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CEO ATTRIBUTES AND FIRM PERFORMANCE: A SEQUENTIAL MEDIATION PROCESS MODEL

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Research on the impact of CEO attributes on firm performance is sporadic and fragmented, with various studies addressing select pieces of the puzzle. Through synthesizing and integrating diverse theoretical perspectives on the functioning of firm executives, this article advances a sequential mediation process model to link CEO attributes with firm performance. The model incorporates CEO emotion and cognition, along with top management team (TMT) and organizational processes as multilevel mediating mechanisms linking CEO attributes to firm performance outcomes. In addition, we draw from event system theory to highlight contextual events confronting firms and CEOs that alter the sequential mediation process resulting in stronger/weaker effects of CEOs on firm performance. Our research not only extends the literature by addressing *what*, *how*, and *when* CEO attributes impact firm performance in a more holistic fashion but also identifies meaningful theoretical and methodological opportunities for research advancement.

Recent decades have witnessed a surge of research interest in the effect of CEOs on firm performance (Burgelman, Floyd, Laamanen, Mantere, Vaara, & Whittington, 2018). Scholars in various fields have used different methods to examine the extent to which CEOs account for heterogeneity of organizational performance, such as variance decomposition (Crossland & Hambrick, 2007; Weiner & Mahoney, 1981) and stock market reactions to sudden CEO death announcements (Johnson, Magee, Nagarajan, & Newman, 1985; Quigley, Crossland, & Campbell, 2017). Despite the ongoing debate (Fitza, 2014; Lieberson & O'Connor, 1972) and the constraints that CEOs may face from time to time (Hambrick & Finkelstein, 1987), prior research consistently finds that CEOs do matter to organizational performance. Indeed, the CEO effect has increased substantially over the years (Quigley & Graffin, 2017; Quigley & Hambrick, 2015).

Research has moved beyond the contention that CEOs matter to questions of the channels through which they have an impact on firm performance, with a particular focus on personal attributes. Drawing on several theoretical perspectives, scholars have sought to investigate *what* CEO attributes translate into relevant firm performance outcomes. Taking an upper echelons perspective, some ascribe firm performance to the CEO's background or personality (Hambrick, 2007; Hambrick & Mason, 1984; Wang, Holmes, Oh, & Zhu, 2016; Zhu & Chen, 2015). Leadership scholars link behavioral characteristics (e.g., leadership styles) with firm performance (Waldman, Ramirez, House, & Puranam, 2001). Other scholars focus on mediating mechanisms to examine *how* CEO attributes affect firm performance (Ling, Simsek, Lubatkin, & Veiga, 2008; Peterson, Galvin, & Lange, 2012).

Although a great deal of research has examined elements of the relationship between CEO attributes and firm performance, few attempts have been made to integrate them to create a more holistic picture. In fact, the mediators highlighted in previous studies appear to account for different stages (e.g., TMT processes and strategic choices) in the effects of CEO attributes on firm performance. We, therefore, review different pieces of existing research to identify

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missing (or less studied) elements before presenting a holistic perspective on the relationship between CEO attributes and firm performance. In so doing, we advance a sequential mediation process model to shed light on *what*, *how*, and *when* CEO attributes impact firm performance.

Intellectual History of Executive Attributes and Firm Performance

Academic interest in the connection between executive attributes and firm outcomes gained momentum with Hambrick and Mason's (1984) seminal article introducing upper echelons theory, which holds that executives act on the basis of their personal interpretation of the strategic situation as a function of their experience, values, and personality (Hambrick, 2007). Hambrick and Mason (1984) laid out a linear model connecting the situation facing an organization and the characteristics of the executives in its upper echelons with the strategic choices made to address the situation and ultimately the organization's performance. As they noted, "the heart of the theory is the portrayal of upper echelon characteristics as determinants of strategic choices and, through these choices, of organizational performance" (Hambrick & Mason, 1984: 197).

From this, three streams of research have coevolved. The first examines which attributes of the TMT affect firm performance (Finkelstein & Hambrick, 1990; Kilduff, Angelmar, & Mehra, 2000), the second considers the individual CEO attributes that are related to firm strategy (Chatterjee & Hambrick, 2007, 2011; Hayward & Hambrick, 1997; Simsek, Heavey, & Veiga, 2010), and the third considers how individual CEO attributes impact TMT processes (Ling et al., 2008; Ou, Tsui, Kinicki, Waldman, Xiao, & Song, 2014; Simsek, 2007).

