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A NEUROLOGICAL AND IDEOLOGICAL PERSPECTIVE OF ETHICAL LEADERSHIP

DAVID A. WALDMAN
Arizona State University

DANNI WANG
Rutgers University

SEAN T. HANNAH
Wake Forest University

PIERRE A. BALTHAZARD
California State University, Sacramento

A growing body of literature has considered the outcomes of ethical leadership in terms of positive effects on followers. However, little research has addressed its antecedents. We thus have insufficient knowledge of the personal characteristics or qualities of ethical leaders. Accordingly, the current research draws on conceptualizations of what constitutes the moral self through conceiving such characteristics largely in terms of a neurological index derived through quantitative electroencephalogram, in combination with ethical ideology. Integrating neuroscience and moral psychology, our findings suggest that the interaction of leader relativism and idealism partially mediates the effects of the brain's default mode network in the prediction of ethical leadership.

The ethical behavior of leaders has taken on growing perceived importance in recent years as firms attempt to increase ethical practices and avoid scandals (Colvin, 2003). Yet, research on this topic is at a relatively nascent stage of development. Ethical leadership has been defined as "the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement, and decision-making" (Brown, Treviño, & Harrison, 2005: 120). A growing number of studies have supported the importance of ethical leadership in relation to its favorable effects on follower and group ethical outcomes (e.g., Mayer, Aquino, Greenbaum, & Kuenzi, 2012; Mayer, Kuenzi, Greenbaum, Bardes, & Salvador, 2009; Piccolo, Greenbaum, Den Hartog, & Folger, 2010). Little empirical work exists, however, with regard to the personal antecedents of such leader behavior (see Brown & Mitchell, 2010). Identifying the relevant antecedents is a critical prerequisite step needed before we can understand the emergence or development of ethical leadership. To advance this understanding, we propose a model highlighting neurological activity and ethical ideology in the prediction of ethical leadership.

We ground our model in theory on the *moral self*. Early conceptualizations envisioned the moral self as a predominantly cognitive psychological construct, largely comprised of one's moral self-construal or identity (e.g., Blasi, 1980). However, more recent theory approaches the moral self as a more complex phenomenon consisting not only of one's self-construal, but a broader set of cognitive and affective self-regulatory structures and capacities central to moral thought and action (McAdams, 2009; Narvaez & Lapsley, 2009). Jennings, Mitchell, and Hannah (2015: 106) define the moral self as "a complex system of self-defining moral attributes involving moral beliefs, orientations, dispositions, and cognitive and affective capacities that engage regulatory focus toward moral behavior." This definition involves an amalgam of mental activity, and thus implicates a complex system of brain functioning in moral self-regulation, such as that promoting ethical leadership. Indeed, neuroscientists have begun to

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establish a basis for the "self" in the brain (e.g., Raichle & Snyder, 2007; Spreng & Grady, 2010). As such, scholars have proposed that there is at least in part a neurobiological basis for the moral self, and called for researchers to theoretically develop, and more importantly empirically test, such a possibility (Boyatzis, Rochford, & Jack, 2014; Jennings at al., 2015; Narvaez, 2008).

Neuroscience research on the self and self-relevant functioning has focused notably on brain activity in what has been termed the brain's default mode network (DMN), as described in detail later (e.g., Buckner & Carroll, 2006; Spreng & Grady, 2010). Further, researchers have recently argued that the DMN is highly relevant to factors pertinent to ethical leadership, such as moral reasoning (Boyatzis et al., 2014; Koenigs et al., 2007). Driven by this prior research, we build theory describing how discrete brain functioning in the DMN can influence cognitive and affective moral self-regulation that is predictive of ethical leadership. Our approach is in line with the arguments of Treviño, Weaver, and Reynolds (2006: 977) who noted that "Though behavioral ethics research has long been grounded in an individual-level cognitive perspective, more fundamental approaches are emerging [including] studies that explore the neurological mechanics of ethical decision making."

As noted in the above definition, the moral self is a *system* of interrelated components that drive moral self-regulation, and Jennings et al. (2015: 106) noted that a primary component is "moral judgment disposition (the stable tendency to take a specific moral perspective in decisions and action; e.g., ethical ideology and ethical predisposition)." An organizational cognitive neuroscience perspective would suggest that human dispositions are the result of underlying brain activity (Lee, Senior, & Butler, 2012; Senior, Lee, & Butler, 2011). In our theorizing later, we propose that the DMN has direct, as well as indirect, effects on ethical leadership through influencing leaders' relatively enduring orientation in the form of ethical ideology (Forsyth, O'Boyle, & McDaniel, 2008).

Based on ethical position theory, there are two basic dimensions of ethical ideology: (1) relativism; and (2) idealism (Forsyth et al., 2008). *Relativism* pertains to the extent that an individual is situational in his or her moral principles and behaviors, versus being universal across contexts. While universalists emphasize consistent ethical rules across contexts, relativists are more likely to sacrifice certain principles in order to pursue other principles that are deemed more important to them in a given situation. *Idealism* refers to one's unrelenting concerns to avoid causing harm or other negative effects on others across all situations. Idealists believe that they can consistently achieve moral outcomes, while not hurting the welfare of any other people. Individuals who are less idealistic are more pragmatic in their belief that some people may need to be harmed in the pursuit of the "greater good." We propose that neurological activity in the DMN is uniquely predictive of a relativist orientation, and we test the interaction of relativism and idealism in predicting ethical leadership. Heretofore, ethical ideology has been considered and tested largely as an exogenous variable (e.g., Kish-Gephart, Harrison, & Treviño, 2010). The organizational cognitive neuroscience perspective that we take allows for a deeper understanding of the underpinnings of such ideology (Senior et al., 2011; Ward, Volk, & Becker, 2015).

Idealism and relativism have been shown to be predictive of moral reasoning and ethical decision-making (e.g., Kish-Gephart et al., 2010; Singhapakdi, Vitell, & Franke, 1999), which are considered inherent in ethical leadership (Brown et al., 2005). Yet, there is little understanding of whether or how ethical ideology is associated with ethical leadership. We propose that relativistic leaders are inconsistent in ethical decisions and behaviors, and are therefore less likely to be perceived as being principled, and less able as leaders to establish ethical norms in their groups. Further, in line with prior work (Forsyth, 1985; Henle, Giacalone, & Jurkiewicz, 2005; Park, 2005), we simultaneously consider relativism and idealism in the prediction of ethical leadership, and find a moderated mediation effect in terms of the neurological underpinnings of ethical leadership.

We thus theorize and test the interrelations of neurological and cognitive/ideological aspects of the moral self in the prediction of ethical leadership. According to the trait approach to leadership, attributes of leaders such as traits, orientations, and other individual difference characteristics can predict processes (e.g., leader behaviors), as well as leadership outcomes (Zaccaro, 2007). Along these lines, Brown et al. (2005: 119) argued that personal psychological characteristics may contribute to what they termed the "moral person aspect" of ethical leadership. However, existing research has examined a somewhat small range of individual antecedent variables to ethical leadership, such as the Big-Five personality characteristics (Brown & Treviño, 2006; Walumbwa & Schaubroeck, 2009), moral identity (Mayer et al., 2012), and moral reasoning capacity (Jordan, Brown, Treviño, & Finkelstein,

2013). While the latter research assessed *capacity* for moral judgment, it is silent as to the manner in which leaders think about moral issues. Stead, Worrell, and Stead (1990) specifically argued that ethical ideologies should also be considered. We thus extend the research on the antecedents to ethical leadership through assessing its basis in neurological functioning, and how that functioning in part influences the orientation through which leaders view morality—their ethical ideology. In so doing, we add theoretical understanding to how and why individuals behave more or less ethically in leadership positions.

In sum, the current study takes an organizational cognitive neuroscience perspective to argue for how neurological activity can serve as the source for social cognition and behavior in organizations (Lee et al., 2012; Senior et al., 2011), specifically concerning how the moral self predicts leader ethical behavior. As described by Powell (2011), a key advantage of applying neuroscience to organizational phenomena is the ability to better understand the phenomenological basis of constructs, enhance theoretical prediction, and form more precise measures. As a special feature of this study, a determination of the neurological profile for ethical leadership can lead to multiple advancements. At a minimum, these include the ability to track leader development through brain mapping as leaders' neurological functioning may adjust over time, based on exposure to contextual factors and targeted developmental interventions (Healey & Hodgkinson, 2014). We consider such issues in our discussion of implications below.

