

# Prayer, Attachment to God, and Symptoms of Anxiety-Related Disorders among U.S. Adults

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*Considerable research has examined the relationship between religion and mental health. This study adds to the literature in this area by addressing two main questions: (1) Is the frequency of prayer associated with symptoms of anxiety-related disorders among US adults? (2) Is this association conditional on the nature of individuals' attachment to God? We examine these questions using data from the 2010 Baylor Religion Survey (N = 1,511). Results reveal no meaningful associations between the frequency of prayer and anxiety symptoms. In contrast, anxious attachment to God is positively correlated with psychiatric symptoms, while secure attachment to God bears a modest inverse association with these outcomes (when anxious attachment is excluded from the model). Results also show that prayer is inversely associated with symptoms of anxiety-related disorders among individuals who have a secure attachment to God, but positively associated with these outcomes among those who have a more insecure or avoidant attachment to God. Several study limitations and promising directions for future research are discussed.*

**Key words:** religion; prayer; anxiety; mental health; attachment theory; ETAS theory.

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Over the past 20–30 years, the body of research on the connections between religion and mental health has grown dramatically. Although there are null and even negative patterns in the literature, most recent studies in this area have reported salutary associations between various aspects of religiousness and mental health outcomes, such as depressive symptoms, psychological distress, and indicators of well-being (e.g., life satisfaction) (Hackney and Sanders 2003; Koenig et al. 2001; Smith et al. 2003). At the same time, however, religion is a complex and multidimensional phenomenon, and there remains ambiguity over which facets of religiousness are most germane to mental health (Hill and Pargament 2003; Idler et al. 2003).

Findings involving nonorganizational practices—particularly the frequency of prayer—have been especially puzzling for investigators (Bradshaw et al. 2008; Schieman et al. 2013). There are sound reasons to anticipate that persons who pray frequently will enjoy more favorable mental health than others. However, the empirical findings on this point are decidedly mixed. While some studies reveal what appear to be salubrious effects of prayer on mental health, other studies report null, or even negative, associations. To date, researchers have attempted to explain these inconsistencies in terms of variations in: (1) study design and sampling, (2) prayer beliefs and expectancies, (3) styles of prayer, and (4) objects or foci of prayer (i.e., images of God). Here we suggest an alternative approach to this issue, drawing upon insights from attachment theory (Kirkpatrick 2005). Because prayer reflects—at least in part—an attempt to initiate or cultivate a relationship with a divine other, the magnitude and even direction of the link between the frequency of prayer and mental health should depend upon the nature and quality of that perceived relationship.

Our study contributes to the literature by addressing two specific questions: (1) Is the frequency of prayer associated with symptoms of anxiety-related disorders among U.S. adults? (2) Is any such association contingent on the nature of individuals' attachment to God? After outlining prior theory and evidence on the links between the frequency of prayer and mental health, we summarize key elements of attachment theory and review studies on the association between attachment to God and mental health. We also introduce an emerging theoretical perspective—Evolutionary Threat Assessment Systems (ETAS) theory—that connects prayer and attachment to God with an array of psychiatric outcomes. We then test relevant hypotheses using data from the most recent wave of the Baylor Religion Survey, a nationwide probability sample of U.S. adults drawn in 2010. This study focuses on symptoms of four anxiety-related disorders: general anxiety, social anxiety, obsession, and compulsion. This is important because compared to depression and subjective well-being (e.g., life satisfaction, happiness), relatively few studies on religion and mental health have explored psychiatric symptoms (Koenig 2009; Shreve-Neiger and Edelstein 2004). Findings are discussed in terms of the literatures on religion and mental health, attachment to God, and ETAS theory. Study limitations are noted, and several promising directions for further investigation are identified.

## THEORETICAL AND EMPIRICAL BACKGROUND

*Prayer and Mental Health*

Prayer is a central facet of religious practice and expression for adherents of most major world faiths, especially in monotheistic traditions (Ladd and McIntosh 2008; Ladd and Spilka 2002). Why might the frequency of prayer be associated with symptoms of anxiety-related disorders? Researchers have identified several possible mechanisms or pathways (Levin 1996, 2004; McCullough 1995).

To begin with, religions offer guidelines for proper human behavior and conduct, and persons who pray regularly may be inclined to live out the precepts of their religion more faithfully. This may lead to reduced exposure to stressful events and conditions, such as marital and family conflicts, economic and legal problems, and others (Levin 2004). Frequent prayer activity may also be both a marker of, and an impetus for, greater faith commitment and strength of belief (McCullough 1995). By attempting to cultivate a personal relationship with a divine other, persons who pray often may derive a sense of meaning and purpose in life, and may experience self-transcendence (Ellison 1991; Levin 2004). Those who pray often may also enjoy richer social relationships and more supportive personal relationships, which can facilitate emotional well-being (Koenig et al. 1997; Ladd and McIntosh 2008; Ladd and Spilka 2002). Finally, many persons employ prayer as a coping strategy, and there is evidence that it can help individuals to manage negative emotions associated with various acute or chronic stressors (Ellison and Taylor 1996; Nooney and Woodrum 2002; Pargament 1997).

Perhaps for these reasons, a number of studies using diverse community and clinical samples have reported salutary associations between the frequency of prayer and mental health outcomes such as symptoms of depression and psychological distress, as well as indicators of well-being such as life satisfaction and happiness (Ai et al. 2002, 2007; Fry 2000; Maltby et al. 2010; Musick et al. 1998; Nooney and Woodrum 2002). This line of theory and research yields our first study hypothesis:

- H1a: The frequency of prayer will be inversely associated with symptoms of anxiety-related disorders.

However, other studies report very different findings (Masters and Spielmanns 2007; Schieman et al. 2013). Several studies—again based on diverse samples—have found that the frequency of prayer is unrelated to mental health outcomes (e.g., Ellison 1991; Ellison et al. 2009; Krause and Hayward 2013a; Schieman et al. 2006). Some investigators have even reported that persons who pray more often tend to have poorer mental health, especially higher levels of depressive symptoms and other undesirable outcomes, than those who pray less frequently

(Bradshaw et al. 2008, 2010; Ellison 1995; Ellison et al. 2001; Strawbridge et al. 1998). These dissonant findings suggest an alternative hypothesis:

- H1b: The frequency of prayer will be unrelated to, or even positively associated with, symptoms of anxiety-related disorders.