Research on the relationship between TMT attributes and firm outcomes examines whether a TMT's attributes, such as tenure (Finkelstein & Hambrick, 1990), team size (Haleblian & Finkelstein, 1993), structure and diversity (Kilduff et al., 2000; Wiersema & Bantel, 1992), social networks (Collins & Clark, 2003), and functional backgrounds (Cannella, Park, & Lee, 2008), are related to firm performance. This stream of research has provided a great deal of insight into the relationship between executives in the upper echelons and their firm's performance, in the form of explanatory constructs at the TMT level. By contrast, the impact of the most powerful executive, the CEO, has been somewhat overlooked in this line of work.

A related research stream has considered what individual CEO attributes relate to a firm's strategic choices. The theory underpinning this approach not only builds on upper echelons theory to justify the basic relationship but also incorporates micro-perspectives to shift the explanatory variables to the individual level of the CEO and, in general, connects this with major choices and outcomes manifested at the firm level. Research has investigated a variety of different individual attributes, including the CEO's background, such as functional experience (Barker & Mueller, 2002; Datta & Rajagopalan, 1998), education (Ng & Feldman, 2009), and international experience (Carpenter, Sanders, & Gregersen, 2001; Khavul, Benson, & Datta, 2010), along with the impact these have on diversification, innovation, and strategic change. Researchers have also considered CEO demographics, such as age (Hitt & Tyler, 1991; Yim, 2013) and gender (Chen, Crossland, & Huang, 2016; Dejoy, 1992; Eckel & Grossman, 2008), as well as personality attributes, such as core self-evaluation (CSE) (Hiller & Hambrick, 2005; Simsek et al., 2010), hubris (Hayward & Hambrick, 1997), humility (Ou et al., 2014), narcissism (Chatterjee & Hambrick, 2007, 2011), and overconfidence (Chen, Crossland, & Luo, 2015). This research stream has shed light on the influence CEOs have on what happens in firms but has seldom *directly* linked CEO attributes to firm performance, instead associating CEO attributes with specific strategic choices and initiatives of TMTs, with the *implicit* assumption that these strategic choices have implications for firm performance.

The third research stream accounts for the connection between the individual CEO and the TMT's processes. This perspective draws mainly on leadership theory to assess how the attributes of a CEO impact the group of executives he or she leads within a typical organizational hierarchy. The essence of this research is that as CEOs interact with TMT members, their individual attributes can have a significant impact on TMT processes. Peterson, Smith, Martorana, & Owens (2003) identified a number of processes, such as *TMT dynamics*, *flexibility*, *leader dominance*, *cohesiveness*, *corruption*, and *centralization*, resulting from CEO attributes. Other researchers have linked CEO transformational leadership with the TMT's behavioral integration and risk-taking propensity (Ling et al., 2008; Ou et al., 2014). CEO background attributes (e.g., CEO tenure) and personality characteristics (e.g., CEO humility) have also been associated with the TMT's risk-taking propensity (Simsek, 2007) and with manager retention (Ou, Seo, Choi, & Hom, 2017). Overall, this stream of research highlights how individual CEOs impact their TMTs' functioning and provides impetus for conducting studies in related areas (e.g., teams, dyadic interactions, and boards).

The Purpose of this Research

Although these research streams have added to our understanding of the relationship between CEOs and firm performance, the challenge is that each focuses on a different piece of the puzzle. For theory to advance, it is important to step back and examine how the pieces fit together and what may be missing as we integrate them. Some scholars have begun to reflect on this with a retrospective lens, via reviews of the literature (Carpenter, Geletkanycz, & Sanders, 2004) and meta-analytic techniques (Wang et al., 2016). Nevertheless, we take a more forward-looking approach, which combines prior literature and recent theoretical advances to build a process model that accounts for the sequential mediation mechanisms that connect CEO attributes to firm performance, and contingency (moderating) mechanisms related to the functioning of CEO attributes.

Whereas past studies have considered elements of this process, we develop a more holistic model, drawing on previous research in disparate domains to open up new avenues of inquiry into the relationship between CEO attributes and firm performance. We aim to explore interconnections at various levels of analysis, including individual CEO attributes, CEO emotion and cognition, TMT processes, strategic choices, and organizational processes and outcomes. Our study integrates previously unconnected studies and theoretical perspectives to shed light on the connection between CEO attributes and firm performance. We also outline methodological improvements to advance this line of inquiry.