ORGANIZATIONAL COGNITIVE NEUROSCIENCE AND ETHICAL LEADERSHIP

Colquitt and Zapata-Phelan (2007: 1286) referred to "expanders" as research that includes constructs and relationships that although not the focus of prior theory building, could "expand a literature by taking it in a new and different direction." In line with such thinking, Senior et al. (2011) proposed that neuroscience approaches to understanding organizational phenomena, such as ethical leadership, can allow researchers to examine research issues within wider conceptual and analytic frameworks. Waldman, Wang, and Fenters (2016) further suggested that neurological assessment could provide enhanced ecological validity in measurement that is not feasible with traditional methods, such as survey-based approaches. Indeed, we are seeing a growing literature attempting to incorporate neurological theory and measurement in efforts to increase our understanding of management and organizational phenomena in general (e.g., Boyatzis et al., 2012; Dulebohn, Davison, Lee, Conlon, McNamara, & Sarinopoulos 2016), and leadership more specifically (Balthazard, Waldman, Thatcher, & Hannah, 2012; Hannah, Balthazard, Waldman, Jennings, & Thatcher, 2013; Waldman, Balthazard, & Peterson, 2011).

An organizational cognitive neuroscience perspective can be used to understand how the brain may react to stimuli and influence thought and behavior. As summarized by Waldman et al. (2016), a long history of neuroscience research has attempted to understand the neurological basis of behavior through experiments whereby stimuli are introduced, and changes in activity in various regions of the brain are scanned and recorded. Such reflexively-based research fits "well with the view of the brain as driven by the momentary environmental demands" (Raichle & Snyder, 2007: 1084). For example, using functional magnetic resonance imaging (fMRI) technology, Greene and colleagues presented moral dilemmas to participants and observed changes in brain activity as they made judgments based on such stimuli (Greene, 2007; Greene, Nystrom, Engell, Darley, & Cohen, 2004).

However, the organizational cognitive neuroscience perspective can also be applied to what has been referred to as the intrinsic or at-rest brain (Fox, Snyder, Vincent, Corbetta, Van Essen, & Raichle, 2005). A growing body of research suggests that the brain at rest, but in a wakeful state, is not passive, and may in fact be more active than when presented with stimuli or during goal-directed tasks (e.g., Buckner, Andrews-Hanna, & Schacter, 2008). The intrinsic brain reflects the stable capacity of the individual in terms of mental functioning and behavioral potential (Cacioppo, Berntson, Lorig, Norris, Rickett, & Nusbaum, 2003; Raichle & Snyder, 2007). As such, the brain's intrinsic activity can potentially reflect capacity, potential, or orientation for various types of social functioning or behavior, such as leadership (Waldman et al., 2011).

The importance of the intrinsic, at-rest brain has been highlighted by Lindquist, Wager, Kober, Bliss-Moreau, and Barrett (2012), as well as Buckner and Vincent (2007), who suggested that individual differences in at-rest brain activity patterns are central to understanding aspects and patterns of cognition, emotions, and behavior. Ethical ideology and leadership are not discrete episodes, but instead reflect ongoing ways of thinking and acting that we propose are best predicted by the relatively stable patterns of activity in the intrinsic brain, as opposed to the manner in which the brain may react to temporary or fleeting stimuli. Thus, we base our theory on

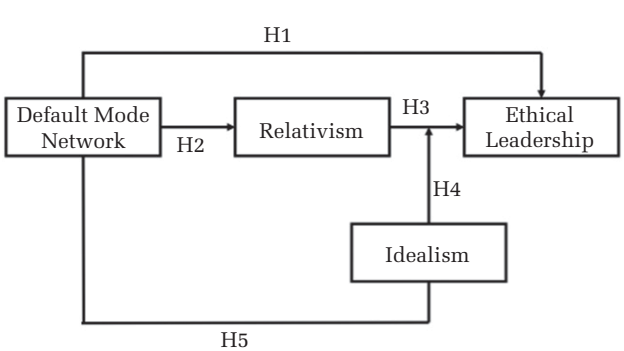
individual differences that are reflected by the intrinsic brain at rest. We proceed recognizing the potential difficulties outlined by Morcom and Fletcher (2007) in attempting to connect the intrinsic brain to task-specific, cognitive processing (e.g., the task of making a discreet, ethical decision). Our theory below instead attempts to connect the intrinsic brain to more generalized cognition, ethical ideology, as well as ongoing behavior in the form of ethical leadership.

A model depicting our organizational cognitive neuroscience perspective of ethical leadership can be seen in Figure 1. The model shows how the intrinsic, or at-rest brain, as reflected in the DMN, can affect ethical leadership directly, as well as indirectly, through the ethical ideology dimension of relativism. In addition, relativism interacts with idealism in predicting ethical leadership. That is, the relationship between relativism and ethical leadership can best be understood by simultaneously considering a leader's relative degree of idealism.

The Neurological Basis for Ethical Leadership

An important element of our model is the identification of a neurological profile, specifically constituent to the DMN, to operationalize aspects of the moral self that promote ethical leadership and ideological aspects of moral cognition. Neuroscience research has located key aspects of the "self" in the DMN, such as brain activity associated with self-awareness, self-reflection, and self-regulation (e.g., Buckner & Carroll, 2006). The DMN is thus our focus for locating the moral self, as developed in our theory below. To identify a relevant profile, we consider three facets of neurological functioning: (1) relevant brain regions; (2) relevant activity in terms of connectivity; and (3) hemispheric asymmetry.

FIGURE 1
Theoretical Model



Relevant brain regions. A theory of brain activity that is applied to behavioral phenomena such as ethical leadership will first need to specify relevant area(s) or lobe(s) of the brain that provide the types of capacities needed to enable the focal type of leadership. One approach is to attempt to localize relevant activity to relatively small areas of the brain, as did Waldman et al. (2011) who associated brain activity in the right frontal regions with leader socialized vision articulation. Increasingly, however, neuroscience theory would suggest that complex behavioral phenomena, like moral judgment or decision-making, can best be considered using a network framework based on the interconnections between multiple brain regions. Lindquist et al. (2012) used what they termed a psychological constructionist approach to suggest that networks of the brain interact to produce psychological events and behavioral phenomena, and they argued that a particular network might be relevant to multiple phenomena that could span various aspects (or categories) of emotions, cognitions, perceptions, and so forth. Examples of recently identified brain networks include those pertaining to pain, pleasure, working memory, mood, addiction, attention, vision, and hearing (Raichle & Snyder, 2007), and recently, leader complexity (Hannah et al., 2013).

The DMN is a network of brain regions that reflects meaningful individual differences (e.g., predictive of cognitive qualities and behavior) when the brain is experiencing an awake, but at-rest, state (Buckner & Vincent, 2007; Fransson, 2005; Raichle, 2010). Its subsystems include parts of the medial temporal lobe, medial prefrontal cortex, and posterior cingulate cortex, along with adjacent ventral precuneus and medial, lateral, and inferior parietal cortexes (Buckner et al., 2008; Raichle, 2010). Buckner and Carroll (2006) linked the DMN with self-projection, which involves a shift in perspective from one's immediate environment to an imagined future environment. In so doing, it simultaneously involves mental navigation between the past and the future through memory, and thus, anticipation and evaluation of upcoming events before they occur (Buckner et al., 2008). Moreover, research suggests that the DMN involves self-projection, or the ability to pivot from perceptions of oneself (e.g., one's own emotions and needs) to social cognition involving perceptions, emotions, and mental states of others (e.g., the needs of others), which is important for anticipating the behaviors of others and navigating social interactions (Buckner & Carroll, 2006; Schilbach, Eickhoff, Rotarskajagiela, Fink, & Vogeley, 2008).

Several fMRI studies have shown that activations in portions of the DMN have occurred in response to discrete morally-based stimuli (Boyatzis et al., 2014; Greene et al., 2004; Moll & de Oliveira-Souza, 2007; Young & Dungan, 2012). Yet questions remain as to whether or how the DMN might be related to more pervasive moral phenomena such as ethical ideologies and leadership. As articulated in detail below, an examination of the DMN seems appropriate for building a theory of the neurological basis of ethical leadership. However, an understanding of the type of relevant electrical activity, as well as specific brain hemispheric focus, may be essential to form such a theory. We now turn to these two topics.

Connectivity. Connectivity refers to the extent to which activity in various parts or regions of the brain are working in a synchronous manner (i.e., activated together at the same time) (Hannah et al., 2013). As described in more detail below, in the current study, we used electroencephalography (EEG) to assess connectivity. EEG connectivity (also known as *coherence*) is a mathematical measure of the degree of similarity between the electrical signals in any set of two different brain regions occurring synchronously (Thatcher, North, & Biver, 2008).

Synchronous activity of this nature within the DMN may be especially relevant to cognition and behavior (Buckner et al., 2008), in particular ethical leadership behavior. Pujol et al. (2012) considered the importance of connectivity with regard to the capacity for moral judgment, and their work suggests that disruption or lack of integration in the DMN might impede moral reasoning capability. Buckner et al. (2008: 19) pointed toward the potential importance of connectivity in the DMN in terms of what they termed "watchfulness" and monitoring of the external environment "like a sentinel", which could be important in terms of moral awareness and moral attentiveness (Reynolds, 2006, 2008). This can help ensure that ethical issues are recognized and that standards are monitored for compliance and enforced. Schreiner et al. (2014) found that connectivity in the DMN is also related to social information processing and social competence, again factors that are relevant to ethical leadership. In total, these arguments point toward the specific relevance of connectivity in the DMN, which is portrayed in our hypotheses later.

