

Positive psychological determinants of treatment adherence among primary care patients

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Background: Patient adherence to medical treatment recommendations can affect disease prognosis, and may be beneficially or deleteriously influenced by psychological factors. **Aim:** We examined the relationships between both adaptive and maladaptive psychological factors and treatment adherence among a sample of primary care patients. **Methods:** One hundred and one rural, primary care patients completed the Life Orientation Test-Revised, Trait Hope Scale, Future Orientation Scale, NEO-FFI Personality Inventory (measuring positive and negative affect), and Medical Outcomes Study General Adherence Scale. **Findings:** In independent models, positive affect, optimism, hope, and future orientation were beneficially associated with treatment adherence, whereas pessimism and negative affect were negatively related to adherence. In multivariate models, only negative affect, optimism and hope remained significant and, in a comparative model, trait hope was most robustly associated with treatment adherence. **Implications:** Therapeutically, addressing negative emotions and expectancies, while simultaneously bolstering motivational and goal-directed attributes, may improve adherence to treatment regimens.

Key words: hope; negative affect; optimism; pessimism; positive affect; treatment adherence

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Introduction

Treatment adherence, or the degree to which a patient's behavior matches recommendations from a health care provider (Schlenk *et al.*, 2001), is an essential component of achieving health-related goals and disease management. Yet, patient non-adherence ranges from 15% to 93%, and it is estimated that four out of 10 patients forget, misunderstand, or ignore treatment recommendations (Martin *et al.*, 2005). Increased cost of health care, medical and psychosocial complications from

disease, and poor quality of life are consequences of poor treatment adherence (Herriman and Cerretani, 2007); as well, it is approximated that the cost of non-adherence is \$300 billion annually and 125 000 deaths, in the United States (DiMatteo, 2004). On the other hand, an average of 26% of patients, across various disease groups, achieves good health outcomes as a consequence of adhering to treatment recommendations (DiMatteo *et al.*, 2002). Treatment adherence has been associated with better outcomes for patients with alcohol dependence (Aguiar *et al.*, 2012), headaches (Gaul *et al.*, 2011), obsessive compulsive disorder (Simpson *et al.*, 2011), and depression. (Sirey *et al.*, 2010).

Conceptually, according to the World Health Organization (WHO, 2003), treatment adherence is a multidimensional phenomenon that is affected

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by five dimensions: (1) social/economic factors such as lack of effective social support network, low level of education, and unemployment; (2) therapy-related factors such as duration of treatment, treatment side effects, and complexity of treatment regimens; (3) the health system/health care team dimension, which refers to patient-provider relationship, status of health insurance reimbursement, and health worker burn out; (4) disease condition-related factors such as symptom severity, prognosis, and level of disability; and, (5) the patient-related dimension, which is comprised of patient attitudes, knowledge, perceptions, expectations, and beliefs.

At the level of the individual patient, characteristics such as fear of side effects, confusion and skepticism about treatment, or feelings of pessimism or low mood (Milam *et al.*, 2004; Brunton, 2011), may negatively affect treatment adherence. Conversely, cognitive-emotional contributors to adaptive health functioning include, among others, positive affect, optimism, hopefulness, and future orientation. Such psychological factors tend to be stable and pervasive, affecting an individual's behaviors, thoughts and feelings (Allemand *et al.*, 2013), including health behaviors and motivation to engage in treatment (Bosley *et al.*, 1995). Importantly, research evidence, as well as theoretical support, suggests ambivalence toward self-health may be amenable to change, and this might be accomplished by addressing several key cognitive-emotional elements – mood and outlook (Rutter and Quine, 2002).

As an example, positive affect is an amalgamation of experiences such as enjoyment, love, and contentment, whereas negative affect is comprised of components such as fear, anger, distress, and sadness (Moneta *et al.*, 2012). According to the Broaden-and-Build model, positive emotional experiences may beneficially expand an individual's cognitive and behavioral repertoire, including intellectual, social and physical resources, perhaps to include health behaviors and treatment adherence; conversely, negative affect might contribute to narrowing of an individual's cognitions and behaviors and, consequently, hinder treatment adherence (Fredrickson, 2001). In fact, positive affect has been found to promote health behaviors such as self-regulation against smoking (Shmueli and Prochaska, 2012), while negative affect has been associated with poor health information processing (Beckjord *et al.*, 2008).