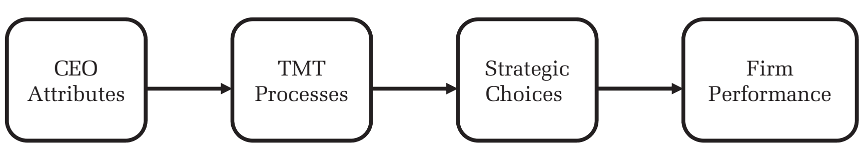
FROM CEO ATTRIBUTES TO FIRM PERFORMANCE: INTEGRATING AND UPDATING PREVIOUS RESEARCH

For the most part, the three existing research streams discussed previously have not been integrated, nor do they consider elements that may account for what, how, and when CEO attributes are related to firm performance, such as micro-mechanisms, contextual factors, and organizational mediators. The obvious first step in developing a more complete process model connecting CEO attributes to firm performance is to integrate the three streams of research described previously. The starting point is CEO attributes, which in turn have an immediate influence over the processes of the TMT that he or she establishes and leads. TMT processes are related to strategic choices that ultimately impact firm performance. As such, the integration of prior studies results in a linear model, as presented in Figure 1. It blends unconnected or partially connected research to explicate the relationship between CEO attributes and firm performance.

However, based on our review of the literature, the aforementioned baseline model overlooks some important mechanisms that may shed light on the relationship. First, advances in micro-perspectives of CEO behavior point to the importance of individual cognition and emotion in connecting CEO attributes with TMT processes (Helfat & Peteraf, 2015; Hodgkinson & Healey, 2011). CEOs, albeit powerful, are still people and, as such, their emotions and cognitions impact their interactions with their TMTs and their strategic choices. To understand how attributes translate into firm performance, we have to account for how attributes translate into emotions and cognition that impact the CEO's decisions and behaviors.

Second, Hambrick and Mason's (1984) original conception of upper echelons theory sees attributes as being "in part a reflection of the situation that the organization faces" (p. 197). Hence, their original model begins with a box labeled "the objective situation—external and internal" (p. 198). Yet, the specifics of the "situation" confronting a firm have only indirectly been accounted for in prior research linking CEO attributes to firm performance. Some researchers have considered contextual issues in conceptualizing managerial discretion, which moderates the relationship (Crossland & Hambrick, 2011; Finkelstein & Hambrick, 1990; Hambrick & Finkelstein,

FIGURE 1
Baseline Model: CEO Attributes, TMT Processes, Strategic Choices, and Firm Performance



1987). Contextual issues in managerial discretion studies tend to be more generic, stable, and enduring, such as the industry environment or influence of national culture. However, the impact of *discrete* and *dynamic* events on CEOs and their connection to firm performance is not accounted for in the current literature; CEOs and other executives often need to make their most telling and significant decisions when their firm is confronted with a novel, disruptive, or critical event. We therefore incorporate a novel theory—event system theory (Morgeson, Mitchell, & Liu, 2015)—to account for events that constitute the objective situation confronting firms and CEOs, which may moderate the proposed sequential mediation process model, therefore accentuating or attenuating the impact of CEO attributes.

Third, the implementation of strategic choices within an organization has a major impact on whether those choices translate into firm performance, yet the aforementioned baseline model overlooks the organizational processes through which executives' strategic choices are translated into organizational performance outcomes. As scholars develop greater understanding about the implementation of strategic choices within complex organizations and across multiple hierarchical levels and geographies, there may be variation in the way strategic choices are translated into firm performance based on organization-level mechanisms pertaining to the implementation of such choices. Therefore, we propose an updated model (Figure 2) that takes into consideration the organizational mechanisms that connect strategic choices to firm performance.

In the model, we first integrate different streams of inquiry to highlight the mechanisms that may translate CEO attributes into firm performance (i.e., the solid line boxes in Figure 2). Then, we elaborate on our three major additions to the scholarly understanding of the connection between CEO attributes and firm performance: i.e., novel, disruptive, or critical events; CEO emotion and cognition; and organizational processes in the boxes with dotted lines. This sequential mediation process model suggests a number of fruitful research opportunities and is positioned to generate a more holistic view of what, how, and when CEO attributes influence firm performance.