Hemispheric Asymmetry

Although similar brain regions exist in both hemispheres of the brain, the concept of hemispheric asymmetry suggests that the left and right cerebral hemispheres of the brain may differ in their information processing emphases and their potential to affect different forms of thought and behavior. Hellige (1990) offered evidence suggesting that the left hemisphere is largely responsible for the rational or analytic consideration of details in one's reasoning and decision-making. There is evidence that both hemispheres of the brain contribute as a distributed system to the experience of emotion (Bennet & Bennet, 2008; Cacioppo, Berntson, & Nusbaum, 2008). However, increased connectivity *per se* in the right hemisphere could suggest greater emotional balance or regulation through integration in the processes that manage emotional reactions (Bar-On, Tranel, Denburg, & Bechara, 2005; Bechara, Damasio, Tranel, & Damasio, 1997; Salloway, Malloy, & Duffy, 2001; Thatcher et al., 2008), as well as moral judgment (Koster-Hale, Saxe, Dungan, & Young, 2013).

Yet we recognize that an understanding of potential behavioral differences based on hemispheric asymmetry is inherently speculative (Hellige, 1990; Hodgkinson, Sadler-Smith, Burke, Claxton, & Sparrow, 2009). Accordingly, any theory involving asymmetry is based on relative differences, in that one hemisphere may be disproportionately, yet not exclusively, involved as the basis of a particular cognitive or behavioral phenomenon. We thus proceed with some caution in our inferences regarding the meaning of right brain coherence in the DMN (rcDMN), and our analyses include supplemental tests of the left brain.

Toward a Brain Signature for Ethical Leadership

Table 1 summarizes the conceptual links and empirical findings that support the relevance of rcDMN to ethical leadership. Putting the above discussion on rcDMN together suggests that it is predictive of ethical leadership for several reasons. First, right hemispheric connectivity in the DMN is likely to contribute to insight (Aziz-Zadeh, Kaplan, & Iacoboni, 2009; Bowden & Jung-Beeman, 2003; Kounios et al., 2008), as well as perspective-taking and anticipation of future events based on memory or learning from past events (Carrillo-de-la-Peña & Garcia-Larrea, 2007). Thus, rcDMN should allow a leader to be more attentive to, and aware of, one's own moral perspective and ethical issues across time, which is necessary in recognizing and making fair and balanced decisions regarding ethical dilemmas (Rest, Narvaez, Bebeau, & Thoma, 1999; Reynolds, 2008). Such capacities should also enhance leaders' abilities to generate options when

TABLE 1
Right Hemispheric Connectivity in the Default Mode Network (DMN) as a Basis for Ethical Leadership

Key Functions	Conceptual Relationship with Ethical Leadership	Example References
• Moral reasoning	Disruption or lack of coherence (i.e., neural connectivity) might impede moral reasoning and judgment.	Boyatzis et al. (2014); Pujol et al. (2012)
• Perspective-taking and connecting past, present, and future events	Allows for recognition of ethical dilemmas, as well as fair and balanced decision making. May underpin a leader's ability to forecast ethical implications and evoke moral imagination; and the ability to achieve self-consistency in morality over time and context.	Aziz-Zadeh et al. (2009); Bowden & Jung-Beeman (2003); Buckner et al. (2008); Carrillo-de-la-Peña & Garcia-Larrea (2007); Kounios et al. (2008); Somerville (2006)
• Social awareness and information processing	Enhances navigation of social interactions, such as listening to followers, surrounding ethical leadership; gauging the social consensus and norms pertaining to ethical behavior.	Buckner et al. (2008); Buckner & Carroll (2006); Schilbach et al. (2008); Schreiner et al. (2014)
• Watchfulness and sentinel-like skills	Involves moral awareness and monitoring for ethical issues to ensure that ethical standards are enforced.	Buckner et al. (2008)
• Emotional balance or regulation	Allows the leader to regulate his or her emotional reactions when engaged in moral reasoning or judgment, avoid potential conflict between emotions and logical reasoning, and use moral emotions in the self-praising and self-sanctioning of ethical behavior.	Bar-On et al. (2005); Bechara et al. (1997); Jack et al. (2013; Salloway et al. (2001); Talmi & Frith (2007); Thatcher et al. (2008)

faced with ethical dilemmas, and forecast the likely outcomes and first- and second-order effects of those options on various stakeholder groups. This capability may in part underpin what has been referred to as *moral imagination* (Somerville, 2006; Werhane, 1999).

Second, the DMN has been associated with moral and social awareness, as well as watchfulness or sentinel-like skills (Boyatzis et al., 2014; Buckner et al., 2008), which coincide with the regulatory function of the moral self (Jennings et al., 2015). We specifically expect that rcDMN will likely be associated with an ethical leader's ability to gauge the social consensus or norms pertaining to ethical issues (Schreiner et al., 2014), which is central to Brown et al.'s (2005) definition of ethical leadership as promoting the demonstration of normatively appropriate conduct. These attentive and perceptual skills also pertain to a leader's ability to deeply listen to and understand what followers have to say (Schreiner et al., 2014), while ultimately making fair and balanced decisions that enforce ethical standards—both of which are central to ethical leadership.

Third, ethical issues, particularly those with high moral intensity, can evoke considerable emotions on the part of both leaders and followers (Tangney, Stuewig, & Mashek, 2007). Greene et al. (2004) argued that emotional infusion in the execution of ethical decision-making can lead to suboptimal judgments, and the work of Jack, Boyatzis, Khawaja, Passarelli, and Leckie (2013) would indeed suggest that the regulation of emotions is inherent to, and essential for, effective decision-making. Accordingly, if lacking the capacity for emotional regulation, leaders might allow emotions to disrupt rational choice (Greene et al., 2004; Haidt, 2003; Hofmann & Baumert, 2010). Or they could freeze up when facing moral dilemmas if overcome by emotions, and thereby not take action, such as not engaging in open discussions with followers regarding ethics or values. Alternatively, if lacking adequate emotional regulation, leaders might take action in a hostile, vindictive, or otherwise inappropriate manner, and thus not act in a way that would set an example for followers of how to deal with ethical issues.

In contrast, effective emotional regulation, which is consistent with the self-regulatory aspect of the moral self (Jennings et al., 2015), should underpin ethical leadership. Indeed, an understanding and regulation of the leader's own and others' emotions have been deemed critical for leadership in general, and ethical leadership in particular (Gooty, Connelly, Griffith, & Gupta, 2010; Humphrey, 2002; Mahsud, Yukl, & Prussia, 2010). Emotions can also promote ethical and prosocial behaviors (Eisenberg, 2000), because as noted by Bandura (1991: 69), "affective self-reactions provide the mechanism by which standards regulate conduct [based on]. . .anticipatory self-respect and self-censure for actions." Moral emotions such as guilt or shame help individuals restrain from unethical acts, while emotions such as moral elevation or pride promote ethical behaviors. Leaders with more self-control over experiencing and regulating such emotions should thus be inclined to act in ways that are viewed by others as being normatively appropriate. Research

suggests that such effective regulation of emotions is associated with rcDMN (Bar-On et al., 2005; Bechara et al., 1997; Salloway et al., 2001; Talmi & Frith, 2007). In short, rcDMN would likely enhance the regulation of emotions, as well as reduce any debilitating effects of emotions on logical reasoning when making and executing ethical judgments or decisions.

In total, the above arguments suggest that rcDMN helps enable leaders to take ethical actions and monitor and promote an ethical environment. We thus predict that:

Hypothesis 1. Higher connectivity in the right hemisphere of the default mode network is positively associated with ethical leadership.

The DMN, Ethical Ideology, and Ethical Leadership

As depicted in Figure 1, we propose that ethical ideology, a core component of the moral self (Jennings et al., 2015), represents a relatively enduring, cognitive characteristic relevant to ethical leadership, and is in part underpinned by rcDMN. Forsyth (1980; Forsyth et al., 2008) put forth ethics position theory as a means of considering ethical ideology and its effects. This theory is based on the notion that individuals hold differing viewpoints or orientations pertaining to morality, and indeed, "individuals are intuitive moral philosophers" (Forsyth et al., 2008: 814). These philosophies are developed over time as people observe, confront, and resolve moral issues, and as a result, habituate distinct ethical orientations.

Ethics position theory conceptualizes concern for principles in terms of the relativism dimension. As described earlier, relativism refers to the extent that people adhere to or reject universal principles across situations. This theory also considers concern for consequences with regard to the idealism dimension, which deals with concern for others' welfare (Forsyth, 1992). Research has largely demonstrated the orthogonal nature of these two dimensions (Forsyth, 1980; Forsyth et al., 2008). While much research has examined these dimensions and their effects in isolation, they may also hold value when considered together (e.g., Henle et al., 2005). In the current model, we consider relativism, as well as the interaction of idealism and relativism, in mediating the effects of rcDMN on ethical leadership.

