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Depression, patient characteristics, and attachment style: correlates and mediators of medication treatment adherence in a racially diverse primary care sample

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Background: The depth and breadth of problems related to depressive symptomatology and optimal treatment outcomes, including medication treatment adherence, have long been documented in the literature. Missing are clear explanations as to what factors and patient characteristics may account for lack of medication treatment adherence. **Objectives:** The two objectives of the current study were to examine the predictive strength of depression, patient characteristics, and patient attachment style regarding medication treatment adherence and to consider the extent to which attachment styles mediate the relation between depression and medication treatment adherence. **Method:** Participants in the present study were 237 racially diverse American primary care patients with a diagnosis of hypertension who were participants in a clinical trial. Depression, patient characteristics, attachment style, and medication treatment adherence were assessed. **Results:** Partly consistent with our four hypotheses, the following results were found: (a) Black American, younger, never married, and poorer patients had lower medication treatment adherence (b) depression was significantly associated with lower self-reported medication adherence; (c) insecure–dismissing attachment style was related to lower medication adherence; and (d) insecure–dismissing attachment style mediates the relation between depression and medication treatment adherence by exacerbating the negative association. **Conclusion:** Physicians and other primary care providers should consider how depressive symptomatology, patient characteristics, and attachment style may inform the treatment plans they put forward and the extent to which patients may adhere to those treatment plans.

Key words: attachment styles; attachment theory; depression; treatment adherence; primary care

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The depth and breadth of problems related to depression and optimal treatment outcomes, including medication treatment adherence, have long been documented in the literature (DiMatteo *et al.*, 2000). Missing are clear explanations of what factors and patient characteristics may account for the lack of treatment adherence in many populations. Adherence can be defined as the 'active, voluntary, and collaborative involvement of the patient in a mutually acceptable course of behavior to produce a therapeutic result' (Meichenbaum and Turk, 1987: 20). The relationship patients have with their providers could affect patients' adherence to treatment recommendations put forward by primary care providers (Miller, 2008). Clarifying why nonadherence is commonly evidenced among patients (particularly racial minority patients) who are depressed is an important area of study. Attachment styles, which can be described as ways in which individuals relate to others, offer both physicians and researchers one explanation that may be relevant to the process (Norcross and Wampold, 2011; Hooper *et al.*, 2012; Lynch *et al.*, 2012).

A review of the empirical and theoretical literature suggests attachment styles may explain the relationships and communication styles patients have with their primary care physicians, as well as patients' adherence to physicians' treatment recommendations. According to Maunder *et al.*, 'aspects of the attachment system, such as signaling distress, seeking proximity to a caregiver, and using interpersonal contact to modulate affect appear to be relevant to the interpersonal negotiations involved in seeking, receiving, and accepting care at times of illness' (2006: 553). In addition to shaping how a patient perceives and behaves in relationships with health care providers (Nanjappa *et al.*, 2014), attachment styles have been shown to influence patients' level of trust and satisfaction with physicians (Holwerda *et al.*, 2013). Understanding how patients' attachment styles relate to medication treatment adherence will help primary care physicians to better understand behaviors evidenced by patients with particular attachment styles and to consider how to incorporate relevant treatment recommendations that lead to medication treatment adherence among depressed patients.

In the current investigation, we use Bowlby's (1969; 1973; 1977; 1980) attachment theory to explore the relevance of patients' attachments styles and depression with regard to treatment adherence. We also explore the mediating effect of attachment styles on the relation between depression and patients' adherence to primary care physicians' treatment recommendations. In addition, we explore patient characteristics to determine their relation to medication treatment adherence. This article provides a brief review of the empirical research on the relative effects of attachment styles on medication treatment adherence, the combined effects of depression and attachment style on medication treatment adherence, and the research design and results of the current investigation.

Attachment theory and medication treatment adherence

Bowlby's (1970; 1973; 1977; 1980) theory refers to the organization of one's attachment beliefs based on his or her early caregiving experiences. As described by Ciechanowski *et al.* (2002), Bowlby 'proposed that individuals internalize earlier experiences with caregivers, forming enduring cognitive schemas or blueprints of relationships that influence whether they perceive themselves as worthy of care (model of self) and whether others can be trusted to provide care (model of other)' (p. 660). Over the years, attachment styles have been represented by different terms and assessed using different methods among scholars, providers, and researchers. Bowlby (1969) described four different styles of attachment in children. Main and Goldwyn (1994) and Griffin and Bartholomew (1994) described and operationalized corresponding attachment styles in adult relationships. The four established categories of adult attachment styles that Griffin and Bartholomew (1994) described are (a) secure attachment, (b) insecure–dismissing, (c) insecure–preoccupied or avoidant, and (d) insecure–fearful. Attachment styles play an important role in the development of therapeutic relationships (eg, Bennett *et al.*, 2011; Holwerda *et al.*, 2013) and patient adherence to treatment (eg, Ciechanowski *et al.*, 2004).