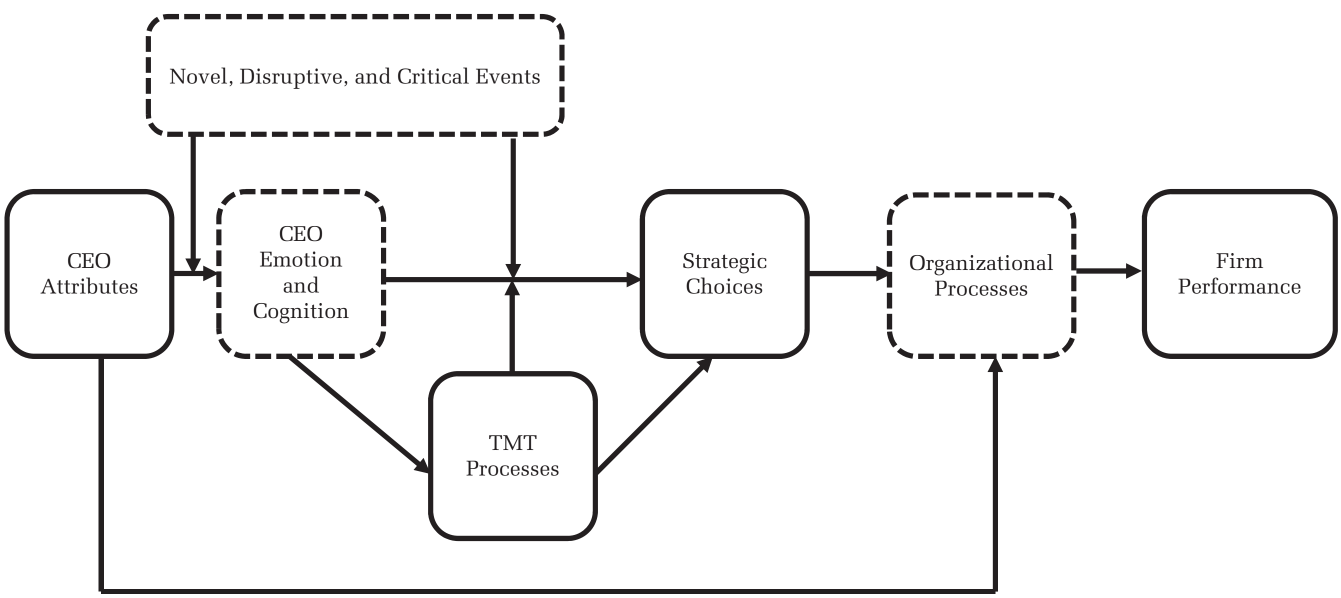
BASELINE MODEL: CEO ATTRIBUTES

Because CEO attributes and their impact on outcomes at the firm level have been extensively studied, it makes sense to categorize the current literature according to their theoretical origins: (1) CEO background features, (2) CEO personality characteristics, and (3) CEO leadership styles.

CEO Background Features

Most studies of CEO background build on upper echelons theory, which suggests "organizational

FIGURE 2
A Sequential Mediation Process Model of the Impact of CEO Attributes and Events on Firm Performance



outcomes–strategic choices and performance levels–are partially predicted by managerial background characteristics" (Hambrick & Mason, 1984: 193). Given the vast literature on this topic and the various dimensions studied, we have created three subsections: CEO professional background, demographic background, and social background.

Professional background. This refers to the professional experience of a CEO and has been found to significantly affect a CEO's actions and effectiveness in leading a firm (Crossland, Zyung, Hiller, & Hambrick, 2014; Hambrick & Mason, 1984; Herrmann & Datta, 2006). Professional experience refers to career roles and activities, distinguished in different ways including functional, international, and industry experience.

Functional experience is acquired in the classic domains of business (e.g., finance, marketing, operations, or HR). Hambrick and Mason (1984) categorized functional experience based on whether it is oriented toward output (marketing, sales, and product development), throughput (production and accounting), or peripheral activities (law, finance, and HR) (see also Barker & Mueller, 2002; Datta & Rajagopalan, 1998). A CEO's prior output experience is held to be positively associated with firm profitability in turbulent industries, throughput experience is held to be positively associated with firm profitability in stable industries, and peripheral experience with unrelated diversification and administrative complexity (Hambrick & Mason, 1984).

International experience refers to whether and how much a CEO may have operated in a business environment outside their home country (Carpenter et al., 2001; Khavul et al., 2010). This may give them a broader, more diverse outlook and enable them to better deal with uncertainty and ambiguity (Carpenter et al., 2001; Khavul et al., 2010).

Industry experience represents the number of years a CEO has worked in the industry of the firm they lead before taking on the CEO role. Industry experience may provide valuable contextual insight and social connections but may also lock a CEO into a particular way of understanding and interpreting issues. It may be valuable in stable environments but less valuable for CEOs of firms facing environmental discontinuities (Hambrick & Mason, 1984). CEO prior industry experience has been found to be positively associated with firm performance (Wang et al., 2016).