Forsyth (1992) argued that people with high relativism are more likely to reject universal rules and act based on factors that are present in the given situation or context and point in time, while those with low relativism are more likely to staunchly observe universal moral rules across contexts and time. As an example, the ethicality of telling the truth will be seen as being more contextual for relativists, making them more open to bending of the truth if it serves their goals, while staunch truthfulness would be a more universal rule for less relativists.

Buckner and Carroll (2006) argued that the DMN is highly relevant to introspection or what they specifically termed self-projection. It involves mental processing that connects the past, present, and future, including mentalization of the viewpoint of ourselves and others (i.e., theory of mind), which is in line with the social awareness aspect of the DMN (e.g., Buckner et al., 2008). It could be suggested that awareness of others' viewpoints might foster relativistic beliefs, since the individual would think more idiosyncratically or contextually regarding ethics. However, we argue that rcDMN engenders ongoing awareness and beliefs in leaders about the importance of connecting the past, present, and future in a coherent manner, and thus be seen by others as consistent in thought and action (i.e., more universalistic). That is, rcDMN may raise leaders' attentiveness to, and concern with, the social ramifications of inconsistencies in their behavior as leaders. This is in line with the motivational strivings that have been associated with a strong moral self, which is characterized by individuals who are highly driven to behave consistently with their ideals and beliefs over time (Blasi, 1980; Jennings et al., 2015) and to understand the importance of such consistency in the minds of others. The rcDMN may in part underpin this aspect of the moral self. Further, the DMN provides the neural basis "to anticipate and evaluate upcoming events before they happen" (Buckner et al., 2008: 2), further supporting leaders' abilities to ensure that the ethical criteria that they use, and the outcomes that they produce, are consistent over time.

It follows that leaders with higher rcDMN may be better positioned to anticipate the problems posed by inconsistent ethical principles, for example, not consistently telling the truth or not always enforcing the group's values or ethical norms. In contrast, relativists are less concerned about such inconsistencies, since their ideological beliefs would dictate that appropriate ethical principles and actions depend more on the specific context and moment in time. Such enduring cognition of this nature might be associated with relatively low rcDMN.

Further, we noted above that rcDMN enhances emotional regulation. Emotions significantly influence

moral processing (Haidt, 2003), and the infusion of affect into moral decisions can potentially disrupt logical coherence and result in inconsistent or situationally-based decisions (Eisenberg, 2000; Greene et al., 2004; Hofmann & Baumert, 2010). The effective regulation of emotions inherent in rcDMN should thus promote more consistent processing of ethical issues, i.e., less relativism.

In total, these arguments suggest that:

Hypothesis 2. Higher connectivity in the right hemisphere of the default mode network is negatively associated with leader relativism.

We are unaware of prior studies attempting to link ethical ideology with ethical leadership, although Forsyth (1980, 1981) argued that the former should be related to moral judgment and behaviors, and Kish-Gephart et al. (2010) found that relativism was negatively related to ethical behavior and decisions. Relativists believe that situational factors, more so than universal moral rules, determine what is ethical. We propose that when leaders overtly reject universally-accepted rules, their inconsistency in moral thought and action across situations will limit their ability to recognize ethical issues, establish ethical norms in the group, show decisiveness, and serve as a model for normative conduct, which is essential in the demonstration of ethical leadership (Brown & Treviño, 2006; Brown et al., 2005). Along such lines, leader behavioral consistency has been established as a key factor in attributions of leader fairness (Barrett-Howard & Tyler, 1986; Greenberg, 1986; Van den Bos, Vermunt, & Wilke, 1996), another important component of ethical leadership (Brown & Treviño, 2006; Brown et al., 2005).

Conversely, less relativistic leaders will display greater constancy of purpose and a core set of ethical values and principles that will be applied more consistently to both their professional and personal lives (Brown & Treviño, 2006). Accordingly, despite whether followers subscribe to those same unwavering principles, they will at least know where they stand with regard to such leaders and know that the leader will treat others with the same procedural fairness and equity. Given their consistent application of certain principles across contexts, such leaders would also be more likely to be seen as "highly principled." Thus, we propose that:

Hypothesis 3. Leader relativism is negatively associated with ethical leadership.

We further consider the idealism dimension of ethics position theory. Highly idealistic people believe that if they focus unwaveringly on preventing harm to, or supporting, the welfare of others, they can always achieve moral ends. Conversely, less idealistic individuals tend to be more pragmatic, and believe that harm to some individuals is often unavoidable to accomplish goals or uphold other principles, or must at times be done for the greater good (Forsyth, 1980; Schlenker & Forsyth, 1977). They are more likely to accept that at times they must choose "the lesser of two evils" (Forsyth et al., 2008: 815).

Idealism could be viewed as a double-edged sword in relation to ethical leadership. On the one hand, consistently acting to ensure the welfare of others (i.e., ensuring that no subordinate is harmed by the leader's decisions) might seem congruent with ethical leadership. On the other hand, the pragmatic leader realizes that ethical actions include practicing fairness and balance in decision-making and enforcing ethical standards (Brown et al., 2005), which might necessitate harming some individuals at times (e.g., punishing a follower for an ethical transgression), or at least not serving the personal needs or welfare of all individuals. Further, while fairness is an attribute of ethical leaders (Brown & Treviño, 2006), fairness in the work setting is often a matter of creating *equity* commensurate with followers' contributions, versus *equality*, and thus followers may receive uneven rewards and incentives according to their contributions. In line with the ethics position theory (Forsyth et al., 2008), we propose that idealism should be viewed in interaction with relativism to better understand how ethical ideology may be associated with ethical leadership.

Ethics position theory characterizes *subjectivists* as being high on relativism, while low on idealism (Forsyth, 1985). Such individuals represent a skeptical point of view and ethical egoism in terms of rejecting moral rules and believing that morality ultimately is based on personal perspectives (Forsyth, 1980; Forsyth et al., 2008). This ideology could engender lower levels of ethical leadership, since the moral inconsistency that is already evident with regard to relativism is compounded in that the welfare of others is not consistently taken into account. For example, the leader might be truthful in order to serve the welfare of favored employees, but believe that it is also appropriate to lie to less favored employees whose welfare is of less concern to the leader. The upshot is that the overall ability of the leader to make decisions that are seen as fair, principled, and balanced will be diminished.

In contrast, we argue that leaders with low relativism combined with low idealism, or what in ethics

position theory is termed *exceptionalists* (Forsyth, 1980), will be associated with the highest ratings of ethical leadership. Exceptionalists live consistently according to their staunch beliefs in certain moral principles, but at the same time, attempt to balance positive and negative consequences of actions and tailor the implementation of those principles across situations to best serve the whole (Forsyth, 1985). Their "moral principles are useful because they provide a framework for making choices and acting in ways that will tend to produce the best consequences for all concerned" (Forsyth et al., 2008: 816). They are thus principled, yet somewhat utilitarian, which may be necessary in practicing ethical leadership. As such, we propose that exceptionalists will be seen as being consistent in their ideals and principles, and thus fair and balanced in their decisions, while also having the best interests of the collective (e.g., team, organization, or stakeholder group) in mind—all of which align with ethical leadership.

While we propose that subjectivists and exceptionalists will be most predictive of lower and higher levels of ethical leadership, respectively, we make no definitive predictions concerning what ethics position theory considers *situationists* (high idealism and high relativism) and *absolutists* (high idealism and low relativism) (Forsyth et al., 2008). We thus explore those conditions in our analyses. Situationists are high in relativism, similar to subjectivists, but as they are high in idealism, followers may see them as being relatively more ethical. As such, high idealism may serve as a temperance characteristic for the otherwise deleterious effects of relativism (Owens, Wallace, & Waldman, 2015; Park & Peterson, 2003). Absolutists are principled in terms of idealism, but also low in relativism—perhaps so much that they are inflexible to the ethical tradeoffs and dualities present in some ethical dilemmas (e.g., when having to choose between two "rights" or two "wrongs"). The ethical leadership of situationists and absolutists may therefore reside between the extremes of low and high ethical leadership that are manifested by subjectivists and exceptionists, respectively.

Research testing interaction effects between relativism and idealism is rare. We know of no studies that have examined such an interaction in relation to ethical leadership. However, in line with our predictions, Henle et al. (2005) found that high relativism combined with low idealism (i.e., subjectivism) was most predictive of organizational deviance (e.g., employee theft). Based on this evidence and our above arguments, we predict that:

Hypothesis 4. The relationship between leader relativism and ethical leadership is moderated by leader idealism, such that the negative relationship with ethical leadership is stronger when there is low idealism. Conversely, ethical leadership is maximized by a combination of low leader relativism and low idealism.