Given that studies of prayer and mental health have employed both cross-sectional and prospective (longitudinal) designs, one might suspect that these null or negative effects could result from statistical confounding. Specifically, individuals who are facing stressful life events or difficult chronic conditions may turn to prayer as a coping resource (Ellison and Taylor 1996; Pargament 1997), and they are also likely to exhibit relatively poor mental health. However, this distinction does not appear to be the major source of disparities in the research findings noted above. Indeed, cross-sectional studies have reported positive findings (e.g., Francis and Kaldor 2002; Maltby et al. 2010), as well as null results (e.g., Ellison et al. 2009; Schieman et al. 2006) and negative findings (e.g., Ellison 1995; Ellison et al. 2001). Similarly, longitudinal studies have revealed positive (e.g., Ai et al. 2002, 2007) and null (e.g., Krause and Hayward 2013a; Levin and Taylor 1998) findings, and at least one longitudinal study has reported a curvilinear pattern, in which individuals who prayed moderately, but not daily, exhibited lower depression (Nathansen 2012). There are also reasons to doubt that the co-occurrence of prayer and stress can help to explain the inconsistent findings in the literature. For example, a number of the studies on prayer and mental health have been based on samples of persons facing serious health or other types of problems (e.g., Ai et al. 2002, 2007; Musick et al. 1998). Many other studies have included controls for individual-level variations in exposure to social stressors (e.g., Ellison 1995; Ellison et al. 2001, 2009). Thus, although residual confounding is still possible, it seems unlikely that this is sufficient to account for the disparate findings in the research literature, and it seems appropriate to consider other explanations.

Previous attempts to resolve these inconsistencies have centered on three main approaches. First, as numerous investigators have noted, prayer is a complex and highly variegated phenomenon (Krause et al. 2000; Krause and Chatters 2005; Ladd and McIntosh 2008; Ladd and Spilka 2002). Poloma and colleagues have identified multiple styles or modalities of prayer, including meditative, colloquial, ritualistic, and petitionary, among others (Poloma and Gallup 1991; Poloma and Pendleton 1989). They showed that these prayer styles have unique associations with specific aspects of well-being, including life satisfaction, happiness, negative affect, and existential well-being. Specifically, individuals who engage regularly in meditative or colloquial prayer appear to derive benefits, while those whose prayers are primarily ritualistic do not.

Second, there is evidence that prayer expectancies may shape the links between prayer and mental health outcomes. For example, in several studies of older adults, those persons who believe that only God knows when and how to

respond to prayer tend to fare particularly well, while those who believe that their prayers are not being answered do not (Krause 2004; Krause and Hayward 2013b). These benefits of prayer expectancies also appear to moderate (buffer) the deleterious effects of lifetime trauma on psychological distress among older adults, and they seem to be greater for African American elders than for their White counterparts (Krause 2009).

Third, several researchers have suggested that the links between prayer and mental health may be contingent upon the image of the perceived divine other (i.e., God, Jesus) to whom prayers are directed. In an important early contribution to this literature, Pollner (1989) argued that individuals may cultivate relationships with a perceived divine other in much the same way that they nurture ties with social others, such as friends and family members. Prayer, scriptural study, and other devotional practices—which he conceptualized as divine interactions—are important in shaping understandings of God and beliefs about what God may expect in terms of devotion and deportment. In this way, through such interactions, God can be experienced as a member of one’s intimate social network.

Based on these arguments, Pollner (1989) hypothesized that the positive associations between the frequency of prayer and psychological well-being would be strongest for persons who envision God as loving and intimate, when compared with those persons who regard God in more hierarchical, distant terms. Contrary to these expectations, however, Pollner found that the link between prayer and well-being was more salutary for persons with more powerful and remote God images. He speculated that these persons may gain a sense of vicarious control from perceiving that they enjoy a personal relationship with most powerful being in the universe, and that the fate of all human affairs is in God’s control. However, Bradshaw et al. (2008) reported that consistent with Pollner’s (1989) original line of argument, frequent prayer is positively associated with symptoms of various types of psychopathology among persons whose image of God is remote. To a lesser extent, frequent prayer is inversely associated with psychopathology among those individuals who envision God as loving. Thus, to date studies investigating whether the role of prayer varies depending upon one’s image of God—the object of prayer—have reported disparate findings.

### ***Attachment to God and Mental Health***

In this paper, we draw on insights from attachment to propose another potential resolution to the prayer-mental health quandary. Briefly, attachment theory proceeds from several core premises (Ainsworth et al. 1978; Bowlby 1969; Hazan and Shaver 1987). Infants and caregivers form close socio-emotional relationships; this is seen as an evolved adaptation that fosters survival. Infants engage in proximity-seeking behavior, drawing close to attachment figures in search of a “safe haven,” especially when perceiving physical or emotional threats. The nature of early bonding relationships is also thought to have a long reach, shaping subsequent intimate relationships (with romantic partners, close

friends, and others) well into adulthood. Not all patterns or styles of attachment are equivalent; some persons develop the ability to form close and reliable attachments with others easily, while others have much greater difficulty in doing so. Research on religion in the attachment-theoretic tradition has long distinguished between: (1) secure (i.e., warm, nurturing) attachments, as opposed to insecure or avoidant (i.e., cool, distant) ones; and (2) anxious (i.e., inconsistent, unpredictable) attachments (Kirkpatrick 2005; Rowatt and Kirkpatrick 2002). Numerous studies over the years have linked secure (as opposed to insecure) attachment styles with desirable psychosocial outcomes (e.g., enhanced coping abilities and positive mental health and psychological functioning), and anxious attachment styles with negative outcomes (Mikulciner and Florian 1998; Murphy and Bates 1997; Pielage et al. 2005).<sup>1</sup>

In recent years, attachment theory has come to occupy a significant place in the social scientific study of religion (Granqvist 1998; Granqvist and Hagekull 2003; Kirkpatrick 2005). Observers have noted that close relationships between humans and God constitute attachments, and that the teachings of Christianity (and other monotheistic world faiths) often invoke parent–child imagery. Indeed, God has been described as the ultimate attachment figure (Kirkpatrick 2005), and there is abundant evidence that believers engage in proximity-seeking behavior through various types of spiritual coping when faced with stressful events or circumstances (Pargament 1997).