More recent research tackles the issue of CEO professional experience more broadly by conceptualizing the construct of CEO *career variety*—"the array of distinct professional and institutional experiences an executive has had prior to becoming CEO" (Crossland et al., 2014: 652). Empirical tests suggest that such variety is positively related to firm-level strategic novelty–manifested in strategic dynamism (period-on-period change) and strategic distinctiveness (deviance from industry central tendencies) (Crossland et al., 2014).

Demographic background. This considers factors including CEO age, education, and tenure, which may be directly or indirectly related to firm performance. Building on upper echelons theory, scholars suggest that age may be associated with variability in firm performance: younger CEOs are more likely to have the physical and mental stamina to perform at a higher level, have a lower psychological commitment to the status quo, be less concerned about financial and career security, and hence be more inclined to take risks when making strategic decisions (Serfling, 2014; Yim, 2013). Older CEOs are more likely to employ outdated business practices, thus potentially dragging down performance (Wang et al., 2016). Empirical evidence suggests that CEO age is negatively related to bolder and potentially riskier strategic actions by firms, including acquisitions (Hitt & Tyler, 1991; Yim, 2013), higher R&D spending (Barker & Mueller, 2002), and international diversification (Herrmann & Datta, 2002). There is also some evidence of a significant positive relationship between CEO age and firm profitability (Wang et al., 2016), yet this research does not isolate the mechanisms underpinning a CEO age effect. CEO age could be proxy for experience, stamina, entrenchment, or change in perception as retirement approaches. This offers a competing perspective to that first proposed by Hambrick and Mason (1984)—that independent of other factors, the insight and complex reasoning that come with age in a CEO may provide an advantage to firms, such that firms led by older CEOs are more effectively managed and hence generate better overall results.

Scholars have argued that a CEO's education is positively related to firm-level strategic action and performance. Education is conceptualized as contributing to a CEO's knowledge, skill base, and cognitive ability (Hambrick & Mason, 1984), which facilitate the acquisition and processing of complex information (Wally & Baum, 1994). A number of studies have established a link between CEOs' formal education and their receptivity to innovation and change (Kimberly & Evanisko, 1981; Ng & Feldman, 2009). Hence, a CEO's level of formal education may underpin a desire to pursue significant and complex firm strategies. It may also enrich a

CEO's cognitive schema, openness to ideas, and social networks such that he/she operates more effectively in the role, enhancing firm performance.

CEO tenure (the length of time spent in the role at a particular firm) has been widely studied (Finkelstein, Hambrick, & Canella, 2009). A general observation is that longer tenured CEOs are more likely to be committed to the status quo because they were part of establishing it (Hambrick & Mason, 1984), wish to protect their legacy (Matta & Beamish, 2008), and have accumulated more power (Meyer, 1975) and internal supporters (Miller, 1991) than those new to the position. Hence, they are more able to resist pressures from diverse stakeholders seeking to disrupt things within the firm. New CEOs are thought to be more motivated to demonstrate competence, make an impact, and hence bring about change (Shen & Cannella, 2002). Paradoxically, therefore, longer tenured CEOs have accumulated the power and internal support to create changes but are less motivated to do so because of their commitment to the status quo, whereas chief executives earlier in their tenure and more motivated to make changes have less power, influence, or support to do so. That said, although shorter tenured CEOs are more likely to engage in higher levels of strategic action, this does not necessarily translate into better firm performance (Wang et al., 2016).

Another demographic variable is CEO gender (Dezsö & Ross, 2012; Oakley, 2000). The gender literature discusses how female leaders may differ from their male counterparts in decision-making (Chen et al., 2016; Dejoy, 1992; Eckel & Grossman, 2008); the group decision-making literature discusses how the presence of female executives may influence group diversity and the group discussion process in a TMT (Chen et al., 2016; Kilduff et al., 2000). Signaling theory explains why shareholder reactions to female CEO appointments are significantly more negative than to male ones (Lee & James, 2007). A recent study by Zhang and Qu (2016) suggested that the performance implication is not a "gender effect" (i.e., systematic performance difference between female and male CEOs) but a "gender change effect" (i.e., a male CEO being succeeded by a female one, and vice versa).

Social background. This refers to a CEO's standing within broad, socially constructed evaluation systems and has been a recent focus for researchers examining the link between CEO attributes and firm performance. Specific constructs include the CEO's social status, reputation, and celebrity (Chen, Hambrick, & Pollock, 2008; Hayward, Rindova, & Pollock, 2004; Wade, Porac, Pollock, & Graffin, 2006; Westphal & Zajac, 1995).

Social status is a sociological concept which reflects the standing of a CEO within the social order but not their performance (Graffin et al., 2008; Podolny, 2005; Washington & Zajac, 2005). Status differences measured via a CEO's standing in certification contests have been found to be positively related to firm performance in the short term but have long-term negative implications. CEOs with high status appear to become overconfident, leading to poor decision-making (Wade et al., 2006).