Based on the logic that we propose in Hypotheses 1–4, as shown in Figure 1, we expect an indirect effect of rcDMN on ethical leadership through the interaction of relativism and idealism. In other words, we expect a moderated, partially mediated relationship. Specifically:

Hypothesis 5. Idealism moderates the indirect relationship between connectivity in the right hemisphere of the default mode network and ethical leadership through relativism. Specifically, the indirect relationship is more positive when idealism is low, rather than high.

METHODS

Participants and Procedure

The data for this study came from both business and military sectors in the U.S. Participants included mid- and senior-level U.S. Army officers (i.e., majors, lieutenant colonels, and colonels) stationed at a training base in the Midwest U.S, executive MBA students from a large university in the Southwestern U.S., and private-sector managers from a variety of occupations in the Southwestern U.S. The military officers represented numerous career specialties in the U.S. Army, including combat arms, administrative, and logistics specialties. They were recruited by asking for volunteers through announcements in the training classes that they were attending. The executive MBA students were from a single cohort class and represented various career paths, including entrepreneurs and mid- to senior-level managers from corporate and not-for-profit sectors (all currently employed). The private-sector managers were from a variety of occupations, including individuals with line- or executive-level responsibility in areas such as policy analysis, banking, finance, accounting, healthcare, logistics, human resources, and marketing. In appreciation of their time, all participants received a personalized, comprehensive report on their leadership competencies, as well as neurological results.

The sample included 104 leaders (27 military, 29 executive masters of business administration (EMBA), and 48 private-sector managers from various types

of organizations) with 3.9% in the 20–29 age range, 31.1% in the 30–39 age range, 36.9% in the 40–49 age range, 18.4% in the 50–59 age range, and 9.7% in the 60–69 age range. Sixty-two percent were males. Ethnicity included 87.3% Caucasian, 6.8% Hispanic, 2.9% African-American, 1% Native-American, 1% Asian-American, and 1% did not report ethnicity. It should be noted that a minority of participants in the current sample (i.e., about 30% of the sample) were also used in the work of Balthazard et al. (2012) (i.e., about 15% of the cases in that prior study). However, none of the variables that are modeled in Figure 1 of the current study were included in the research of Balthazard et al. (2012). Moreover, the three-dimensional, quantitative electroencephalogram (qEEG) methodology described below to construct our DMN measure was uniquely different from the two-dimensional, qEEG method employed by Balthazard et al. (2012), which was used to analyze a separate set of variables.

Procedures

Survey-based data were collected using multiple sources, including the focal leader, subordinates, peers, and superiors. First, focal leaders completed an online survey measuring their relativism and idealism, narcissism (control variable), and basic demographic information. Second, for each leader, we asked five subordinates or peers to respond to an online survey measuring the focal leader's ethical leadership style. For the purposes of the second online survey, focal leaders were asked to provide the names and email addresses of subordinates or peers who could adequately complete the ratings in this survey. For each focal leader, the researchers then contacted the potential raters via email, assured them of confidentiality, and provided a link to a secure website. For each focal leader used in the analyses, we had two to five respondents for the second survey.

In addition to survey-based data, the focal leaders also signed up for a one-hour slot to allow for the EEG assessment process to take place. Leaders were assessed one at a time. Each leader was initially screened for potential exclusion from the sample (e.g., based on mental health, previous brain injuries, and use of psychotropic drugs) and then fitted with an electrode-laden cap. We fastened a set of 19 electrodes to the scalp of participants and collected EEG measures based on the International 10/20 protocol. EEG activity can be assessed in different frequency bandwidths, including *delta* (1–4Hz), *theta* (4–8Hz), *alpha* (8–12Hz), *beta* (12–30Hz), and *gamma* (30–100Hz). For reasons described below, we focus on the *beta* frequency.

To capture the electrical pattern of the rcDMN, EEG segments of at least 240 seconds were recorded at a digitization rate of 128Hz during an eyes-closed resting (but alert) procedure. Such at-rest assessment has been used recently in organizational neuroscience research (e.g., Balthazard et al., 2012; Hannah et al., 2013). Each EEG record was visually examined and then edited with software to remove artifacts, such as eye movement, drowsiness, muscle tension, or instances where recorded EEG voltages in any of the 19 channels exceeded the norm for patterns in the participant's EEG. A resulting minimum of 60 seconds of artifact-free EEG data were obtained for each participant. Split-half reliability,[1] and test-retest reliability analyses were then conducted on the edited EEG segments. Only portions with $> 95\%$ reliabilities were retained for subsequent qEEG spectral analysis.

Overall, the use of self-reports, reports from others including peers/subordinates, and qEEG provide a multi-method procedure that limits common method bias concerns in the current study (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Rated Measures

Ethical ideology. The focal leaders rated their relativism and idealism (10 items each) through self-reports, using Forsyth's (1980) 20-item Ethics Position Questionnaire (EPQ). Sample items are: "No rule concerning lying can be formulated; whether a lie is permissible or not totally depends on the situation" (relativism), and "People should make certain that their actions never intentionally harm others even to a small degree" (idealism). Items were rated on a 9-point scale ranging from (1) "completely disagree" to (9) "completely agree." The alphas for idealism and relativism were .84 and .81, respectively.

Ethical leadership. We assessed ethical leadership using the 10-item scale developed by Brown

[1] In this instance, split-half reliability is simply the ratio of the variance of the even 1-second samples of the edited segments of qEEG divided by the odd 1-second segments. Test-retest reliability is the ratio of variance in the first half of the qEEG segments versus the second half of the segments. Higher moment-to-moment variability is related to a decrease in the split-half reliability and indicates incidences of non-brain sources of artifact (e.g., coughing, eye blinks, and so forth). Relatedly, higher variability is indicative of drowsiness or a brain that is not in an alert state, which prevents an accurate assessment of the at-rest brain. When reliabilities achieve a 95% threshold, the qEEG reading is deemed appropriate for further quantitative analysis (Hannah et al., 2013).

et al. (2005). We asked subordinates or peers to rate leaders' ethical leadership style. Sample items include: "Makes fair and balanced decisions" and "Sets an example of how to do things the right way in terms of ethics." Items were anchored on a 5-point Likert scale ranging from (1) "strongly disagree" to (5) "strongly agree." The α was .92.

Neurological Default Network Index

We used power spectral analysis of qEEG to develop a numerical index for the rcDMN. In line with prior research (e.g., Carrillo-de-la-Peña & Garcia-Larrea, 2007), we focused on average connectivity in the higher *beta* frequency range for appropriate areas of the DMN, as defined below. The high *beta* frequency is relevant to the wakeful state and alert brain, and it has been considered in other research dealing with moral and leadership phenomena (Waldman et al., 2011).

We applied a technique known as low-resolution brain electromagnetic tomography (LORETA) to convert these scalp measurements into information about the source localization and characteristics of electric neuronal activity in our participants (Balthazard & Thatcher, 2015; Pascual-Marqui, 1999; Pascual-Marqui, Michel, & Lehmann, 1994). LORETA calculates neurophysiological data through a three-dimensional distribution of 2394 "voxels" (i.e., small three-dimensional space) of $7 \times 7 \times 7$ mm that can be combined to *virtually* reconstruct the brain and report on activity in respective regions or connections between regions (e.g., coherence). Regions can be identified by using their anatomical labels or Brodmann Areas (BAs), a standard naming convention and widely-used brain atlas based on cellular structure that splits the brain into 44 right and left hemispheric regions (Jasper, 1958).

In line with our conceptualization, we operationalized rcDMN by applying the coherence metric in the higher *beta* frequencies of right hemisphere BAs that constitute significant sub-regions of the DMN. Coherence, a statistical calculation reported as a percentage, measures variables, military and EMBA, to control forthe extent that any two brain voxels are working together in a synchronous manner (Thatcher, Krause, & Hrybyk, 1986). The coherence values that we report reflect overall coherence in the brain areas of interest, and thus reflect the average level of coherence between each of the many voxels in those areas. Coherence values in BAs of the DMN have been shown to be relatively stable over time (Greicius, Krasnow, Reiss, & Menon, 2003).

Using the BA nomenclature and LORETA methodology, the overall DMN covers BA2, BA7, BA10, BA11, BA19, BA29, BA30, BA31, BA35, BA39, and BA40—a very large cortical area that contains a potentially unwieldy, 55 network connections (e.g., coherence measures) in each hemisphere. Although there exists "striking uniformity" (Harrison et al., 2008: 9781) in the basic anatomy of the DMN, research is increasingly demonstrating that the DMN may be functionally heterogeneous, with sub-regions that show different patterns of connectivity (Leech, Kamourieh, Beckmann, & Sharp, 2011; Margulies et al., 2009). Indeed, our data reflect that the most dense structural connectivity (i.e., strongly correlated areas) occurs in the posterior cingulate cortex region, a major node within the DMN that has been shown to have high metabolic activity and acts as a cortical hub (Hagmann et al., 2008; Raichle, MacLeod, Snyder, Powers, Gusnard, & Shulman, 2001).