An expectancy of doubt versus confidence, rather than a mood, optimism is the general belief that the future will be positive, with positive outcomes to life experiences, whereas pessimism is the expectation of negative outcomes (Scheier and Carver, 1992). In general, optimism may promote health behaviors via active coping (Carver *et al.*, 2010); further, according to expectancy-value theory, optimists may be more likely to adhere to treatment recommendations because optimistic expectations about treatment may result in a valuing of, and motivation toward, health or treatment goals (Carver and Scheier, 1998). Pessimism, alternatively, has been associated with denial and behavioral disengagement (Carver *et al.*, 1993), use of passive coping strategies, and poor health behavior (Kubzansky *et al.*, 2004).

Health goals must often be strived for, and hopefulness is a crucial component of success in such endeavors. Conceptualized as a motivational process of identifying, planning for and working toward attainment of a goal (Snyder, 2002; Bruininks and Malle, 2005), the construct of hope is closely associated with treatment adherence. Greater levels of hopefulness are associated with better overall health (Nekolaichuk *et al.*, 1999), engagement in stroke aftercare (Arnaert *et al.*, 2006), and fewer depressive symptoms (Visser *et al.*, 2013). Conversely, hopelessness, is related to poor participation in treatment (Dunn *et al.*, 2009), poor quality of life (Pompili *et al.*, 2013), negative perceptions of health and health illness self-blame (Iliceto *et al.*, 2010).

Perhaps intuitively, treatment adherence, as well as other pathways toward health-related goals and treatment adherence, may be dependent on extent of future orientation, or the ability for a person to envision expectations about and actions related to future goals (Nurmi, 2005; Hirsch *et al.*, 2006). The ability to anticipate potential future scenarios, including health situations, may have motivational consequences for current health behavior; specifically, forethought and desire of a particular outcome may encourage goal identification, planning, and commitment (Lens *et al.*, 2012), including engagement in health promotion behaviors (Crockett *et al.*, 2009).

As a group, and across samples, positive affect, hope, optimism, and future orientation, and lower negative affect and pessimism, appear to be associated with self-determination and self-efficacy (Corrigan *et al.*, 2012), which may motivate and

facilitate treatment adherence. Although the aforementioned cognitive-emotional characteristics have been extensively studied with regard to health behaviors, including treatment engagement, no previously published research has examined these factors in the primary care setting, where their manifestation may be different. Understanding the association of these characteristics to treatment adherence in this setting is a crucial first step toward development of targeted interventions to promote adherence to health regimens. As such, we hypothesized that positive affect, optimism, hopefulness and future orientation would be significantly positively related to treatment adherence; and negative affect and pessimism would be inversely related, to treatment adherence, at the bivariate level, and at the multivariate level covarying age, sex and race/ethnicity.

Methods

Participants

Participants ($n = 101$) in this Institutional Review Board-approved study were recruited from a rural, primary care clinic serving working and uninsured patients, in a region of the United States identified as a Health Provider Shortage Area (Correll *et al.*, 2011). Participants were primarily female ($n = 71$; 71%), White ($n = 94$; 94%), and had a mean age of 42.18 (SD = 12.83). Our sample participants ranged from 18 to 64 years of age, and did not qualify for state-level insurance (TennCare) or federal-level insurance (Medicare). Most participants ($n = 46$; 47%) reported an annual income less than \$20 000, and 27 participants (28%) earned less than \$10 000; such incomes are not unexpected, as most of the nation's rural, poor receive their health care services from primary care providers (Ferrer, 2007). Further, six percent of our sample ($n = 6$) did not graduate high school, and only 25 persons (25%) had obtained a college degree. Self-report data were collected over a one-year period through in-person and online survey administration. Participants completed an informed consent process, and those who completed the survey materials were compensated with \$15.00.