CEO reputation, an economic concept that sheds light on differences in perceived or actual CEO quality (Podolny, 2005), has garnered attention in the accounting and finance literatures. CEO reputation has been found to be associated with firm earnings quality, suggesting that those with a high reputation manage earnings to meet performance expectations (Francis, Huang, Rajgopal, & Zang, 2008).

CEO celebrity is a unique form of social status conferred on certain CEOs (Cho, Arthurs, Townsend, Miller, & Barden, 2016; Malmendier & Tate, 2009). According to Hayward et al. (2004), celebrity status takes hold when journalists over-attribute a firm's actions and outcomes to the disposition of its CEO rather than to broader contextual factors, and such over-attribution is internalized and enacted by the CEO. Research suggests that becoming a celebrity CEO is associated with initial underperformance (Malmendier & Tate, 2009) and with paying higher premiums for target firms in the short term, whereas CEOs who have enjoyed celebrity status for some time are not subject to such errors (Cho et al., 2016). In summary, the research on CEO social background is still relatively new and a clear understanding of the connection with firm performance is still emerging.

CEO Personality Characteristics

Research linking CEO personality dimensions to organizational performance outcomes is informed by psychology literature (on the micro side) and upper echelons research (on the macro side). As personality is a "relatively permanent, ingrained disposition," it is thought to affect how CEOs attend to and process information about the environment, the firm, and their own capabilities (Finkelstein et al., 2009: 70). The argument underpinning this research is that a CEO's *self-concept* as measured by personality characteristics—e.g., Big Five personality (Nadkarni & Herrmann, 2010; Peterson et al., 2003), CSE (Hiller & Hambrick, 2005; Simsek et al., 2010), hubris (Hayward & Hambrick, 1997), humility (Ou et al., 2014), narcissism (Chatterjee & Hambrick, 2007, 2011), and overconfidence (Chen et al., 2015)—can impact his/her cognitive and emotional states, which in turn affect firm performance.

More specifically, the upbeat emotions of CEOs with a positive self-concept prompt them to process more information and attend to more positive environmental cues (as opposed to CEOs with a lower positive self-concept), which in turn allows them to identify more opportunities, and view them more favorably (Baron, 2008; Hiller & Hambrick, 2005). As such, a positive self-concept is likely associated with strategic action in the pursuance of opportunities: this may generate valuable returns, but may also be risky and place the firm in a precarious position (Hiller & Hambrick, 2005). CEOs with a positive self-concept (e.g., CSE) have favorable self-perceptions and are more likely to view themselves as exceptional, potent, admirable, and important (Barrick, Mount, & Gupta, 2003; Finkelstein et al., 2009; Hiller & Hambrick, 2005; Judge, Locke, & Durham, 1997). As a result, they are inclined to set more ambitious goals and pursue grander initiatives with higher stakes attached (Hiller & Hambrick, 2005; Judge & Ilies, 2002).

Interestingly, researchers have started exploring both positive (bright-side) and negative (dark-side) elements of CEO self-concept (Resick, Whitman, Weingarden, & Hiller, 2009). CSE and humility tend to be viewed as "bright-side" elements of self-concept, whereas narcissism, hubris, and overconfidence are perceived as "dark-side" elements. Recent research has also begun recognizing the potential "bright side" of narcissism, hubris, and confidence—CEOs with these attributes are more likely to introduce breakthrough technology and dramatic innovations (Gerstner, Konig, Enders, & Hambrick, 2013; Tang, Li, & Yang, 2015a).

Empirical research supports the broad idea that CEO self-concept has a direct and indirect impact on firm performance in both positive and negative directions. For example, some studies link CEO CSE—a "deeply sourced dispositional trait that defines how we evaluate ourselves and our relationship with the environment" that is "characterized by self-confidence, self-worth, self-potency, and freedom from anxiety" (Hiller & Hambrick, 2005: 299)—with firm-level entrepreneurial orientation (EO) (Simsek et al., 2010) and the development of dynamic capabilities within a firm (von den Driesch, da Costa, Flatten, & Brettel, 2015). CSE has also been linked to transformational leadership, which in turn is associated with higher levels of organizational performance under certain conditions (Resick et al., 2009). These studies indicate that the indirect connection between CEO CSE and firm performance via a variety of firm-level factors is relatively robust.