Patients with a *secure attachment style* often demonstrate positive treatment adherence. According to Feeney (2000), patients with a secure attachment style are willing to consult and comply

with primary care physicians as well as other health care providers and to proactively develop their own support network. They usually have little difficulty with patient–physician communication and are willing to mobilize constructive behavior (Maunder and Hunter, 2009); these patients tend to trust their physicians and believe that these providers will adequately meet their health care needs (Ciechanowski *et al.*, 2004; Holwerda *et al.*, 2013). Nanjapp *et al.* (2014) indicated that the reason patients with secure attachment had better relationships with health care providers was because they had 'positive views of themselves and others which allows them to engage and connect effectively with people to build long-lasting relationships' (p. 751).

Patients with an *insecure–dismissing attachment style* tend to have difficulties with adherence to their treatment plans. As these individuals usually are compulsively self-reliant and constantly search for autonomy, they have low desire for patient–physician collaboration and are more likely to miss appointments (Feeney, 2000; Ciechanowski *et al.*, 2004; Ciechanowski and Katon, 2006). In addition, their distrust of professionals and belief that physicians or other providers cannot adequately help them often lead these patients to reject any medical advice or treatment recommendations (eg, dosing regimens; see Hunter and Maunder, 2001) and in the case of treatment failure, they will tend to blame others, for example, a health care provider (Kiesewetter *et al.*, 2012). These patients rarely interact with health care providers (Ciechanowski *et al.*, 2004).

Individuals with *insecure–preoccupied attachment* may have difficulties with their medication treatment adherence for several reasons. As patients they often idealize their health care professionals, possibly to a point that interferes with the patient–physician relationship. Physicians should be aware of patients who may have an insecure–preoccupied attachment style so they can appropriately respond to their needs and requests. However, if problems continually arise, these patients may become highly frustrated with treatment recommendations and act in ways that sabotage the effectiveness of the proposed plan (Feeney, 2000). According to Maunder and Hunter, 'in medical settings, people with a preoccupied attachment style have a sense of personal fragility and hyper-vigilance for threat that may increase attention to body sensations, resulting

in high levels of perceived stress, amplified symptoms and unexplained medical symptoms' (2009: 125). These patients are often described as 'clingy' because they tend to utilize a constant distress signal to ensure that their needs are addressed by providers (Tan *et al.*, 2005).

Patients with an *insecure–fearful attachment style* are likely to have poor treatment adherence (Ciechanowski *et al.*, 2003). As they mistrust depending on others, these individuals have low desire for a patient–physician relationship or collaboration (Ciechanowski *et al.*, 2006). They ask for help only when highly distressed. Maunder and Hunter described these patients as 'suffering without help-seeking' (2009: 127); they often have frequent symptoms and infrequent medical visits.

While the extant literature base indicates that attachment styles are associated with treatment adherence, in evaluating adherence, it is important to also consider the social spheres with which these individuals operate. Some researchers have argued that for individuals with chronic illness, treatment adherence is a negotiation in competing social spaces (eg, McCoy, 2009; Murdoch *et al.*, 2013; 2015) and thus patients manage their illness according to these spaces (Murdoch *et al.*, 2015). In a qualitative study involving 26 participants with asthma, Murdoch *et al.* found that participants presented 'their versions of their asthma management as plausible to meet the interactional tasks of ensuring their performances functioned effectively' (2013: 460). In addition, their 'versions of illness management were subject to the resources available to them and those which they felt relevant within the interaction taking place' (Murdoch *et al.*, 2013: 461).

A more significant amount of research has accumulated on the significant relation between depression and treatment adherence (DiMatteo *et al.*, 2000; Trivedi *et al.*, 2007; Zivin and Kales, 2008); higher rates of depression are associated with lower levels of treatment adherence. However, little is known about the combined effects of depressive symptoms and attachment styles on treatment adherence. In their meta-analytic study, DiMatteo *et al.* (2000), suggest there may be factors that have gone unmeasured that may mediate the relation between depression and treatment adherence. Examining how attachment styles may mediate the relation between depression and treatment adherence can afford researchers and providers alike constructs that may be targeted.

New contribution

This research goes beyond previous studies by exploring a possible mediator for two ubiquitous areas (depression and treatment adherence) evidenced in primary care research and practice. Specifically, this investigation adds new information to the literature base in two ways. First, it explores the construct of attachment style in a depressed primary care population. Second, it examines a potential mediator for the relation between a significant public health condition such as depression (Kessler *et al.*, 2003) and a significa-tion health care problem (treatment adherence) that impinges upon medical care delivery in over 50% of patients in the United States (DiMatteo *et al.*, 2000).