Measures

The Medical Outcomes Study General Adherence Scale (MOS general adherence scale), a five-item

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measure, was used to assess general treatment adherence (Sherbourne *et al.*, 1992). Items are rated on a 6-point Likert scale ranging from 1 (none of the time) to 6 (all of the time); for example, 'generally speaking, how often during the past 4 weeks were you able to do what the doctor told you?' The MOS general adherence scale has demonstrated acceptable internal reliability ($\alpha = 0.78$) (Kravitz *et al.*, 1993), including in primary care ($\alpha = 0.88$) (Hamilton, 2003).

Trait positive affect and negative affect were assessed using the NEO Five-Factor Inventory (Costa and McCrae, 1992). Using sub-cluster item scoring, four items are utilized to assess trait positive affect and five items to assess trait negative affect (Chapman, 2007). Items are rated on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. In previous research with a clinical sample, positive affect ($\alpha = 0.68$) had moderate internal reliability and negative affect ($\alpha = 0.78$) had acceptable internal reliability (Hirsch *et al.*, 2007).

The Life Orientation Test-Revised (LOT-R) was used as a measure of dispositional optimism and pessimism (Scheier *et al.*, 1994). The LOT-R consists of 10 items which are rated on a 5-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree). Three items measure optimism (eg, 'Overall, I expect more good things to happen to me than bad'), three items measure pessimism (eg, 'I rarely count on good things happening to me'), and four items are fillers (eg, 'It's important for me to keep busy'). The LOT-R demonstrated acceptable internal consistency for optimism ($\alpha = 0.71$) and moderate internal consistency of pessimism ($\alpha = 0.68$), in a primary care sample (Herzberg *et al.*, 2006; Hirsch *et al.*, 2013).

Trait hope was measured by the composite score of the Trait Hope Scale (THS), which consists of eight items (Snyder *et al.*, 1991). Items are rated on a 4-point Likert scale that ranges from 1 (definitely false) to 4 (definitely true); a sample item is: 'there are lots of ways around any problem'. Internal consistency for the THS ranges from 0.74 to 0.84 (Curry *et al.*, 1997), and the measure has been previously used in a primary care sample (Hirsch *et al.*, 2011).

Future orientation was measured using six items derived from the Reasons for Living Inventory-Older Adult Version (Edelstein *et al.*, 2009). Items are rated on a Likert scale ranging from 1 (extremely

Table 1 Means, standard deviations, and correlations

Variables	M	SD	1	2	3	4	5	6
1. Positive affect	3.48	0.77	–					
2. Negative affect	3.20	0.88	–0.52**	–				
3. Optimism	10.00	2.62	0.56**	–0.63**	–			
4. Pessimism	8.18	3.02	–0.54**	0.63**	–0.83**	–		
5. Hopefulness	5.55	1.49	0.53**	–0.59**	0.68**	–0.70**	–	
6. Future orientation	4.81	1.01	0.35**	–0.37**	0.47**	–0.51**	0.56**	–
7. Treatment adherence	4.64	0.97	0.32**	–0.37**	0.39**	–0.32**	0.41**	0.22*

Optimism and pessimism = Life Orientation Test-Revised; Hopefulness = Trait Hope Scale; Future orientation = Future Orientation Scale; Positive affect and negative affect = NEO-FFI Personality Inventory; Treatment adherence = Medical Outcomes Study General Adherence Scale.

* $P \leq 0.05$, ** $P \leq 0.01$.

unimportant) to 6 (extremely important); sample item is: ‘I have future plans I am looking forward to carrying out’. This scale has not been previously used with primary care patients but, in a clinical sample of depressed patients the six items demonstrated good internal consistency ($\alpha = 0.91$), with an average item-total correlation of 0.75 (Hirsch *et al.*, 2006).

Statistical analyses

Pearson’s product-moment correlations were used to examine zero-order associations between, and independence of, study variables. No correlation coefficients exceeded the cut-off recommended for multicollinearity ($r > 0.80$) (Katz, 2006), and all variables were retained in analyses. Hierarchical linear regression analyses were used to examine individual predictors of treatment adherence while controlling for age and sex. Additional multivariate models were analyzed, entering clusters of psychological variables simultaneously: (i) positive affect and negative affect; (ii) optimism and pessimism; and, (iii) trait hope and future orientation, as predictors. Finally, a multivariate model, using stepwise linear regression, was used to explore relative robustness of predictors.