Researchers working in the attachment theory tradition have reported that secure (as opposed to avoidant or insecure) attachment to God is associated with higher levels of life satisfaction, and with lower levels of depressed affect, psychological distress, and feelings of loneliness; on the other hand, anxious attachment to God has been found to be inversely associated with positive affect, and positively linked with distress and neuroticism (Bradshaw et al. 2010; Kirkpatrick and Shaver 1992; Kirkpatrick et al. 1999; Rowatt and Kirkpatrick 2002). Further, in at least one longitudinal study, secure attachment to God moderated (buffered) the deleterious effects of stressful life events on changes in distress among members of a single Protestant denomination (Ellison et al. 2012).

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<sup>1</sup>It is important to note that our work builds on research by (Kirkpatrick 2005; Rowatt and Kirkpatrick 2002), who drew heavily on Ainsworth et al.'s (1978) early research on attachment styles, as well as Hazan and Shaver's (1987) seminal work on adult attachment styles and romantic relationships. This line of research suggests three broad attachment styles: secure, insecure, and anxious. It is important to note, however, that alternative classifications schemes of attachment styles have been proposed. For example, some scholars have argued that there are multiple types of insecure attachment based on internal models of self and others: preoccupied, dismissing, and fearful (Bartholomew and Horowitz 1991; Brennan et al. 1998). Research in this and other areas offers great promise for the study of attachments to God. To date, however, they have not been extended in this direction, and we cannot address them in our study due to data limitations. Future research should address this shortcoming in the literature by applying alternative formulations of attachment theory to the study of religious life.

Based on the core insights of attachment theory, and its applications to the scientific study of religion, we suspect that closer attention to variations in modes or styles of attachment to God may help to resolve ambiguous association between the frequency of prayer and mental health. Specifically, praying in the context of a secure (as opposed to insecure or avoidant) relationship with God—an ideal attachment figure—may confer great emotional comfort, resulting in more favorable mental health outcomes. On the other hand, for persons with an anxious attachment to God—i.e., those who have an uncertain, inconsistent relationship with the divine—regular prayer could make it difficult to gain a clear sense of what God expects or demands, thereby perhaps undermining the sense of meaning and existential certainty, and contributing to negative emotions. Taken together, these prior strands of theory and research suggest two additional hypotheses:

- H2a: The association between the frequency of prayer and symptoms of anxiety-related disorders will be more salutary for persons with a secure (versus insecure/avoidant) attachment to God.
- H2b: The association between the frequency of prayer and symptoms of anxiety-related disorders will be more deleterious for persons with an anxious attachment to God.

### ***Prayer, Attachment to God, and Mental Health: The Role of ETAS Theory***

Our study augments the existing body of research on religion and mental health, which has focused primarily on depressive symptoms and subjective well-being (e.g., life satisfaction, happiness), by centering on anxiety-related disorders (Koenig 2009; Shreve-Neiger and Edelstein 2004). Specifically, these disorders include: (1) generalized anxiety, which involves excessive, uncontrollable, and often irrational worry and apprehensive expectations (Grant et al. 2005; Marks and Nesse, 1994); (2) social anxiety (or social phobia), the most common of the anxiety disorders, which involves intense fear, self-consciousness, and dread in social situations (Gilbert 2001a; Stein et al. 2000); and (3) obsession and compulsion, which involve intrusive thoughts, uneasiness, apprehensions and fear, as well as a broad range of repetitive behaviors and rituals aimed at inducing calm and reducing negative feelings (Brune 2006; Markarian et al. 2010). Why might we expect prayer and attachment to God to be linked with symptoms of anxiety-related disorders? An emerging body of scholarship known as ETAS theory helps establish this connection (Flannelly and Galek 2010; Flannelly et al. 2007).

ETAS theory builds upon a significant body of research that identifies dysfunctional beliefs as an underlying cause of symptoms of a range of psychiatric symptoms (Beck et al. 1985; Gilbert 1984). A few examples help to illustrate this point. For people with general anxiety, these negative beliefs are often very broad, such as “It is always best to assume the worst,” or “Any strange situation should be regarded as dangerous” (Beck et al. 1985:63). Social anxiety involves

distorted beliefs about oneself and others, and obsessive–compulsive disorder appears to involve a cluster of beliefs about oneself and the world. These include beliefs about personal responsibility (“For me, not preventing harm is as bad as causing harm”), one’s own thoughts (“Having violent thoughts means I will lose control and become violent”) and the dangerousness of the world (“I often think things around me are unsafe” or “Even ordinary experiences in life are full of risk”) (Moulding et al. 2011:360–61).

In general, the beliefs that are associated with general anxiety, social anxiety, obsession–compulsion, and other psychiatric disorders express the view that the world (including other people) is dangerous and that one’s physical and/or psychological well-being is at risk (e.g., Bhar et al. 2008; Brune 2006; Gilbert 2001a, 2001b; Schlager 1995; Wenzel et al. 2006). Although these beliefs have obvious adverse consequences, it is thought that the brain mechanisms underlying these types of beliefs evolved because such beliefs have survival value (Gilbert 1998, 2002). Why would this be so? From the vantage point of evolutionary psychology, the answer appears to be that believing the world is dangerous has survival value because it reflects the principle that it is better to be safe than sorry. In other words, it is better to treat something as harmful (i.e., a threat) when it is not, than to treat it as harmless (i.e., not a threat) when it can cause harm (Gilbert 1998, 2002). Thus, the beliefs associated with psychiatric disorders are thought to be heuristics for making decisions about how to deal with life situations, in which the heuristic is biased toward treating situations, people, and other things as threats (Gilbert 1998; Marks and Nesse 1994). The premise that psychiatric symptoms are the product of brain systems that have evolved to assess threats is widely accepted among neuroscientists (e.g., Eilam et al. 2011; Mollica et al. 2009; Tempesta et al. 2010; Woody and Szechtman 2011), but little research has examined the specific influence of beliefs on areas of the brain associated with threat assessment and psychiatric disorders (Harris et al. 2008).