Current investigation

In the current investigation, our primary aims were twofold: (a) to identify the association of depression, individual characteristics, and attachment style with medication treatment adherence in a racially diverse sample of primary care patients; and (b) to examine the extent to which attachment styles mediate the relation between depression and medication treatment adherence after controlling for individual characteristics. Informed by the literature described above and our research aims, the following four hypotheses were tested.

Hypothesis 1 Individual characteristics have a direct association with medication treatment adherence. This hypothesis was tested using both analysis of variance (ANOVA) and simple linear regression.

Hypothesis 2 Depression has a direct association with medication treatment adherence. This hypothesis was tested using analysis of covariance (ANCOVA).

Hypothesis 3 Attachment style (operationalized as secure, insecure–dismissing, insecure–preoccupied, and insecure–fearful) has a direct association with medication treatment adherence. This hypothesis was tested using a multiple linear regression.

Hypothesis 4 Attachment style mediates the relation between depression and medication treatment adherence. Each of the four attachment styles was studied to determine the extent to which it has a mediating effect on the relation between depression and medication treatment adherence. This hypothesis was tested using structural equation modeling (Kline, 2005).

Method

Participants and procedure

The participants in this investigation were drawn from a larger randomized controlled trial: the Patient-Physician Partnership Study (Triple P Study). The purpose of that larger study was to determine the extent to which an intensive patient-centered intervention improves treatment adherence and blood pressure compared with a minimal intervention (Cooper *et al.*, 2009; 2011). The current investigation is delimited to a subsample of the Triple P Study. More specifically, this investigation is a cross-sectional analysis of the variables of interest reported by 279 primary care patients at the baseline time point and before the assignment to study groups or exposure to any intervention. This cross-sectional analysis was utilized rather than longitudinal analysis for two reasons. First, the cross-sectional analysis controls for any exposure to the intervention, as all baseline data points were collected before the intervention. Second, both the depression and attachment style measures were collected only at baseline. The cross-sectional analysis will ensure that the current propensity for depressive symptoms is utilized, as this measure may change between the baseline and 12-month follow-up, yet it is not measured at the 12-month follow-up. A total of 42 patients were excluded due to missing observations in either our variables of interest or the demographic covariates, thus yielding a final sample size of 237 patients.

A comprehensive description of the larger study's procedures can be found elsewhere (see Cooper *et al.*, 2009), so we describe the procedure concisely here. A total of 50 primary care physicians were recruited. The patients of these physicians who had uncontrolled hypertension were recruited to

participate in the Triple P Study. Following presentations about the study at primary care offices (ie, possible study sites), mailed letters of invitation, and follow-up phone calls were given to both physicians and their patients. Research assistants then scheduled trainings, meetings, and interviews with physician- and patient-participants.

The randomized controlled trial included racially diverse, low-resourced (poor) patients recruited from 2003 to 2005. Randomly selected physicians participated in continuing education training modules (ie, intensive patient-centered intervention) geared toward increasing physicians' interviewing skills and cultural competency. Physicians received $200 for their time.

Recruited patients of the physicians were also randomly assigned to one of two groups – the intervention group or the minimal intervention group – and responded to questions and several measures related to appointment keeping, medical recommendations, satisfaction with provider care, and lifestyle recommendations. This created four treatment groups by crossing the two physician groupings with the two patient groupings. Patient-participants took part in three interviews over 12 months (with assessments made at baseline, three months, and 12 months). Patient-participants received educational materials related to hypertension and other concerns typical of patients with hypertension. The current investigation used only measurements collected from the full panel of subjects recruited on the basis of a hypertension diagnosis at the baseline time point and thus before exposure of the study interventions, to avoid any confounding effects of the intervention on our results. Patients received $25 for each interview completed (up to three possible interviews).

All procedures in the Triple P Study were approved by the Johns Hopkins Medicine Institutional Review Board, and written informed consent was obtained from all physician- and patient-participants. All guidelines related to ethical treatment of human subjects were followed throughout the duration of the study.

Measures

Demographics

Participant background information for the Triple P Study (Cooper *et al.*, 2009) was elicited from primary care patient-participants for a range of demographic factors. Participants were asked about factors including race, gender, age, marital status, education level, and socioeconomic status. Race was dichotomized as Black American and White American. Age was measured by subtracting the date of birth from the date of the interview. Marital status was trichotomized as three categories: currently married, no longer married, and never married. Education level was trichotomized into did not graduate high school, high school graduate, and attended at least some college. Socioeconomic status was trichotomized based on income: <$10 000/year, between $10 000 and $35 000/year, and >$35 000/year.