Power analyses were conducted to ensure adequate sample size and to reduce risk for Type I error (α) and Type II error (β) (Green, 1991; Tabachnick and Fidell, 2007). For regression analyses and desired medium effects, $\alpha = 0.05$, and $\beta = 0.20$, a sample size of $n \geq 50 + 8m$ is necessary to assess multiple correlations, where m refers to the number of independent variables in each model; our sample size of 101 exceeds the required 82 cases.

Results

In support of our hypotheses, at the bivariate level, greater positive affect ($r = 0.32$, $P = 0.001$), optimism ($r = 0.36$, $P < 0.001$), hopefulness ($r = 0.41$, $P < 0.001$), and future orientation ($r = 0.22$, $P = 0.03$) were associated with better self-reported treatment adherence. On the other hand, negative affect ($r = -0.37$, $P < 0.001$) and pessimism ($r = -0.32$, $P = 0.001$) were negatively related to treatment adherence (see Table 1).

In separate hierarchical regression analyses, pessimism, optimism, hopefulness, negative affect, and positive affect were independently associated with patient-reported treatment adherence. Meanwhile, future orientation was not significantly related to treatment adherence (see Table 2).

In a multiple regression model, with simultaneous entry of the predictors of positive and negative affect, only negative affect was significantly related to treatment adherence. In a model combining pessimism and optimism, optimism was associated with treatment adherence. Finally, in a model simultaneously examining trait hope and future orientation, trait hope was significantly related to treatment adherence (see Table 2). In an exploratory model, using stepwise regression, trait hope emerged as the characteristic most robustly associated with treatment adherence ($\beta = 0.41$; $F(19.56)$, $t = 4.42$, $P < 0.001$).

Discussion

With a focus primarily on positive psychological variables amenable to brief treatment in primary

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Table 2 Hierarchical multiple regression analyses of psychological factors affecting treatment adherence

Variables	Independent models				Multivariable models			
	B	SE	β	f^2	B	SE	β	f^2
Age	0.004	0.008	0.057		0.004	0.008	0.057	
Sex	0.004	0.215	0.002		0.004	0.215	0.002	
Positive affect	0.392	0.120	0.317**	0.11	0.192	0.139	0.156	
Negative affect	-0.440	0.110	-0.404***	0.17	-0.342	0.130	-0.314**	0.20
Optimism	0.149	0.035	0.409***	0.19	0.179	0.066	0.493**	
Pessimism	-0.101	0.032	-0.318**	0.11	0.031	0.057	0.099	0.20
Hopefulness	0.266	0.061	0.414***	0.20	0.258	0.069	0.401***	
Future orientation	0.205	0.097	0.216*	0.05	0.026	0.103	0.027	0.20

Independent models = single IV; multivariable models = simultaneous IV's. Optimism and pessimism = Life Orientation Test-Revised; Hopefulness = Trait Hope Scale; Future orientation = Future Orientation Scale; Positive affect and negative affect = NEO-FFI Personality Inventory; Treatment adherence = Medical Outcomes Study General Adherence Scale.

* $P \leq 0.05$, ** $P \leq 0.01$, *** $P \leq 0.001$. f^2 = effect size: 0.02 = small, 0.15 = small, 0.35 = large (Cohen, 1988).

care, we found that, after adjusting for age and sex in independent models, future orientation, optimism, pessimism, hope, negative, and positive affect were predictors of treatment adherence, supporting our hypotheses and previous research suggesting that treatment adherence is a multidimensional phenomenon affected by patient-related factors (WHO, 2003; Brunton, 2011). Most previous research on treatment adherence has focused on patient demographic and socioeconomic factors (Rivero-Santana *et al.*, 2013), whereas our study focuses on psychological and motivational factors. In independent models, all cognitive-emotional characteristics were associated with treatment adherence in expected directions. When pairs of variables were analyzed simultaneously, negative affect, optimism, and hopefulness were more robustly associated with patient-reported treatment adherence, than were positive affect, pessimism, and future orientation. Finally, when model contribution was assessed, trait hope emerged as most robustly associated with treatment adherence. In sum, it appears that treatment adherence may benefit from reduction of negative emotions, bolstering positive expectancies and, particularly, establishing and working toward health-related goals.