CEO narcissism—a potential "dark-side" personality construct—has been conceptualized as the opposite of humility (Zhang, Ou, Tsui, & Wang, 2017). Narcissism is defined as "the degree to which an individual has an inflated sense of self and is preoccupied with having that self-view continually reinforced" (Chatterjee & Hambrick, 2007: 353). Empirical research on CEO narcissism suggests that it is positively related to the number and size of firm acquisitions (Chatterjee & Hambrick, 2007), spending on R&D, capital expenditure, and mergers and acquisitions (Chatterjee & Hambrick, 2011). Furthermore, narcissistic CEOs are more aggressive in their adoption of technological discontinuities, especially when they anticipate widespread admiration for their bold actions (Gerstner, König, Enders, & Hambrick, 2013).

Narcissistic CEOs are also much more likely to be influenced by strategies they observe at other firms and to resist the influence of their directors' prior experience when formulating firm strategy, suggesting that the CEO's narcissism limits directors' influence over corporate strategy and influences the CEO's learning and information processing in a negative way (Zhu & Chen, 2015). A connection has been posited between CEO narcissism and EO—or the level of innovativeness, proactiveness, and risk-taking within a firm (Miller, 1983). Narcissistic CEOs are more likely to foster an EO within the firm they lead (Wales, Patel, & Lumpkin, 2013). However, CEO narcissism has been shown to weaken the generally positive relationship between EO and firm performance (Engelen, Neumann, & Schmidt, 2016). Firms led by narcissistic CEOs experience greater performance variability (Wales et al., 2013).

CEO hubris is sometimes referred to as overconfidence: "exaggerated pride or self-confidence" (Hayward & Hambrick, 1997: 106). In empirical research, CEO hubris has been linked with the size of premiums paid for acquisitions (Hayward & Hambrick, 1997), with poor financial performance (Park, Kim, Chang, Lee, & Sung, 2018), and with greater levels of risk-taking, especially when a CEO has higher levels of managerial discretion (Li & Tang, 2010). CEO hubris is also associated with higher levels of innovation—viewed as a positive for firms (Tang et al., 2015a), yet more negatively for society. CEO hubris may undermine socially responsible firm activities and increase socially irresponsible activities (Tang, Qian, Chen, & Shen, 2015b). Taken together, CEO narcissism and hubris may provide some performance benefits for firms in the form of increased innovation, responsiveness to technological discontinuities, and greater pursuance of opportunities and risk-taking. Conversely, firm performance may suffer if narcissism prompts CEOs to overpay for acquisitions, engage in socially irresponsible activities, and to copy the strategies of other firms.

Overall, studies on CEO humility, narcissism, and hubris reflect a confounding effect underlying much of the literature on CEO self-concept. Whereas a grander view of self is helpful in initiating strategic action and taking risks, a humbler view is useful for motivating and empowering employees at different levels when implementing those actions. More recent studies have begun examining different organizational implications between these related but distinctive personality characteristics, such as between CEO narcissism and hubris (Tang, Mack, & Chen, 2018).

Other CEO personality factors which have received research attention include locus of control (Boone, Brabander, & Witteloostuijn, 1996; Boone, De Brabander, & Hellemans, 2000; Miller, De Vries, & Toulouse, 1982) and regulatory focus (Gamache, McNamara, Mannor, & Johnson, 2015; Wowak & Hambrick, 2010). In a study of 39 small firms, Boone et al. (1996) found that the CEO's locus of control was significantly associated with profitability and long-run organizational survival. Miller et al. (1982) found that firms with an internal locus of control CEO tended to pursue more product-market innovation, undertook greater risks, and led rather than followed their competitors.

In terms of the CEO's regulatory focus, Wowak and Hambrick (2010) suggest that it is related to the CEO's cognitive framework and posit that the CEO's regulatory focus interacts with stock option pay in affecting risk-taking behavior. Gomache et al. (2015) investigate the differential effects of CEO promotion vs. prevention foci on the quality and scale of acquisitions and how these relationships are moderated by stock option pay. It is interesting that both studies consider how the impact of CEO attributes is moderated by the design of compensation.

CEO Leadership Styles

Leadership theories which are used to account for the connection between CEO attributes and firm performance conceptualize CEO leadership styles in various ways: e.g., charismatic leadership (Waldman et al., 2001), transformational leadership (Jansen, George, Van den Bosch, & Volberda, 2008), transactional leadership (Waldman et al., 2001), and servant leadership (Peterson et al., 2012).