Depression

In the Triple P Study (Cooper *et al.*, 2009) depression was assessed using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) at the first time point. The CES-D was developed to assess for depressive-related cognitions and behaviors that correspond with the *Diagnostic and statistical manual of mental disorders* (American Psychiatric Association, 2000). Respondents use a Likert-type scale ranging from 0 (*rarely or none of the time*) to 3 (*most or all of the time*) to answer questions about how they have felt during the previous seven days. Scores can range from 0 to 60. Higher scores reflect a greater likelihood of depression. A score at or above 16 indicates a likelihood of mild to moderate depression, while scores of 21 and above indicate severe depression. In the current investigation, dichotomized depression scores using a 16-point cutoff score were created from the CES-D full scale value, creating two groups of patients with either some level of depression or no indication of depression (ie, depressed versus nondepressed). These two groups allow for comparisons to be made between depressed and nondepressed patients within the sample. The CES-D is one of the most widely used instruments to capture depressive symptomatology. Sound psychometric properties have been described with a variety of diverse populations (Knight *et al.*, 1997; Roberts, 1980). Reliability coefficient scores have been reported in the range of 0.85–0.91 (Roberts, 1980; Knight *et al.*, 1997).

Attachment style

Attachment style was assessed in the Triple P Study (Cooper *et al.*, 2009) using the relationship

questionnaire (RQ; Bartholomew and Horowitz, 1991). The RQ was developed to measure adult attachment style and patterns for self and other. It is a four-item self-report instrument; each item is scored on a seven-point Likert-type scale ranging from one (*not at all like me*) to seven (*very much like me*). The RQ generates a score ranging from one to seven for each of the four attachment styles: secure, insecure–dismissing, insecure–preoccupied, and insecure–fearful. In the current investigation, the four styles were used as independent Likert-type scale measures. Consistent with other studies, these measures were treated as four individual subscale measures (Alexander, 1993). Reliabilities on this scale were previously found to be between 0.72 and 0.96 (Scharfe and Bartholomew, 1994).

Medication treatment adherence

Medication treatment adherence was measured using the Hill–Bone Compliance to High Blood Pressure Therapy Scale (Kim *et al.*, 2000). The Hill–Bone scale was developed to assess patients' self-reported adherence to treatment recommendations. Using a Likert-type scale ranging from one (*none of the time*) to four (*all of the time*), patients respond to questions about how often they do not adhere to their treatment regimen. The Hill–Bone scale can generate a total score and subscale scores. Higher scores reflect poorer treatment adherence or greater nonadherence. The psychometric properties of the Hill–Bone scale have been reported to be fair, with reliabilities above 0.70 (Koschack *et al.*, 2010; Voils *et al.*, 2011). The Hill–Bone medication adherence subscale score was the only one used in the current investigation. This subscale uses a total of nine items all relating to their medication and treatment. Items range from 9 to 36, with higher values indicating greater noncompliance.

Data analysis procedure

Measures collected only at baseline were utilized in order to establish current relations among the patients and to avoid any confound from the intervention. First, the relations between the demographic variables and our dependent variable (medical treatment adherence) were examined. This was explored using ANOVA and regression. Significant results were used as covariates in subsequent analyses. Second, individual relationships between medication treatment adherence and both depression and attachment style were examined. An ANCOVA was used to examine mean differences in medication treatment adherence for dichotomized depression while controlling for the individual characteristics of gender, race, marital status, and socioeconomic status. Regression analysis was then used to assess medication treatment adherence in relation to the measures of attachment style while controlling for individual characteristic of gender, race, marital status, and socioeconomic status. Last, a mediation analysis was performed to determine the extent to which attachment style mediates, or controls, the relationship between depression and medication treatment adherence. All regression and ANOVA procedures were performed using SAS version 9.2 (SAS Institute, 2008) using the general linear model procedure. The mediation analyses were performed within a structural equation modeling framework. An IBM SPSS version 22.0 (IBM Corp., 2013) macro and script (Preacher and Hayes, 2008) were used for mediation analysis.

Results

The study tested four hypotheses regarding the relation between individual characteristics and medication treatment adherence, depressive symptoms and medication treatment adherence, the relationship between attachment style and medication treatment adherence, and the extent to which attachment style mediates the relation between depression and medication treatment adherence. All significant effects of the individual characteristics were removed by using covariates in subsequent analyses.