Thus, to form the rcDMN index, we aggregated the high-*beta* coherence values of 15 right hemisphere network connections from this most representative sub-regions of the DMN.[2] Specifically, these connections broadly represent the DMN in terms of BAs or regions in the parietal lobe; anterior, retrosplenial, and posterior cingulate cortexes; perirhinal cortex; angular gyrus; and visual cortex (i.e., occipital lobe). As is the case for a single measure of coherence, our index has a possible range of 0 to 100, with "0" reflecting no coherence and "100" reflecting complete coherence, wherein all included brain voxels in these BAs are firing at the same time on the same frequency.

Control Variables

We controlled for leader gender (0 = female, 1 = male) and age as these demographic variables may contribute to unethical behaviors (Kish-Gephart et al., 2010) and potentially levels of cognitive moral development (Rest et al., 1999), which may influence ethical leadership (Jordan et al., 2013). Moreover, Raichle (2010) noted how EEG coherence can vary with age. In addition, because we have samples from three different types of occupational backgrounds or sectors, we created two dummy variables, military and EMBA, to control for leader background, whereby for military: 0 = non-military, 1 = military; for EMBA: 0 = non-EMBA, 1 = EMBA.

In predicting ethical leadership, we also controlled for narcissism. Narcissistic leaders may lack

[2] These electrode combinations include: BA2–BA7, BA7–BA29, BA7–BA30, BA7–BA31, BA7–BA35, BA19–BA29, BA19–BA30, BA19–BA35, BA29–BA39, BA30–BA31, BA30–BA35, BA30–BA39, BA31–BA35, BA31–BA39, and BA35–BA39.

empathy and care predominantly about their own needs and concerns, rather than those of others, all of which can detract from ethical leadership behavior (Brown et al., 2005; Galvin, Waldman, & Balthazard, 2010; Hernandez, 2012). Narcissism was measured using the Narcissistic Personality Inventory (34 items) developed by Raskin and Hall (1979). Sample items included "I like to have authority over other people"; "I am more capable than other people"; "I am an extraordinary person." The leaders rated their own narcissism from (1) "strongly disagree" to (5) "strongly agree." The α was .94.

Aggregation Tests

Ethical leadership was rated by an average of 3.41 raters per leader. Based on a review of response logs, we could not detect a pattern of nesting within raters, largely eliminating concerns of non-independent data. This is because our participants were members of many different units or organizations. Prior to aggregation, we checked for inter-rater agreement (Bliese, 2000; James, Demaree, & Wolf, 1993). For ethical leadership, the mean and median $r_{wg(j)}$ were both .97, and the intraclass correlation coefficients (ICCs) were $ICC_1 = .34$, and $ICC_2 = .54$. The results indicated that ethical leadership ratings had good within-leader agreement, and thus, we aggregated the individual level data to the group (or leader) level.

RESULTS

Table 2 presents the means and standard deviations for all variables in the study, as well as the correlation matrix of these variables at the leader level. For our sample, we obtained a mean coherence value of 52% for the rcDMN index (i.e., patterns of *beta* frequency in the rcDMN voxel pairs matched 52% of the time). This value is in line with a population rcDMN coherence value of 50% obtained by averaging the published normed coherence values for each voxel combination included in our rcDMN index (see Neuroguide, 2014).

Several correlational findings are noteworthy. First, gender was negatively correlated with relativism ($r = -.37$, $p < .01$), suggesting that men are less relativistic, and thus more likely to have universal moral beliefs. Second, rcDMN was negatively related to both idealism ($r = -.23$, $p < .05$) and relativism ($r = -.20$, $p < .05$). Third, relativism and idealism are not significantly related ($r = -.10$, $p > .10$), indicating that as suggested by Forsyth (1980, 1985), these two components of ethical ideology are orthogonal, rather than opposite ends of one continuum.

Finally, with regard to our default mode network measure, rcDMN, we obtained both positive and negative correlations with leader background variables. To check the sample differences, we performed analysis of variance (ANOVA) analyses. The mean scores of rcDMN for military, EMBA, and private-sector managers were 59.3, 46.4, and 52.7, respectively, which were significantly different ($F = 20.56$, $p < .01$). Paired comparisons of group means revealed significant differences for all three group comparisons at the $p < .01$ level, which account for the positive relationship ($r = .45$, $p < .01$) between the military dummy variable and rcDMN in Table 1, as well as the negative relationship ($r = -.44$, $p < .01$) between the EMBA dummy variable and rcDMN. We consider the theoretical significance of these differences in our discussion below.

Hypothesis Tests

To test our hypotheses, we first conducted a multiple regression analysis using relativism and ethical leadership as separate dependent variables, as shown in Table 3. To predict relativism, in the first step, we entered gender, age, and the two leader background dummy variables (military and EMBA) as control variables (Model 1). In the second step, we added rcDMN (Model 2). To predict ethical leadership, we entered gender, age, the two leader background dummy variables (military and EMBA), and narcissism as control variables in the first step (Model 3). In the second step, we added rcDMN (Model 4). In the third step, we added relativism and idealism (Model 5). In the final step, we added standardized relativism and idealism, as well as their interaction term (Model 6).

Hypothesis 1 suggests that rcDMN will be positively related to ethical leadership. As shown in Table 3, Model 4, Hypothesis 1 was supported ($\beta = .31$, $p < .01$). Hypothesis 2 predicted that rcDMN would be negatively related to relativism. This hypothesis was supported ($\beta = -.19$, $p < .05$), as shown in Table 3, Model 2.[3] Hypothesis 3 predicted that

[3] Although rcDMN was also significantly, negatively correlated with idealism, in a separate regression analysis predicting idealism, rcDMN failed to remain significant after controlling for gender, age, and the two leader background variables. Accordingly, we conclude that in line with our theory, rcDMN is only uniquely predictive of the relativism component of ethical ideology.

TABLE 2
Means, Standard Deviations, and Correlations[a]

	Mean	*SD*	1	2	3	4	5	6	7	8	9
1. Gender	0.59	0.49	–								
2. Age	4.00	1.02	−.03	–							
3. Military	0.26	0.44	.36**	−.06	–						
4. EMBA	0.28	0.45	.17	−.23**	−.37**	–					
5. Narcissism	2.93	0.50	.09	−.34**	−.26**	.48**	*.91*				
6. rcDMN	52.65	8.86	.06	−.10	.45**	−.44**	−.19	–			
7. Relativism	5.29	1.70	−.37**	.18	−.44**	−.25*	−.09	−.20*	*.76*		
8. Idealism	5.06	1.45	.18	−.08	−.04	.46**	.36**	−.23*	−.10	*.85*	
9. Ethical leadership	4.33	0.39	.15	−.00	.28**	.14	−.17	.28*	−.30**	.13	*.93*

[a] $N = 94–104$ leaders. Reliability coefficients are reported along the diagonal in italics. For gender, female = 0, male = 1. We categorized age by range, such that a mean score of 4.00 represents the 40–49-year-old age range. For military, "0" is non-military, "1" is military; for EMBA, 0 is "non-EMBA", 1 is "EMBA." rcDMN refers to the coherence (or connectivity) in the right hemisphere of the default mode network.

* $p < .05$

** $p < .01$

relativism is negatively associated with ethical leadership. This hypothesis was not supported (as shown in Table 3, Model 5, $\beta = -.10$, $p > .10$). Hypothesis 4 predicted that relativism would interact with idealism to predict ethical leadership. The interaction term's coefficient in Model 6 was significant ($\beta = .23$, $p < .05$). The simple slope plot is shown in Figure 2, providing support for Hypothesis 4 in that the negative relationship between relativism and ethical leadership becomes significant when there is low idealism.