ETAS theory brings together research findings from several fields to explain the relationships among beliefs, threat assessments, and psychiatric symptoms (Flannelly and Galek 2010; Flannelly et al. 2007). Drawing on insights from diverse fields including evolutionary psychology, neurobiology, and others, ETAS theory advances several core propositions: (1) that specific brain structures have evolved to assess potential threats of harm; (2) that threat assessments involve innate, emotional, or cognitive circuitry; (3) that many kinds of psychiatric symptoms are products of these neural threat assessments; and (4) that beliefs directly moderate threat assessments, and therefore, psychiatric symptoms.<sup>2</sup>

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<sup>2</sup>The neural mechanisms involved in the attachment system and threat assessments are thought to share common structural components and perform complementary functions to some extent. Whereas the attachment system is focused on the development and maintenance of key social relationships that provide security, ETAS perform the more general

Thus, ETAS theory proposes that beliefs about the world, including religious beliefs, can directly affect a broad array of psychiatric symptoms by influencing the threat assessments that underlie them (Flannelly et al. 2007). Beliefs can do this, according to the theory, by: (1) modulating the threshold for what constitutes a threat; or (2) modulating the sensitivity of threat assessments by ETAS. In either case, religious beliefs are thought to facilitate or inhibit threat assessments. For example, the belief that God will protect one from harm may decrease general anxiety and other forms of anxiety by inhibiting threat assessments about the dangerousness of the world at large. Some observers have argued that prayer behavior may reflect beliefs about the nature of God. Other factors being equal, many individuals who pray regularly may believe that God responds to prayer (Breslin and Lewis 2009), and they may be prone to view God as a loving, helpful presence (Grossoehme 1996). Moreover, attachment styles may reflect beliefs about the nature of God and one's relationship with God. Persons with a secure attachment to God tend to believe that God is warm, caring, supportive, and protective, whereas persons with a more insecure attachment tend to believe that God is cold and indifferent, and those with an anxious attachment view God as inconsistent and unreliable (Kirkpatrick and Shaver 1992; Rowatt and Kirkpatrick 2002). In this way, the ETAS theory supplies an explanation for why divergent styles of attachment to God may moderate the associations between prayer—a behavior that is often undertaken and experienced as an attempt to establish or sustain a close relationship with God—and mental health. Given its core tenet that many forms of psychopathology stem from distorted beliefs and perceptions of threat, ETAS theory also helps to explain why the patterns hypothesized above may be expected to surface with regard to a broad array of psychiatric outcomes, including those involving anxiety-related disorders, which are the focus of the present study.

## DATA AND MEASURES

To test the hypotheses outlined above, we analyze data from a nationwide probability sample of U.S. adults—the most recent iteration of the Baylor Religion Survey (BRS)—which was completed in November 2010 by the Gallup Organization. We employ the 2010 BRS because it contains measures of our key concepts: anxiety-related symptoms, prayer, and attachment to God. Random digit dialing was used to contact a sample of 7,000 adults who were asked to participate in the survey. Approximately 2,500 of those individuals who were initially contacted agreed, and of these, 1,714 persons returned the survey. The overall response rate for the study is 24.49 percent, which is similar to the response rate for previous waves of the BRS. A total of 203 survey participants

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function of assessing threats of potential harm in the world, including threats to social relations (Flannelly and Galek 2010; Siltan et al. 2011).

failed to answer a screening item about the existence of God, said they did not know whether God existed, had no opinion about God's existence, or reported that they did not believe in God (and thus were atheists). These individuals were excluded from the present study. Excluding these individuals did not substantially bias the demographic makeup of the sample. Case loss on other items was minor (82 individuals), and was handled using multiple imputation techniques. The following analyses are based on five imputed data sets. The final  $N$  is 1,511.

### **Dependent Variables: Symptoms of Anxiety-Related Disorders**

Four different measures of anxiety-related disorders are examined. All measures are adapted from existing scales in the public domain for: (1) General Anxiety Disorder (Kroenke et al. 2010); (2) Social Anxiety/Social Phobia (Moore and Gee 2003); (3) Obsessions of Obsessive–Compulsive Disorder (Kaplan 1994); and (4) Compulsions of Obsessive–Compulsive Disorder (Kaplan 1994). The root question for each item was: “Over the past month, how often have you . . .?” The response options for each item were: never (0), rarely (1), sometimes (2), often (3), and very often (4). The items for each symptom class are listed in table 1, along with the Cronbach's  $\alpha$ 's for the three items measuring each symptom class. The variable for each class consisted of the mean score on the three items comprising that class.

The scale measuring General Anxiety Disorder captured the first two criteria of the disorder—that a person has excessive anxiety and worry, and has difficulty controlling the worry—according to the fourth edition of the *Diagnostic and*

TABLE 1 Items Used to Measure Each Class of Anxiety-Related Disorders

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Generalized Anxiety Disorder: $\alpha = 0.84$
Felt nervous, anxious, or on edge
Unable to stop or control worrying
Worried too much about different things
Social Anxiety/Social Phobia: $\alpha = 0.82$
Feared that you might do something to embarrass yourself in a social situation
Became anxious doing things because people were watching
Endured intense anxiety in social or performance situations
Obsessions (Obsessive–Compulsive Disorder): $\alpha = 0.76$
Been plagued by thoughts or images that you cannot get out of your mind
Thought too much about things that would not bother other people
Thought too much about pointless matters
Compulsions (Obsessive–Compulsive Disorder): $\alpha = 0.77$
Felt compelled to perform certain actions, for no justifiable reason
Repeated simple actions that realistically did not need to be repeated
Been afraid something terrible would happen if you did not perform certain rituals

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*Statistical Manual of Mental Disorders* (Text Revision) (DSM-IV-TR 2000). The Social Anxiety scale measured its first two criteria—that a person has a fear of social and performance situations, and that these situations provoke anxiety. The Obsessions scale captured the first two criteria of obsessions: recurrent, intrusive thoughts or images that are recognized as inappropriate and excessive. The Compulsions scale measured both criteria of compulsions: repetitive, ritualistic behaviors which are performed to prevent harm that the person feels compelled to perform. The first two criteria of each of these disorders are their major criteria (DSM-IV-TR 2000).

### **Key Independent Variables: Prayer and Attachment to God**

The frequency of prayer was measured by participants' responses to the following question: "About how often to you spend time alone praying, outside of religious services?" Response categories were: never (1), only on certain occasions (2), once a week or less (3), a few times a week (4), once a day (5), several times a day (6).