Descriptive results

The overall sample selected for the current investigation comprised 237 primary care patients. The majority of the sample were female ($n = 161$; 68%) with a mean age of 61.6 (SD = 11.7). More than half of the sample were Black American ($n = 146$; 62%); 38% ($n = 91$) was White American. Of the total sample, 46% ($n = 109$) reported they had previously been married, 37% ($n = 88$) were currently married, and 17% ($n = 40$) were

never married. When asked about education, 33% ($n = 78$) of the participants reported having finished less than a high school education, and the remaining participants reported completing high school ($n = 88$; 37%) or some college ($n = 71$; 30%). Finally, 32% ($n = 77$) reported a current income of <\$10 000 a year, 33% ($n = 79$) reported an income between \$10 000 and \$35 000 a year, and 34% ($n = 81$) reported a current income of >\$35 000 a year.

The CES-D-depression score at baseline within the Triple P Study (Cooper *et al.*, 2009) was used to create a dichotomized depression variable as a way of assessing differences between depressed and nondepressed patients. In the current investigation, 29% ($n = 68$) of the total study sample ($n = 237$) reported a CES-D depression score of 16 or greater indicating mild to severe depression symptoms, while 71% ($n = 169$) of the study sample reported a CES-D score lower than 16 indicating no depressive symptoms. While there is disparity between the number of depressed versus nondepressed subjects, there is appropriate power in the current investigation to determine significance between groups in our analysis (*post-hoc* power = 0.84). Demographic information for the complete sample and subsamples (depressed versus nondepressed) can be found in Table 1. A multivariate analysis of variance revealed significant differences in the mean attachment style ratings for the depressed and nondepressed individuals, Wilks's $\lambda = 0.90$, $F(4, 232) = 6.79$, $P = <0.001$. Mean values for the two groups are reported in Table 2. Univariate ANOVAs detected that depressed individuals reported higher scores for insecure–dismissing attachment style, $F(1, 235) = 16.42$, $P = <0.001$ and higher scores for insecure–preoccupied attachment style, $F(1, 235) = 15.41$, $P = <0.001$. However, no significant differences were found in ratings for the secure attachment style, $F(1, 235) = 2.80$, $P = 0.10$ and the insecure–fearful attachment style, $F(1, 235) = 0.50$, $P = 0.48$.

Hypothesis 1: direct effect of individual characteristics on medication treatment adherence

Several demographic factors (ie, race, socioeconomic status, marital status, age, and gender) were examined independently to determine any direct relationships on medical treatment adherence.

Table 1   Demographics of total sample and subsamples by depression

Characteristic	Total sample ($n = 237$)		Depressed: CES-D ≥16 ($n = 68$)		Not depressed ($n = 169$)	
	Number of patients (%)	Mean (SD)	Number of patients (%)	Mean (SD)	Number of patients (%)	Mean (SD)
Age (years)		61.6 (11.7)		56.9 (9.3)		63.5 (12.0)
Gender (female)	161 (67.9)		50 (73.5)		111 (65.7)	
Race						
White American	91 (38.4)		24 (35.3)		67 (39.6)	
Black American	146 (61.6)		44 (64.7)		102 (60.4)	
Marital status						
Married	88 (37.1)		17 (25.0)		71 (42.0)	
No longer married	108 (45.6)		36 (52.9)		72 (42.6)	
Never married	41 (17.3)		15 (22.1)		26 (15.4)	
Income						
<\$10 000	76 (32.1)		35 (51.5)		41 (24.3)	
\$10 000–\$35 000	80 (33.8)		22 (32.3)		58 (34.3)	
>\$35 000	81 (34.1)		11 (16.2)		70 (41.4)	
Depression	68 (28.7)					
Education						
<High school graduate	79 (33.3)		26 (38.2)		53 (31.4)	
High school graduate	88 (37.1)		27 (39.7)		61 (36.1)	
At least some college	70 (29.6)		15 (22.1)		55 (32.5)	
Years		11.8 (2.5)		11.6 (2.2)		11.9 (2.6)

CES-D = Center for Epidemiologic Studies Depression Scale.

Table 2 Mean attachment style ratings for depressed and nondepressed patients

Variable	Depressed sample ($n = 68$)		Nondepressed sample ($n = 169$)		P value
	Mean	SD	Mean	SD	
Secure attachment	4.57	2.08	5.05	1.96	0.095
Insecure–dismissing	4.25	2.28	3.02	2.05	**<0.001**
Insecure–preoccupied	3.62	2.30	2.46	1.95	**<0.001**
Insecure–fearful	4.63	2.06	4.40	2.35	0.482

P value represents the hypothesis test for the difference between group means. Boldfaced values represent significant differences.