Hypothesis 5 predicted that idealism moderates the indirect relationship between rcDMN and ethical leadership through relativism. Initial support for Hypothesis 5 can be seen in Table 3. Specifically, the coefficient for rcDMN gets reduced from Model 4 ($\beta = .31$, $p < .01$) to Model 6 ($\beta = .25$, $p < .05$), but remains statistically significant, which is evidence for partial mediation (Baron & Kenny, 1986). We further tested Hypothesis 5 using M-Plus 7.1 (Muthén & Muthén, 2013), with results shown in Table 4. Specifically, the indirect relationship is

TABLE 3
Model Results in the Prediction of Relativism and Ethical Leadership[a]

	Dependent Variable					
	Relativism		Ethical leadership			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Independent Variable						
Gender	−.10	−.11	−.06	−.05	−.06	−.09
Age	.03	.02	.05	.06	.05	.02
Military	−.56**	−.49**	.40**	.28*	.21	.15
EMBA	−.42**	−.48**	.41**	.51**	.48**	.45**
Narcissism			−.24†	−.25†	−.27*	−.32**
rcDMN		−.19*		.31**	.31**	.25*
Relativism					−.10	−.16
Idealism					.10	.06
Relativism* Idealism						.23*
R^2	.39**	.42**	.21*	.28*	.29**	.35**
R^2 *change*		.03*		.07*	.01	.06*

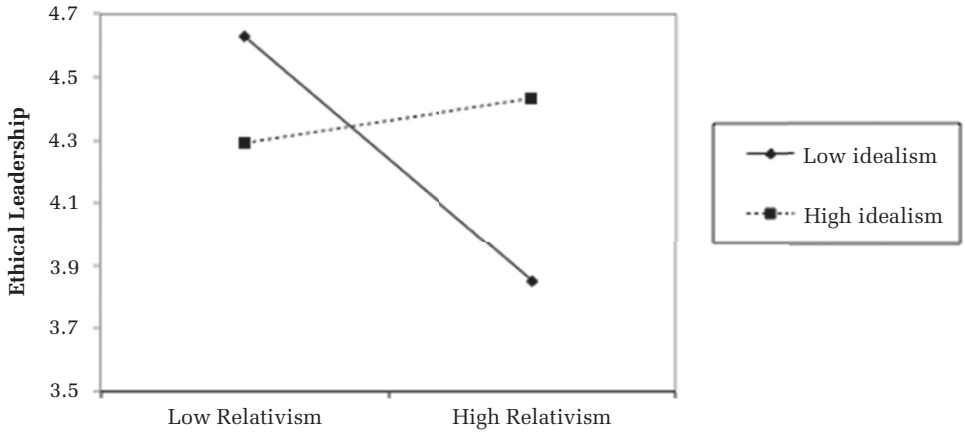
[a] Based on 94–104 observations. For gender, female = 0, male = 1. For military, "0" is non-military, "1" is military; for EMBA, 0 is "non-EMBA", 1 is "EMBA." rcDMN refers to the coherence (or connectivity) in the right hemisphere of the default mode network. Standardized coefficients are reported here.

† $p < .10$

* $p < .05$

** $p < .01$

FIGURE 2
Interaction of Relativism and Idealism in the Prediction of Ethical Leadership[a]



[a] The interaction plot was calculated based on standardized relativism and idealism, with all of the controls standardized.

more positive when idealism is low, rather than high. As shown in Table 4, we conducted analyses to examine the interaction of relativism and idealism as a mediator of the relationship between rcDMN and ethical leadership. Specifically, we used a bootstrapping method (sample = 10,000) to test indirect effects (Preacher & Hayes, 2004). As Table 4 indicates, the indirect effect was significant when idealism is low ($b = .005$, $p < .05$, 95% confidence interval [CI] = .001 to .011) but not when high ($b = -.001$, $p > .10$, 95% CI = −.006 to .001). In total, these analyses provide support for Hypothesis 5.

Supplemental Analyses

Discriminant validity. We engaged in several supplemental analyses in order to assess the discriminant validity of our findings. First, we repeated the above multiple regression analyses using a measure of transformational leadership. We computed transformational leadership using 20 items from the Multi-factor Leadership Questionnaire (MLQ-Form5×, Bass & Avolio, 1997), which was assessed in the same survey as ethical leadership. Transformational leadership was composed of individualized consideration, inspirational motivation, idealized influence, attributed charisma, and intellectual stimulation (Bass & Avolio, 1997). Prior to aggregation, we checked for inter-rater agreement (Bliese, 2000; James et al., 1993) because transformational leadership was rated by the same multiple followers and peers, similar to ethical leadership (the average number of raters = 3.41). The mean and median $r_{wg(j)}$ were .91, .97 respectively, and the ICCs were $ICC_1 = .20$, and $ICC_2 = .48$. The results indicated that we could aggregate the individual level data to the group (or leader) level to form a measure of transformational leadership.

TABLE 4
[a]Indirect Effect of Default Network on Ethical Leadership via Relativism[a]

	Path *a* (*SE*)	Path *b* (*SE*)	Indirect effect	95% CI of indirect effect
Low idealism	–.03* (.01)	–.16** (.06)	.005*	(.001, .011)
High idealism	–.03* (.01)	.03 (.07)	–.001	(–.006, .001)

[a] Unstandardized coefficients and their standard errors (*SE*) are reported in the first two columns. CI refers to confident intervals. Path *a* is the path from default mode network to relativism; Path *b* is the path from relativism to ethical leadership. Controls (including narcissism, gender, age, military, and EMBA) were not reported here. rcDMN refers to the coherence in the right hemisphere of the default mode network. Bootstrapping sample = 10,000.

* $p < .05$
** $p < .01$

Similar to prior research (e.g., Brown et al., 2005), the correlation between transformational leadership and ethical leadership was $r = .74$, $p < .01$. However, unlike the significant correlation that we obtained between the rcDMN index and ethical leadership ($r = .28$, $p < .01$), the correlation between our rcDMN index and transformational leadership was not significant ($r = .10$, $p > .05$). In addition, rcDMN was not significant in predicting transformational leadership using multiple regression analysis. Thus, our default mode network index showed discriminant validity in the prediction of ethical leadership.

Second, we computed an rcDMN index for the left hemisphere of the brain, which mirrored the same BAs tested in the right hemisphere. The resulting correlation between DMN and ethical leadership was $r = .23$, $p < .05$, which is marginally less than the $r = .28$, $p < .01$ correlation revealed in Table 2 for rcDMN. Although congruent with what we argued above, this finding suggests that hemispheric differences are likely to only be relative (Hellige, 1990; Hodgkinson et al., 2009).

Third, we examined the correlations between ethical leadership and the high-*beta* coherence indices for other known neural networks including addiction, pain, visual, and sensorimotor networks (Raichle & Snyder, 2007). Further supporting the discriminant validity of our rcDMN index, none of these other indices correlated significantly with ethical leadership. Additionally, we used a Monte Carlo experiment to constitute 100 test indices by averaging, within a respective index, the mean coherence value of 15 randomly selected BAs that are not part of the DMN. Results indicated that less than 5% of the test indices correlated significantly with ethical leadership.

DISCUSSION

Our research provides an integrated model of the antecedents of the ethical leadership. Grounded in an understanding of what constitutes the moral self, it highlights the roles of both neurological and ideological antecedents of ethical leadership. Our study demonstrates unique prediction by a neurological index based on coherence in the right brain's default mode network (rcDMN), a brain network relevant to the self (e.g., Boyatzis et al., 2014; Buckner & Carroll, 2006; Koenigs et al., 2007; Spreng & Grady, 2010). We also reveal that idealism moderates the negative relationship between relativism and ethical leadership, as well as the indirect effects between the rcDMN and ethical leadership through the interaction of relativism and idealism.

Theoretical Implications and Future Research

A unique aspect of the current research is the incorporation of organizational cognitive neuroscience concepts in our theory and measurement. As such, our study exemplifies how research can apply constructs and theory from other fields of study to expand an understanding of management phenomena, such as ethical leadership (Colquitt & Zapata-Phelan, 2007). Our research follows recent work suggesting that organizational cognitive neuroscience could enrich construct and theory development, as well as prediction (Ashkanasy, Becker, & Waldman, 2014; Becker, Cropanzano, & Sanfey, 2011; Hannah et al., 2013; Powell, 2011).

We theorized how a mediated model, including rcDMN as a key explanatory variable, could enhance our understanding of the ethical leadership construct. As shown in Table 3, the study variables together explained a sizeable 35% of the variance in ethical leadership. The current findings show that a neural index based on the intrinsic activity in DMN within the brain predicts unique variance in ethical leadership. Our theory suggests that electrical connectivity or coherence in the DMN is indicative of qualities that may be especially relevant to ethical leadership, such as self-projection and social and sentinel-like awareness. The work of Lindquist et al. (2012) would confirm that a particular network could account for multiple behavioral qualities. Accordingly, a question remains as to whether self-projection or other qualities associated with the DMN can form the basis of ethical behavior in general (e.g., workplace deviance), beyond ethical leadership per se. Our attained, partially mediated relationship through relativism would suggest effects of the DMN on the moral cognition of individuals, which implies the relevance of the DMN to ethical behavior more broadly conceived. However, future research is necessary to determine the extent of generalization to other forms of ethical behavior.

We should note that our supplemental findings also provide evidence for what the DMN may not be relevant to, at least within the realm of leadership. Specifically, we found no connection between right hemispheric, coherence activity in the DMN and transformational leadership. Authors have attributed qualities such as forethought and big picture thinking to both the DMN and transformational leadership (Bass & Avolio, 1997; Thatcher et al., 2008). The current findings could be interpreted as not supporting a relationship between the DMN and these qualities, at least in terms of leadership behavior.

