; MARS = Medication Adherence Rating Scale; MSPSS = Multidimensional Scale of Perceived Social Support; WAI = Working Alliance Inventory.

Significant Multiple Regression Model Predicting Illness Management and Recovery Scale Scores at Follow-Up Controlling for Baseline Illness Management and Recovery Scale Scores

Table 5

Model	Variable	F Change	R <sup>2</sup>	R <sup>2</sup> Change	B (SE)	$\beta$	Df	t	p	Tolerance	VIF
1	IMRS Baseline Score	47.20	.21	.21	.38 (.06)	.46	180	6.87	.00	1.00	1.00
2	IMRS Baseline Score	11.52	.26	.05	.27 (.06)	.33	179	4.32	.00	.736	1.36
	Baseline Goal Scale Total				.04 (.01)	.26	179	3.40	.001	.736	1.36

Note: IMRS = Illness Management and Recovery Scale VIF = Variance Inflation Factor

Significant Multiple Regression Model Predicting Adaptive Coping Scores at Follow-Up Controlling for Baseline Adaptive Coping Scores

**Table 6**

Model	Variable	F Change	R <sup>2</sup>	R <sup>2</sup> Change	B (SE)	$\beta$	df	t	P	Tolerance	VIF
1	Adaptive Coping Baseline Score	104.87	.37	.37	.56 (.06)	.61	181	10.24	.00	1.00	1.00
2	Adaptive Coping Baseline Score	5.29	.39	.02	.48 (.07)	.52	180	7.35	.00	.69	1.44
	Maladaptive Coping Baseline Score				.17 (.08)	.16	180	2.30	.02	.69	1.44

Note: VIF = Variance Inflation Factor