Mean values of medication treatment adherence differed significantly between the two races, $F(1, 235) = 8.76$, $P = 0.003$. Black American patients reported significantly poorer medication treatment adherence ($M = 10.70$, SD = 2.32) compared with that reported by White American patients ($M = 9.88$, SD = 1.57). Medication treatment adherence also differed based on socioeconomic status, $F(2, 234) = 5.88$, $P = 0.003$. Patients in the lowest income bracket exhibited significantly poorer medication treatment adherence ($M = 11.05$; SD = 2.35) than that reported in the two higher brackets, $M = 10.07$ (SD = 2.20) and $M = 10.07$ (SD = 1.57), respectively, which did not differ from each other. Mean differences on medication treatment adherence were also found based on marital status, $F(2, 234) = 6.87$, $P = 0.001$. Participants who were either currently married ($M = 9.95$, SD = 1.38) or previously married ($M = 10.35$, SD = 2.00) reported significantly better medication treatment adherence than was reported by those patients who indicated they had never been married ($M = 11.39$, SD = 3.12). Age was found to have a significant negative relationship with treatment adherence, $b = -0.04$, SD = 0.01, $t(235) = -3.57$, $P < 0.001$. Hill–Bone medication adherence scores decreased with age, indicating greater treatment adherence as age increased. Gender differences were not found in medical treatment adherence, $F(1, 235) = 1.62$, $P = 0.20$. As we found four variables to have a direct relationship on treatment adherence, their effects will need to be controlled for in order to better evaluate the subsequent hypotheses. Therefore, in all subsequent analyses, race, age, socioeconomic status, and marital status were added as covariates to partial out the effects described above.

Hypothesis 2: direct effect of depression on medication treatment adherence

The association between depression and medication treatment adherence (ie, Hill–Bone medication subscale score) was examined in an ANCOVA model. After controlling for our covariates, depressed individuals were found to demonstrate significantly poorer medication treatment adherence, $F(1, 229) = 10.66$, $P = 0.001$. Depressed individuals scored significantly higher on the Hill–Bone medication subscale ($M = 11.05$, SD = 2.34) than did their nondepressed counterparts ($M = 10.12$, SD = 1.94). Since higher scores indicate poorer medication treatment adherence, depression is associated with greater nonadherence.

Hypothesis 3: direct effect of attachment style on medication treatment adherence

A multiple regression analysis was conducted to determine the relationship between the four attachment styles and medication treatment adherence with the four covariates controlled for. Results indicate that the attachment styles were found to have a significant relationship with medication treatment adherence, $F(10, 226) = 4.17$, $P < 0.001$, after controlling for race, age, socioeconomic status, and marital status. Parameter estimates are shown in Table 3. Patients who reported higher likelihood of an insecure–dismissing attachment style showed significantly poorer medication treatment adherence, $b = 0.16$, SD = 0.06, $t(226) = 2.48$, $P = 0.014$. No significant effects were found for the other three relationship styles with regard to medication treatment adherence.

Table 3 Regression parameters for attachment style on treatment adherence

	Estimate	SE	t	P value
Intercept	11.914	0.896	13.30	**<0.001**
Secure attachment	− 0.092	0.064	− 1.43	0.155
Insecure–dismissing	0.161	0.065	2.48	**0.014**
Insecure–preoccupied	− 0.026	0.069	− 0.37	0.709
Insecure–fearful	0.061	0.058	1.04	0.298

Boldfaced values indicate a significant *P* value. All parameters are estimated with covariates of race, socio-economic status, marital status, and age included in the model.

Hypothesis 4: mediation effect of attachment style on the relation between depression and medication treatment adherence

A mediation relationship was explored, with attachment style measures mediating the relationship between depression and medication treatment adherence. Results indicate that attachment style scores do significantly mediate the relationship between depression and medication treatment adherence, $z = 1.82$, $P = 0.034$. Table 4 presents the mediation results for the variables after controlling for our four covariates (race, age, socioeconomic status, and marital status).

The full mediation model with unstandardized parameter estimates is visually presented in Figure 1. The total indirect effect was equal to 0.2, which indicates a small but significant effect. In addition, the presence of attachment style as a mediator accounts for 30% of the relationship between depression and treatment adherence. Of the four attachment styles, the insecure–dismissing style had a unique impact on this mediation effect. More specifically, depression scores were significantly higher for those individuals with higher insecure–dismissing and insecure–preoccupied attachment style scores. In turn, insecure–dismissing attachment style scores were positively related to Hill–Bone medication treatment adherence scores (ie, indicating poorer medication treatment adherence). In other words, the presence of an insecure–dismissing style correlates to poorer treatment adherence when present in conjunction with depression as compared with either of these two variables separately.

Discussion

One purpose of this empirical investigation was to examine the relations among depression, patient characteristics, attachment style, and medication treatment adherence. A second purpose was to establish whether attachment style mediates the relation between depression and medication treatment adherence. Determining what factors and patient characteristics may account for the lack of medication treatment adherence that is often observed in primary care settings – long empirically studied and discussed in the literature – continues to be an important area of study (DiMatteo *et al.*, 2000).