Consistent with support for the beneficial effect of optimism on healthy behaviors and active coping (Waldrop *et al.*, 2001; Solberg-Nes and Segerstrom, 2006), our study suggests that optimism – even over and above the effects of pessimism – is associated with active treatment adherence. An optimistic

belief that treatment recommendations will be successful, and that health or functionality will improve as a result, may increase treatment adherence (Karademas *et al.*, 2011). Similarly, hopefulness, which is related to self-efficacy and strategic planning (Berg *et al.*, 2011), was associated with treatment adherence. From a theoretical perspective, hopefulness may facilitate personal efficacy in identification, planning and movement toward treatment and health-related goals (Tong *et al.*, 2010). Additionally, the goal-setting and motivational consequences of having positive expectations about the future may promote adaptive behavior engagement (Lens *et al.*, 2012), such as treatment compliance. Conversely, individuals who are present-oriented or hold negative expectations about the future may have a limited sense of personal control (Crockett *et al.*, 2009), perhaps affecting engagement in adaptive future health behaviors.

In contrast to the adaptive characteristics of optimism and hope, we found that negative affect, which may involve symptoms of anger, anxiety, and depression was associated with poor treatment adherence (Beckjord *et al.*, 2008; Grindley *et al.*, 2008). Mechanistically, negative affect may constrict an individual's thought-action repertoire and self-regulatory behaviors (Moskowitz *et al.*, 2012), thus hindering the ability to adhere to treatment recommendations. Therapeutic efforts to reduce negative mood may be effective in encouraging patient involvement in the treatment process (Tice *et al.*, 2007; Grindley *et al.*, 2008). Curiously, both

positive affect and future orientation failed to predict treatment adherence when included in multivariate models, suggesting that negative rather than positive affect, and that goal-orientation rather than simple future desires, are more robust contributors to treatment adherence.

Our novel findings must be interpreted in the context of minor limitations. Our sample of rural primary care patients was small, and was comprised of predominantly White females, which may limit generalizability. Further, because our volunteer participants self-selected into the study in response to flyers and brochures, we do not have information on the larger potential population from which our sample was drawn; thus, selection bias is possible, and sample representativeness is uncertain. Despite these issues, however, our sample was demographically similar to previous primary care samples (Probst *et al.*, 2006), as well as to residents of the geographic area surrounding the clinic data collection site, according to US Census estimates (2014). Finally, our use of self-report treatment adherence as an outcome is less than ideal, and may be subject to recall bias or social desirability effects, and our cross-sectional design limits the extent to which causal attributions can be discussed; therefore, our study should be replicated using objective, prospective assessments of diverse samples.

Previous research has strongly established the beneficial linkage between adaptive characteristics and health outcomes in medical samples; for instance, a supportive environment and social support network and positive affect are related to beneficial health outcomes including treatment adherence (DiMatteo, 1994; 2004; Hirsch *et al.*, 2012); our study adds to this literature by expansion to a rural, primary care sample and by distinct focus on positive psychological functioning. In general, we found that positive psychological characteristics promote treatment adherence, and maladaptive psychological functioning, such as poor mood and outlook, are detrimental to compliance. Our findings may have clinical implications, which might be addressed by Behavioral Health Consultants in the primary care setting (Kolbasovsky *et al.*, 2005). Decreasing negative affect, and increasing optimism and hopefulness, could be psychological targets that translate into better treatment adherence, perhaps via educational and affective interventions (Dolder, 2003).

Cognitive behavioral therapy strategies (Rains *et al.*, 2006), such as re-appraisal of maladaptive cognitive distortions about treatment, and motivational interviewing techniques (Russell *et al.*, 2011), such as eliciting change talk and self-affirmation, may promote a sense of positive mood and adaptive future orientation that facilitates health goal-oriented behaviors including treatment adherence.

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