We recognize that it is possible for excessive reductionism in theory development based on neurological phenomena, whereby researchers might go too far in terms of attempting to reduce phenomena such as ethical behavior or leadership to neurological underpinnings. That is, while our hypothesized findings do suggest a unique role of neural variables in the prediction of ethical leadership, some unexpected findings of our research would also suggest that organizational or occupational context may also be associated with neural patterns of leaders. Specifically, we found higher right hemispheric connectivity in the DMN for our military sample, while discovering significantly lower connectivity in our EMBA sample.

While causality is not altogether clear, these results are in line with the socially-situated view of cognition suggested recently by Healey and Hodgkinson (2014). They argued that as individuals interact with their environments over time, their brains continuously process and integrate sensory information, potentially leading to changes in neural processes or activity, which we would suggest might include the intrinsic brain. Ashkanasy et al. (2014) argued that a consideration of the brain in relation to context represents a new angle on one of the oldest controversies in organizational behavior, specifically the interplay between the individual and context. That is, the context may not only affect individual cognition, emotions, and behavior, it may also have relatively enduring, physiological effects in terms of brain structure and functioning. For example, in our data, the military officers were somewhat exclusive in that they were specially chosen as candidates for career advancement in their training programs. It is possible that these individuals were both somewhat unique in terms of their own personal characteristics, but also shaped neurologically by their professional training, education, and socialization. In sum, future research should model the interplay between personal characteristics (including neural qualities), background, and context in predicting ethical leadership.

We further contribute to ethics position theory (Forsyth et al., 2008) by finding that ethical leadership can best be understood through a combination of relativism and idealism. Specifically, low relativism (or universalism) combined with low idealism is most predictive of ethical leadership. In the terms of ethics position theory, such leaders would be referred to as exceptionalists. Conversely, high relativism combined with low idealism (i.e., subjectivism) was least predictive of ethical leadership. We reason that exceptionalism gets translated into leadership behavior that is characterized by consistency; for example, obtaining results the right way in every instance, as opposed to the Machiavellian maxim of "the ends justify the means." It also implies pragmatism on the part of the leader who may realize that to enforce ethical standards or to do what is "right," the personal welfare of some individuals may need to be sacrificed, at least in the short term. Conversely, subjectivism implies that moral principles and behavior that are based on the personal whims of the leader depending on his or her own personal assessment of a context are highly inconsistent, and thus, not deemed principled.

It is also worthwhile to address the two combinations shown in Figure 2 that are moderately predictive of ethical leadership. First, leaders with low relativism and high idealism (absolutists), show the moral consistency of exceptionalists, although perhaps they are not as pragmatic in realizing that sometimes the welfare of certain individuals may need to be compromised to ensure the greater good, and that the inflexible subscription to lofty ideals may sometimes produce undesirable outcomes. Second, a moderate level of ethical leadership can also be seen with regard to situationalists, or those with high levels of both relativism and idealism. Such leaders will tend to decompose or inspect each situation to seek positive consequences. Yet they are inconsistent in terms of moral absolutes, thus limiting their ability to reinforce norms and standards, which are a function of ethical leadership. However, they are consistent in the pursuit of the welfare of all involved, thus possibly tempering the potential deleterious effects of relativism (Owens et al., 2015; Park & Peterson, 2003).

We recognize that our theory pertaining to ethical ideology might be subject to societal and cultural considerations. For example, our theory and findings would suggest that relativistic values on the part of a leader, especially in combination with low idealism, are associated with that leader being viewed as less ethical. One could deduce that followers are distrustful when the leader believes that ethics are situational in nature; for example, that telling the truth or sharing important information depends on the context or timing. Indeed, in the U.S. culture in which the current research took place, followers are likely to desire constancy and consistency in their leaders in terms of the display of values and behaviors relevant to ethical conduct, while at the same time expecting pragmatism in terms of idealism (Forsyth et al., 2008). However, as described by Adler (2000), followers in Asian or Latin cultures might not process information in this manner. In such cultures,

followers may be more relativistic (or particularistic) themselves, and accordingly, may tend to view the relativistic leader as being more prototypical of their societal culture, and thus, perceive him or her as being more ethical. Thus, future research is necessary to examine potential cultural moderators of the relationships in the current study.

Practical Implications

Practically, this study may provide clues for organizations about the development of leaders. Based on the concept of neuroplasticity (Bavelier, Levi, Li, Dan, & Hensch, 2010; Dulebohn et al., 2016), Waldman et al. (2011) considered the technique of neurofeedback as a method to alter neurological circuitry of individuals to be in line with a known pattern of effective behavior (i.e., known through research). For example, the current research begins to suggest a neurological signature for ethical leadership based on the DMN. With further research and refinement of that signature, it may be ultimately possible to develop leaders using neurofeedback who would be more predisposed to ethical leadership.

With that said, we caution that neurofeedback should not be viewed as a "magic bullet" to develop higher degrees of ethical leadership. However, it may be possible to combine a technique of this nature with more traditional development programs (Brown & Treviño, 2006). For example, neurofeedback might be combined with multi-source, survey-based feedback and coaching approaches to leader development (Bracken, Timmreck, & Church, 2001). In this way, the neural underpinnings of ethical leadership could be addressed in tandem to the leader receiving information or coaching pertaining to ethical leadership. If a neurological signature for ethical leadership is further validated, neural-based measurement could eventually be used to track the development of leaders, whether through traditional training, neurofeedback, or other interventions, as their brain activity adjusts toward a normative profile.

Our findings further suggest that attention be paid toward the ethical ideologies of prospective leaders. Subjectivism appears to be somewhat anathema to, while exceptionalism is more in line with, ethical leadership. Accordingly, selection procedures might include an assessment of the extent to which leaders adhere to a core set of values or moral absolutes across situations (i.e., in a universalistic manner), while simultaneously being pragmatic about concerns regarding the welfare of all individuals. However, we temper this recommendation with the realization that the exceptionalist profile that is suggested by the current findings may differ somewhat in its relevance to ethical leadership depending on institutional and cultural factors. Perhaps leaders should attempt to balance a set of core values and principles that they hold with a degree of tolerance for the differing values and principles of others, coupled with situational demands.

Limitations and Conclusion

Like other research, this study has strengths and limitations. Most notably with regard to strengths, we utilized multiple sources and methodologies to collect the data pertaining to the variables in our model. They included self-ratings for leader ideological beliefs, qEEG for neurological variables, and other ratings for ethical leadership. However, the cross-sectional and somewhat limited nature of our data collection processes limit causal interpretations or explanations. On the one hand, ethical ideologies represent personal characteristics that become relatively stable over time, and thus are likely to have well preceded the display of ethical leadership behavior. Moreover, intrinsic brain circuitry also becomes fairly stable in adulthood, although the plasticity of the brain mentioned above does suggest that it is possible for brain circuitry to change over time (Bavelier et al., 2010).

But with that said, in our theory, we posed mediating mechanisms (e.g., social awareness and perspective taking) that are considered in neuroscience literature as being relevant to the DMN (e.g., Buckner & Carroll, 2006; Buckner & Vincent, 2007). Moreover, other potentially mediating variables include moral psychological factors such as moral personality (Frimer, Walker, Dunlop, Lee, & Riches, 2011; Lapsley & Narvaez, 2004), moral maturation and conation (Hannah, Avolio, & May 2011), and moral identity (Aquino & Reed, 2002). In sum, to better formulate causal interpretations, we encourage future research to more directly assess mediating mechanisms, as well as a longitudinal sequencing of data collection procedures.

In conclusion, the current study helps to strengthen our understanding of the basis for the ethical leadership construct. Our use of neuroscience theory and methods provides a more comprehensive picture of this important construct by identifying a neurological marker that is uniquely predictive. In the future, we expect that neuroscience may continue to help inform our understanding of an array of management and organizational phenomena.

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David A. Waldman (waldman@asu.edu) is a professor of management in the W. P. Carey School of Business, Arizona State University. He received his PhD from Colorado State University. His research interests include leadership, organizational neuroscience, micro-based issues in social responsibility, and academic entrepreneurship.

Danni Wang (dwang@business.rutgers.edu) is an assistant professor in the Department of Management and Global Business at Rutgers Business School-Newark and New Brunswick, Rutgers University. She received her PhD from Arizona State University. Her research interests focus on leadership, accountability, teams, and neuroscience applications.

Sean T. Hannah (hannahst@wfu.edu) is professor of management and Wilson Chair of Business Ethics in the School of Business, Wake Forest University. A retired U.S. Army Colonel, he received his PhD from the University of Nebraska and researches the development and effects of exemplary leadership, business ethics, and character development.

Pierre A. Balthazard (balthazard@csus.edu) is dean of the College of Business Administration at California State University, Sacramento. He earned a joint PhD degree in Business Administration and Systems & Industrial Engineering from the University of Arizona. His research interests concern the neuropsychology of leadership and organizational neuroscience.