This study used a racially diverse sample of 237 primary care patients to test four hypotheses. The foremost results of our investigation are as follows: (a) depression had a significant negative association with overall medication treatment adherence; (b) attachment style, specifically insecure–dismissing attachment style, had a significant negative relation with medication treatment adherence; and (c) attachment style, specifically insecure–dismissing attachment style, mediates the relation between depression and treatment adherence, resulting in a greater negative association than each of the two variables individually. The next section summarizes our findings in the context of the literature base.

First, we found support for Hypothesis 1. Patient characteristics were found to be significantly related to medication treatment adherence, suggesting that individual characteristics of a given patient have a direct effect on the patient's medication treatment adherence. More specifically, Black Americans, younger patients, poorer patients, and single patients are more likely to be depressed and also more likely to have poorer medication treatment adherence. These findings concur with results obtained by Murdoch *et al.* (2013) who utilized case representations of participants who had not taken asthma medications as advised. Murdoch *et al.* found that in explaining their illness, the participants 'activated culturally understood discourses … to justify their medicine taking' (p. 460). In addition, the manner in which the participants managed their illness was subject to the resources that were available to them (Murdoch *et al.*, 2013). Our findings related to marital status are consonant with the literature

Table 4 Estimated indirect effects in the mediation analysis

	Indirect effect	SE	Z	P value
Total	0.202	0.111	1.82	**0.034**
Secure attachment	0.040	0.039	1.01	0.156
Insecure–dismissing	0.168	0.091	1.85	**0.032**
Insecure–preoccupied	− 0.024	0.070	−0.34	0.365
Insecure–fearful	0.019	0.038	0.50	0.309

Boldfaced values indicate a significant P value.
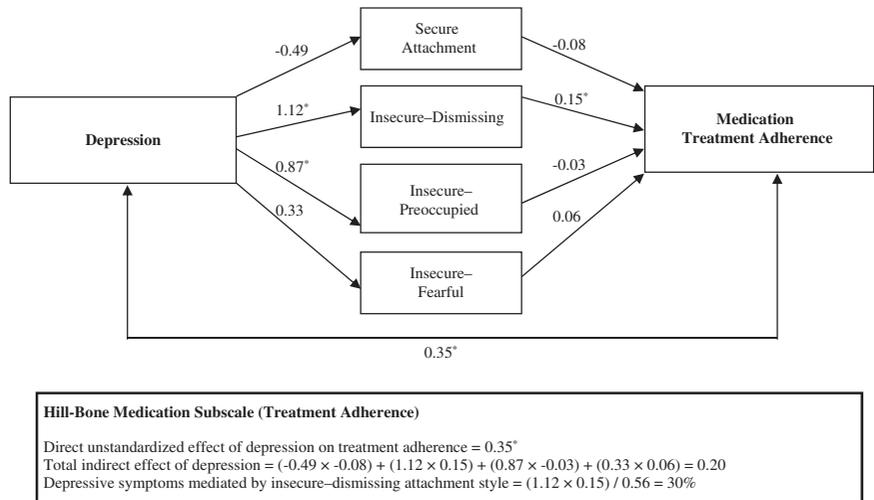
Figure 1 Hypothesized mediation model: the relation between depression, attachment styles, and treatment adherence. *Significant coefficient

base. For example, DiMatteo (2004) in a literature review involving 122 studies between the years of 1948 and 2001 found that 'the odds of adhering if married are 1.27 times higher than if unmarried, and the risk of nonadherence is 1.13 times higher among unmarried subjects than among married subjects' (p. 211). Demographic factors or patient characteristics such as race, age, socioeconomic status, and marital status should thus be taken into consideration when physicians formulate treatment plans.

Second, and consistent with Hypothesis 2 and other studies (DiMatteo *et al.*, 2000; Trivedi *et al.*, 2007; Zivin and Kales, 2008), depression had a significant negative relationship with medication treatment adherence. Higher rates of depression correlated with greater rates of nonadherence in our study sample. These findings, which replicated in part results from a sample of patients with

cardiovascular disease and diabetes, indicate that depression is an important factor in overall treatment adherence, as well as adherence specifically to medication treatment.

Third, we found partial support for Hypothesis 3, indicating that attachment style was directly related to medication treatment adherence. We hypothesized that all four attachment styles would be related to medication treatment adherence. However, we found that only one of the attachment styles had a direct relation to adherence. Specifically, insecure–dismissing attachment style had a negative relationship with medication treatment adherence. This finding is consistent with the theorizing (Feeney, 2000; Hunter and Maunder, 2001) and findings from empirical studies (Ciechanowski *et al.*, 2003; 2004; Ciechanowski and Katon, 2006), but it is only partially consistent with our hypothesis.