Attachment to God was gauged using Rowatt and Kirkpatrick's (2002) nine-item multidimensional measure. Secure (as opposed to insecure) attachment to God ( $\alpha = 0.92$ ) was tapped by the respondent's agreement with each of the following six items, which range from "not true" (1) to "very true" (4): (a) "I have a warm relationship with God." (b) "God knows when I need support." (c) "I feel that God is generally responsive to me." (d) "God seems impersonal to me" (reverse coded). (e) "God seems to have little or no interest in my personal problems" (reverse coded). (f) "God seems to have little or no interest in my personal affairs" (reverse coded). Anxious attachment ( $\alpha = 0.79$ ) was assessed from the following three items, which were also coded on a 1–4 scale: (a) "God sometimes seems responsive to my needs, but sometimes not." (b) "God's reactions to me seem to be inconsistent." (c) "God sometimes seems warm and other times very cold to me."

### **Covariates**

Our analyses also control for several variables that could potentially confound the associations between prayer, attachment to God, and anxiety-related symptoms in our national sample of U.S. adults. These include the following: age (measured in years); gender (1, female; 0, male); race and ethnicity (African Americans and other minorities are compared with non-Hispanic Whites, the reference group); and marital status (1, married; 0, all others). Education was measured with a series of three dichotomous variables: a high school diploma or less (the reference group), some college, and a college degree or more. Finally, two items were used to measure religiousness. Respondents were asked about their religious attendance via the following item: "How often do you attend religious services at a place of worship?" Response options included "never" (0), "less than once a year" (1), "once or twice a year" (2), "several times a year" (3), "once a month" (4), "2–3 times a month" (5), "about weekly" (6), "weekly" (7), and

“several times a week” (8). Respondents were also asked: “How religious do you consider yourself to be?” Answers were coded on a scale ranging from “not at all religious” (1) to “very religious” (4).

## RESULTS

### *Descriptive Statistics*

Table 2 shows descriptive statistics for all measures used in this study. According to the mean scores presented here, symptoms of anxiety-related disorders are relatively low. General anxiety, social anxiety, obsession, and compulsion have means of 1.18, 0.68, 0.97, and 0.37 (on 0–4 scales), respectively. Scores on secure attachment to God are relatively high, with a mean of 3.28 on a 1–4 scale, while the mean for anxious attachment to God is 2.02 on a 1–4 scale. The average BRS respondent attends religious services slightly more than once a month, prays somewhere between “several times per week” and “once a day,” and identifies him/herself as “somewhat religious.” On average, BRS respondents are approximately 56 years old, which is significantly older than the U.S. adult population as a whole. The percentage of whites is also higher (81 percent), while the percentages of African Americans (10 percent) and others (9 percent) are lower, than those in the general population. BRS respondents are more likely to be married (65 percent) than U.S. adults as a whole. With respect to education, 32

TABLE 2 Descriptive Statistics

Measures	M	SD
General anxiety	1.18	0.90
Social anxiety	0.68	0.76
Obsession	0.97	0.77
Compulsion	0.37	0.59
Secure attendance God	3.28	0.65
Anxious attendance God	2.02	0.69
Prayer	3.35	1.62
Age	55.62	15.67
Female	0.54	—
White	0.81	—
Black	0.10	—
Other race	0.09	—
High school or less	0.32	—
Some college	0.33	—
College degree or more	0.35	—
Married	0.65	—
Religious salience	3.09	0.92
Religious attend.	4.11	2.90

percent of the sample obtained a high school diploma or less, 33 percent had some college or attended a trade school, and 35 percent earned a college degree or graduate degree. Even though our sample characteristics vary from the population in some important ways, controlling for these factors in our regression models means that our parameter estimates should not be biased due to the lack of representativeness [Winship and Radbill, \(1994\)](#).

### ***Bivariate Correlations***

Table 3 presents bivariate correlations between our measures of frequency of prayer, attachment to God, and anxiety-related symptoms. Several notable, but unsurprising, patterns emerge from this table. First, our measures of psychiatric symptoms are positively correlated with one another, with  $r$ 's ranging from 0.524 to 0.772 (all  $p < .001$ ). These patterns comport with a broader literature on the comorbidity of anxiety disorders. For example, the initial National Comorbidity Survey and the subsequent replication survey revealed that Americans who have had a DSM diagnosis of one anxiety disorder (within the preceding 12 months, or at some other point in their lives) are relatively likely to have a DSM diagnosis of another anxiety disorder ([Kessler et al. 1998, 2005](#)). Second, the frequency of prayer bears no significant association with any set of symptoms, with  $r$ 's ranging from  $-0.026$  to  $-0.054$  (all n.s.). These results are consistent with H1b, but they run directly counter to H1a. Third, secure attachment to God bears a modest inverse correlation with these various psychiatric symptoms. These correlations range from  $-0.085$  to  $-0.108$  (all  $p < .001$ ). Fourth, anxious attachment to God is positively correlated with symptoms of anxiety-related disorders, with  $r$ 's ranging from 0.188 to 0.221 (all  $p < .001$ ). Fifth, the frequency of prayer exhibits a strong positive correlation with secure attachment to God ( $r = 0.620$ ,  $p < .001$ ), and a somewhat weaker inverse association with anxious attachment to God ( $r = -0.288$ ,  $p < .001$ ). Finally, our measures of secure and anxious attachment to God are inversely correlated ( $r = -0.507$ ,  $p < .001$ ).

### ***Multivariate Analyses***

Next we estimated multivariate OLS regression models, gauging the net effects of prayer and attachment to God on each measure of psychiatric symptoms. For each outcome, two models are presented: (1) a main effects model (table 4); and (2) an interactive model (table 5) that tests our hypotheses that the associations between the frequency of prayer and anxiety-related disorders will vary depending on the respondent's attachment to God. Prior to calculating statistical interactions, raw terms were zero-centered to minimize multicollinearity with product terms, as recommended by [Aiken and West \(1991\)](#). To conserve space, we discuss only those findings bearing on our main hypotheses.

The multivariate results for main effects are quite straightforward (table 4). First, as predicted by H1b (and contrary to H1a), and consistent with the bivariate patterns noted above, we find no net association between the frequency of prayer and any of the measures of psychiatric symptoms. Second, secure

TABLE 3 Bivariate Correlations

Measures	Secure Attendance God	Anxious Attendance God	Prayer	General Anxiety	Social Anxiety	Obsession	Compulsion
Secure Attendance God	1.00						
Anxious Attendance God	-.507***	1.00					
Prayer	.620***	-.288***	1.00				
General Anxiety	-.101***	.215***	-.040	1.00			
Social Anxiety	-.085***	.188***	-.054	.590***	1.00		
Obsession	-.108***	.221***	-.047	.772***	.643***	1.00	
Compulsion	-.102***	.190***	-.026	.524***	.590***	.621***	1.00

Notes: r's significantly different from zero: \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$

TABLE 4 OLS Parameter Estimates (Standardized Estimates in Parentheses) from the Regression of Anxiety-Related Symptoms on Religion Variables and Covariates

Variable	General anxiety	Social anxiety	Obsession	Compulsion
Age	-0.006*** (-0.107)	-0.004*** (-0.094)	-0.005*** (-0.103)	-0.002* (-0.050)
Female	0.234*** (0.129)	0.072 <sup>+</sup> (0.047)	0.081* (0.052)	-0.058* (-0.049)
Black	-0.061 (-0.020)	-0.101 (-0.040)	-0.142* (-0.055)	0.113* (0.057)
Other race	0.094 (0.030)	-0.022 (-0.009)	0.021 (0.008)	0.062 (0.031)
Some college	-0.185*** (-0.097)	-0.126*** (-0.078)	-0.095*** (-0.058)	-0.001 (-0.001)
College degree or more	-0.289*** (-0.154)	-0.218*** (-0.138)	-0.258*** (-0.160)	-0.155*** (-0.126)
Married	-0.160*** (-0.085)	-0.178*** (-0.112)	-0.184*** (-0.114)	-0.125*** (-0.102)
Religious salience	0.066 <sup>+</sup> (0.061)	0.007 (0.008)	-0.029 (-0.031)	0.018 (0.026)
Religious attend.	-0.033*** (-0.107)	-0.002 (-0.006)	-0.012 (-0.043)	-0.008 (-0.041)
Secure attendance God	-0.007 <sup>a</sup> (-0.005)	-0.033 <sup>a</sup> (-0.028)	-0.003 <sup>a</sup> (-0.002)	-0.032 <sup>a</sup> (-0.035)
Anxious attendance God	0.273*** (0.210)	0.212*** (0.193)	0.242*** (0.217)	0.148*** (0.174)
Prayer	0.018 (0.033)	-0.006 (-0.013)	0.012 (0.025)	0.020 (0.054)
Intercept	1.011	0.611	0.900	0.344
Adj. R <sup>2</sup>	0.105	0.064	0.089	0.071

Notes: <sup>+</sup> $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

<sup>a</sup>Coefficient is statistically significant at  $p < .05$  when anxious attachment to God is not in model.

The reference group for Black and other race is non-Hispanic White.

The reference group for Some college and College degree or more is High school or less.

Results are similar when robust standard errors are estimated.

Cell entries are OLS parameter estimates (standardized estimates in parentheses).

attachment to God bears a modest but consistent inverse association with all four measures of anxiety symptoms, but only when anxious attachment to God is excluded from the models. When our measures of secure and anxious attachment to God are included simultaneously, the estimated net effect of secure attachment is diminished to nonsignificance. Third, anxious attachment to God is positively linked with psychiatric symptoms, regardless of whether or not the

TABLE 5 The Interactive Influence of Secure Attachment to God and Prayer on Anxiety-Related Symptoms (OLS Parameter Estimates)

Variable	General anxiety	Social anxiety	Obsession	Compulsion
Secure attendance God	-0.049 <sup>a</sup>	0.007 <sup>a</sup>	-0.024 <sup>a</sup>	-0.050 <sup>a</sup>
Prayer	0.015	-0.008	0.010	0.018 <sup>+</sup>
Secure attendance God × prayer	-0.081***	-0.049**	-0.042*	-0.035*

Notes: <sup>+</sup> $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

<sup>a</sup>Coefficient is statistically significant and inversely associated with anxiety-related symptom at  $p < .05$  when anxious attachment to God is not in model.

All models include controls for age, sex, race, education, marital status, religious salience, religious attendance, and anxious attachment to God (secure attachment to God and prayer are zero centered).

Results are similar when robust standard errors are estimated.

measure of secure attachment to God is included in the models.<sup>3</sup> Effect sizes for anxious attachment to God are comparable for the various anxiety-related outcomes, with standardized  $\beta$ 's ranging from 0.174 (compulsion) to 0.217 (obsession); all effects are significant at the  $p < .001$  level. We also estimated models that did not contain controls for our covariates. The results from these models were very similar to the ones reported in table 4, suggesting that our results are robust regardless of whether: (1) demographic characteristics; (2) socioeconomic status; and (3) other religious characteristics (i.e., service attendance and personal religious salience) are held constant. In other words, these variables do not appear to play much of a role in the relationships reported in table 4.

Two key patterns surface in the interaction models (table 5). First, for each outcome secure attachment to God (but not anxious attachment) moderates the links between prayer and symptoms of anxiety-related disorders. All interactions are significant at  $p < .05$  or beyond. The nature of these interactions becomes clear when they are graphically displayed in figures 1–4. In each instance, for respondents who have the mean score on the secure attachment measure, the association between prayer and psychiatric symptoms is negligible. For those exhibiting above-average levels of secure attachment to God (one or two standard deviations above the mean), there is an inverse link between prayer and symptoms. In contrast, for respondents with below-average scores (one or two standard deviations below the average) on our secure attachment measure, there is a sharp positive association between prayer and psychiatric symptoms. Taken together, these results offer clear support for H2a. However, contrary to H2b, there is no evidence that anxious attachment to God moderates the association

<sup>3</sup>Variance inflation factor (VIF) statistics are 2.28 or less for all predictors in the models shown in table 4, suggesting that multicollinearity is not a major problem in our analyses (Kutner et al. 2004).

FIGURE 1. The Interactive Influence of Prayer and Secure Attachment to God on General Anxiety.