Finally, we also found partial support for Hypothesis 4, indicating that attachment style does mediate the relation between depression and medication treatment adherence. However, the only attachment style that accounted for a significant amount of unique variance in medication treatment adherence was the insecure–dismissing attachment style. This significant finding is consistent with other studies that have uncovered the relation between insecure–dismissing attachment style and of medication treatment adherence (Ciechanowski *et al.*, 2003; 2004; Ciechanowski and Katon, 2006).

Our findings relating specifically to attachment style are consistent with the attachment theory framework (Bowlby, 1969; 1973; 1977; 1980; Feeney, 2000) and the oft-reported characteristics evinced among people with an insecure–dismissing attachment style. Many scholars who focus on attachment theory have reported on the criticality of understanding patients' relational and interactional preferences (ie, attachment styles) and how this knowledge may enhance positive medical encounters (Miller, 2008; Norcross and Wampold, 2011; Hooper *et al.*, 2012). Most would agree that ethical, competent, and culturally responsive providers try to understand how best to engage patients in their own health care (Huntsinger and Luecken, 2002), encourage patients to schedule and attend appointments when needed, cocreate patient-centered treatment plans (Adler, 2002; Arbuthnott and Sharpe, 2009; Norcross and Wampold, 2011; Lynch *et al.*, 2012), and encourage patients to adhere to the evidence-based treatment guidelines set forth (McWilliams and Bailey, 2010).

While individual differences were present in relation to medication treatment adherence, attachment style and depression were found to be consistently related to this factor as well. These findings have implications for the importance of considering psychological, social, cultural, and demographic factors when diagnosing, assessing, and formulating treatment plans. Thus, in addition to patient-centered care, culturally tailored care is an important consideration when physicians and providers examine correlates and predictors of medication treatment adherence (Paez *et al.*, 2008). Further clarification as to how demographic variables influence treatment outcomes and processes (eg, symptoms, medication treatment adherence, patient–physician communications) is also an important area for future investigations.

Limitations of the study

The results of this study should be examined in conjunction with the current investigation's limitations. The current investigation is limited by its cross-sectional, single-informant design. Therefore, given the cross-sectional, nonexperimental nature of the current study, no conclusions related to cause and effect can be made. In addition, the cross-sectional nature of the study allows for discussion of the relation between the study factors at the current time point, but may not be reflective of the relationships over time. While this study did collect data across multiple time points, analysis was not conducted over time as to not confound our results with the intervention conducted in the study.

The fact that all data for the current study were based on self-report measures is an additional limitation to this investigation. However, it is worth noting that several adherence studies have utilized self-reports (eg, Sher *et al.*, 2005; Kongkaew *et al.*, 2013). It is difficult to determine the extent to which participants' responses were accurate and true, versus reflecting only what they perceived to be more socially desirable responses (Trimble, 1997). Jerant *et al.* (2008) suggested that three to four days produces reliable and valid estimates for self-reported recall of treatment adherence.

Another limitation related to measurement is our assessment of attachment style. The measure of attachment style is meant to measure how the individual approaches a relationship. However, this measure was not created to measure physician–patient interactions. Our interpretations are based on the assumption that attachment in the physician–patient relationship is similar to attachment in other contexts.

Finally, the sample itself may limit the generalizability of the study, as samples from clinical trials are more self-selective and are atypical in having agreed to participation in a clinical trial. This fact could also confound the attachment style frequencies of the sample, as the likelihood of agreeing to participate in the study may be dependent upon their attachment style.

Consequently, the sample characteristics may have attenuated the study's findings and thereby limits the study's generalizability.

Implications for primary health care research and practice

Despite the study limitations, our results add to the literature on the importance of attachment styles and have implications for practice by physicians and other providers. Given current depression prevalence rates (Kessler *et al.*, 2003), ascertaining how depressive symptoms may negatively affect medication treatment adherence is vital. In the current investigation, the important finding that depression had a direct negative relationship with medication treatment adherence was consistent with the clinical and research literature base: for example, Ciechanowski *et al.* (2004) found that depressive symptoms predicted medication treatment adherence among patients with diabetes. In addition, the presence of an insecure–dismissing attachment style exacerbated this negative relationship between depression and medication treatment adherence. While more research needs to be conducted to address the consistency of these findings, the attachment style of the patient may provide valuable insight into how depression relates to the both the patient–physician relationship and the consistency of the treatment outcomes and processes of the patient.

Our findings should be considered preliminary, yet they do establish that depression symptoms and attachment styles matter in the context of medication treatment adherence among primary care patients. The findings underscore the need for physicians and other providers to consider patients' attachment styles during practice. Future research should include collaborations among physicians, researchers, and patients to create and test patient-centered treatments and examine their effectiveness for improving treatment adherence among patients with various attachment styles.

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