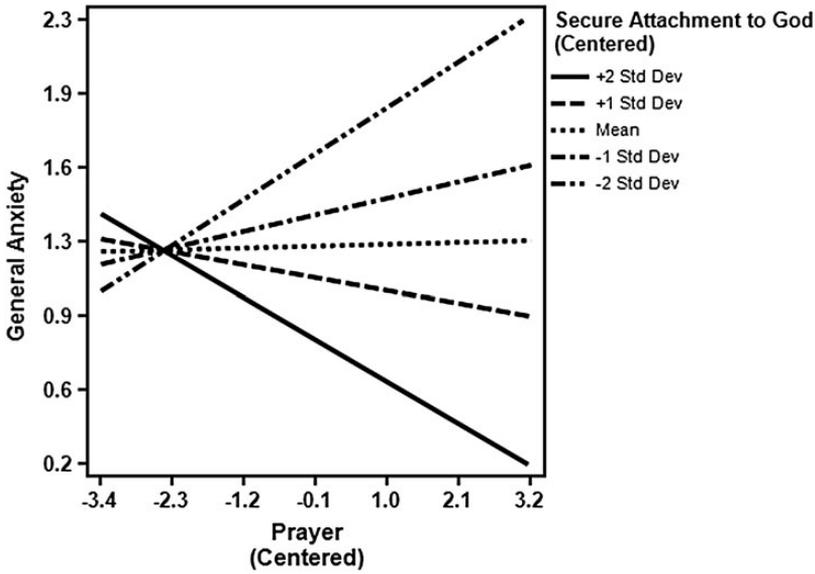
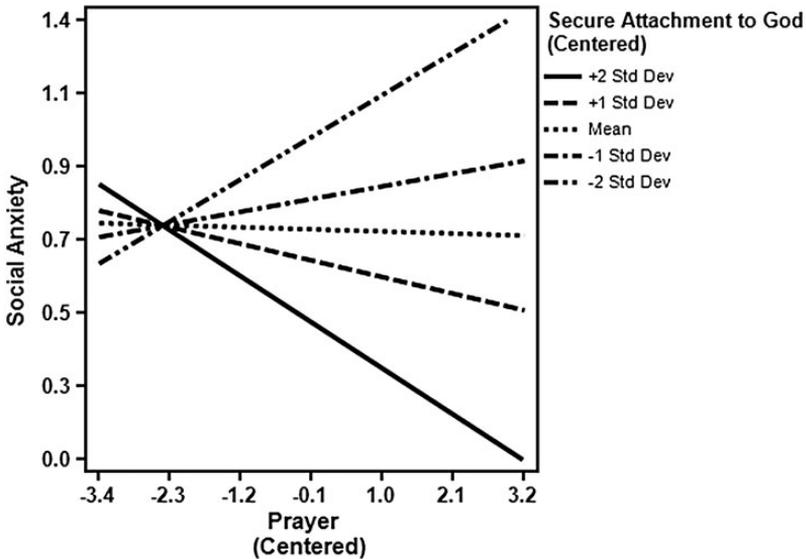


FIGURE 2. The Interactive Influence of Prayer and Secure Attachment to God on Social Anxiety.



between prayer and symptoms of any anxiety-related disorders. This null finding is intriguing for another reason, however: the absence of a significant interaction effect suggests that the strong association between an anxious attachment to God

FIGURE 3. The Interactive Influence of Prayer and Secure Attachment to God on Obsession.

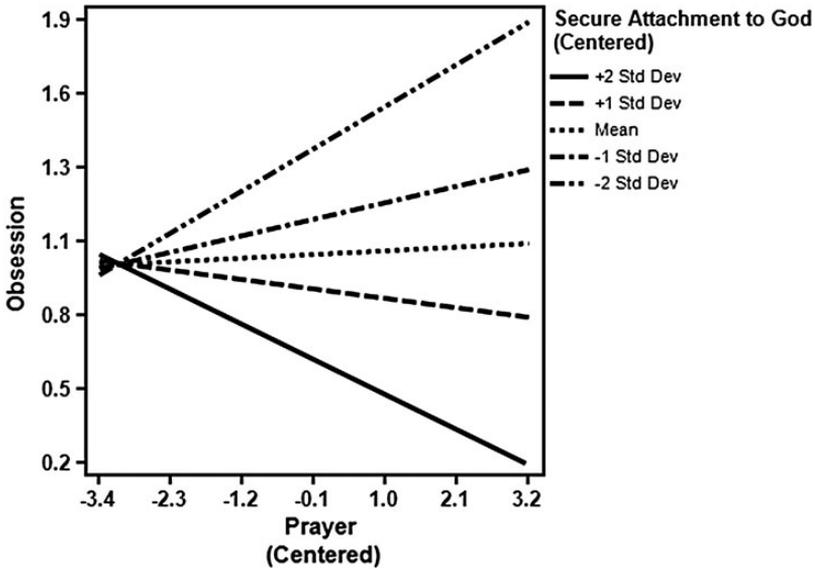
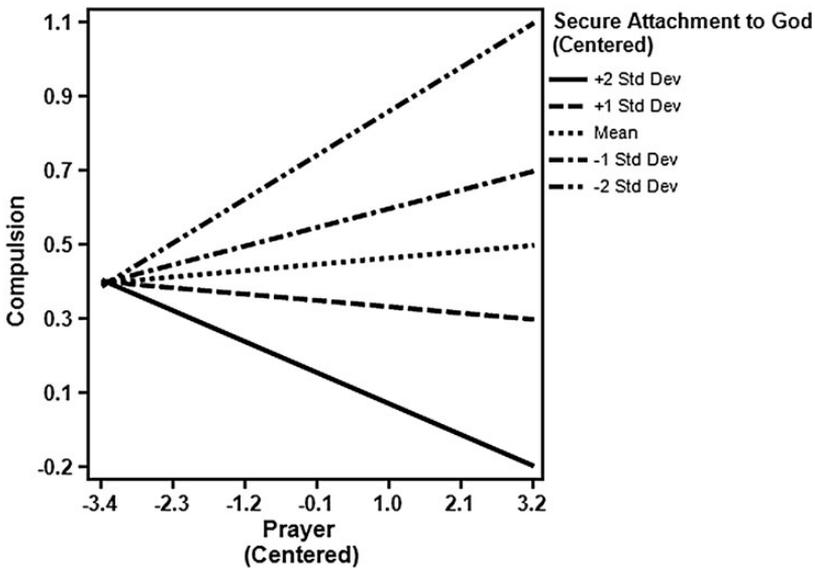


FIGURE 4. The Interactive Influence of Prayer and Secure Attachment to God on Compulsion.



and psychiatric symptoms cannot be attenuated even by stress-alleviating activities such as prayer. Although it lies beyond the scope of the present paper, this pattern deserves additional exploration by future investigators.

## DISCUSSION

We began this study by noting that the association between the frequency of prayer and mental health has been highly inconsistent in previous studies, and we suggested that insights from attachment theory could help to clarify the ambiguous nature of this association. We have tested relevant hypotheses using data from the most recent Baylor Religion Survey by focusing on symptoms of several specific anxiety-related disorders which have been understudied relative to depression, life satisfaction, and other mental health outcomes.

The results are straightforward. Consistent with the thrust of many previous studies, we find no meaningful association between the frequency of prayer and psychiatric symptoms (Masters and Spielmans 2007; Schieman et al. 2013). Secure attachment to God bears a modest inverse association with symptoms of anxiety (when anxious attachment is not in the model), while anxious attachment to God is more strongly and positively linked with these outcomes. Perhaps most importantly for our purposes, we find consistent interactions between the frequency of prayer and secure attachment to God, such that persons who pray often to a God who is perceived as a secure attachment figure derive clear mental health benefits, while those who pray to a God who is perceived as distant or unresponsive experience elevated levels of anxiety-related symptoms. There is no evidence that anxious attachment to God moderates the association between the frequency of prayer and these psychiatric symptoms. Thus, several, but not all, of our study hypotheses receive empirical support in these data.

These findings underscore the usefulness of concepts drawn from attachment theory for the social scientific study of religion (Bradshaw et al. 2010; Kirkpatrick 2005; Rowatt and Kirkpatrick 2002). Individuals who pray regularly to a God that is perceived as a secure attachment figure, a “safe haven” in the terms sometimes used by attachment theorists, may benefit from guidance and solace, as well as security and comfort in times of stress. Persons who pray in an attempt to forge a relationship with a divine other, but who believe that their prayers are unmet and that God is distant and unresponsive, are likely to feel a deep sense of estrangement from God’s love. Thus, our results are broadly consistent with an emerging literature which indicates that the nature of one’s perceived relationship with God can play an important role in shaping mental health outcomes. In particular, Pargament (1997), Exline (2002), and others have shown that individuals who experience one particular form of spiritual struggles, sometimes termed “divine struggles,” exhibit greater mental health problems and have more difficulties adjusting to stressful events and conditions, than other persons.

In addition, the findings reported here augment a nascent trend in the religion-mental health field. Briefly, investigators are moving beyond testing only simple main effects models, and are now increasingly interested in more complex interrelationships among religious variables. In particular, the linkages between some facets of religious affiliation, practice, belief, and experience on mental health may be contingent on others (Ellison et al. 2013; Schieman et al. 2013;

Schwadel and Falci 2012). Our study suggests that, in addition to their direct associations with health and well-being, styles of attachment to God may be important as moderators of the effects of other dimensions of religiousness. Additional examination of such conditional effects and testing of interactive models offers a promising avenue for further investigation in this area.

Interpreting the current findings from the perspective of ETAS theory, we propose that secure attachment to God makes the world seem less threatening because it modulates threat assessments about the dangerousness of the world at large. In doing so, it reduces anxiety and other threat-related symptoms. A secure attachment to God has a particularly potent role in inhibiting neural threat assessments that the world is dangerous among those who seek closeness to God through frequent prayer. On the other hand, the inconsistent relationship with God embodied in anxious attachment actually facilitates neural threat assessments that the world is dangerous, thereby heightening symptoms of the psychiatric disorders examined here.

Like all studies, our work is characterized by several limitations. First and foremost, the Baylor Religion Survey data are cross-sectional. For this reason, it is impossible to establish the temporal order among variables in our models, and therefore we cannot make any firm claims about causality. As we noted earlier, in cross-sectional studies of prayer and mental health, it is conceivable that associations (whether positive, negative, or null) may be influenced by persons with high levels of stress and/or poor mental health tending to pray more often than others, and to be less able to experience God as a secure attachment figure. Although we believe that our interpretation of the data and findings is the most persuasive one, we cannot rule out these alternative possibilities with the data at hand. For this reason, further research using longitudinal data is sorely needed in this area. Second, the Baylor Religion Survey is also characterized by a relatively low response rate. For this reason, replication of these findings with new data from surveys with higher response rates could be valuable in confirming our results.

In addition, there is some evidence that styles of attachment to God may be correlated with styles of attachment to social intimates, such as romantic partners, family members, and close friends, and that attachment to these figures may be germane to mental and physical health. However, data on these attachments are unavailable in the Baylor Religion Survey. Thus, future studies should incorporate measures of these other attachments, to confirm that findings such as those reported here are due to the unique effects of attachment to God (Granqvist 1998; Granqvist and Hagekull 2003). Theorists and researchers have also debated whether secure attachment to God parallels or amplifies the effects of secure attachments to other figures, or whether secure attachment to God compensates for insecure or anxious social attachments to nonreligious others (Kirkpatrick and Shaver 1992; Kirkpatrick et al. 1999). Two recent small-scale studies have cast some light on this issue, reporting modest but significant salutary associations between secure attachment to God and psychological well-being that were independent of the positive effects of secure social attachments

(Miner 2009; Sim and Loh 2003). Nevertheless, this issue merits closer attention in future research.

Further, although our work has centered on (1) associations between attachment to God and mental health, and (2) the extent to which attachment to God moderates the associations between prayer and mental health, it is also possible that the estimated net effects of styles of attachment to God on psychiatric outcomes are conditional upon one another, e.g., that the effects of attachments that are perceived as both secure and inconsistent could be especially detrimental for mental health. Although these more complex patterns lie beyond the scope of the current paper, they clearly warrant additional investigation in the future.

Despite its limitations, we believe that this study has made an original contribution to the literature on prayer and mental health. Specifically, we have shown that the association between the frequency of prayer and anxiety-related symptoms may vary widely depending upon the nature of one's attachment to God, i.e., whether one has a secure (as opposed to insecure or avoidant) or anxious attachment to God. Further research along the lines discussed above can cast additional light on the complexities of the connections between prayer, attachment, and mental health.

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