Charismatic leadership. Charismatic leadership is conceptualized as a relationship between a leader and followers based on leader behaviors combined with favorable attributions from followers (Klein & House, 1995; Waldman et al., 2001). More specifically, "key behaviors on the part of the leader include articulating a vision and sense of mission, showing determination, and communication of high performance expectations. Favorable attributional effects on followers include the generation of confidence in the leader making followers feel good in his/her presence, and the generation of strong admiration or respect" (Waldman et al., 2001: 135). Empirical evidence on the relationship between CEO charismatic leadership and firm performance is mixed. Some studies have found no direct relationship between CEO charisma and subsequent firm performance but found that CEO charisma predicted firm performance under conditions of high environmental uncertainty (Tosi, Miangyi, Fanelli, Waldman, & Yammarino, 2004; Waldman, Javidan, & Varella, 2004). Another study found evidence suggesting that CEO charisma is related to subsequent firm performance but found no support for a moderating effect of perceived environmental uncertainty (Waldman et al., 2004). More recently, Agle, Nagarajan, Sonnenfeld, and Srinivasan (2006) attempted to resolve these mixed findings and found that perceptions of CEO charisma were not associated with subsequent organizational performance, even after incorporating the potential moderating effect of environmental uncertainty. Taken as a whole, the link between CEO charismatic leadership and firm performance remains unclear.

Transformational leadership. Transformational leadership is similar to (and sometimes subsumes) charismatic leadership. It is conceptualized as a meta-construct consisting of "four interdependent, mutually reinforcing attributes: (1) charisma: creating and presenting an attractive vision of the future; (2) inspirational motivation: energizing followers to go beyond self- interest; (3) intellectual stimulation: stimulating followers to challenge assumptions and view problems from new perspectives; and (4) individualized consideration: focusing on follower development by providing support, encouragement, and coaching" (Ling et al., 2008: 557).

Researchers examining the impact of transformational CEOs on firm performance in small and medium-sized enterprises found that CEO transformational leadership had a significant, direct effect on measures of firm performance, yet firm size, tenure, and founder status served as moderators in this relationship, with transformational CEOs having a more pronounced effect on firm performance in smaller firms with longer tenured CEOs and CEOs with founder status (Ling et al., 2008).

Transactional leadership. This is largely oriented toward maintaining existing systems and cultures. Transactional leaders operate within an existing system or culture, as opposed to trying to change it (Waldman et al., 2001). They attempt to satisfy the needs of followers by focusing on exchange and contingent reward/punishment; pay close attention to deviations, mistakes or irregularities; and make corrections when necessary (Bass, 1985; Waldman et al., 2001). Empirical research provides no support for a significant relationship between CEO transactional leadership and firm performance (Waldman et al., 2001).

Servant leadership. Alongside increased interest in leader humility, scholars have conceptualized a more caring style of leadership, labeled *servant leadership*. As defined by Hale and Fields (2007), servant leadership "places the good of those led over the self-interest of the leader, emphasizing leader behaviors that focus on follower development, and de-emphasizing glorification of the leader" (p. 397). Liden, Wayne, Zhao, and Henderson (2008) identify seven dimensions composing servant leadership: acting ethically, showing sensitivity to others' personal concerns, putting subordinates first, helping subordinates grow and succeed, empowering others, creating value for the community, and having the conceptual skills and knowledge of the organization and tasks at hand necessary to support and assist followers. Peterson et al. (2012) found that a CEO's servant leadership was a significant predictor of firm performance.

Criticism of the leadership styles literature. Although CEO leadership styles have been empirically associated with firm performance, inconsistency in the findings points to potential confounds and concerns pertaining to research in this area. Van Knippenberg and Sitkin (2013), with reference to research on charismatic and transformational leadership styles, identify four problems. First, they point out that a clear conceptual definition of charismatic–transformational leadership is lacking, largely because current theories advance multidimensional conceptualizations of charismatic or transformational leadership without specifying how different dimensions combine or how dimensions are selected for inclusion or exclusion. Second, theories fail to sufficiently specify the causal model capturing how each dimension has a distinct influence on mediating processes and outcomes and how this is contingent on moderating influences. Third, charismatic and transformational leadership are mostly confounded with their effects. Fourth, the most frequently used measurement tools are invalid in that they fail to reproduce the dimensional structure specified by theory and fail to achieve empirical distinctiveness from other aspects of leadership. As such, van Knippenberg and Sitkin (2013: 2) suggest that there is a need to "forego the label of charismatic-transformational leadership in favor of the study of more clearly defined and empirically distinct aspects of leadership."

BASELINE MODEL: TMT PROCESSES

TMT members report directly to and interact with a CEO relatively frequently and with fairly high intensity, thereby constituting a CEO's immediate social environment in the workplace (Hambrick & Finkelstein, 1987; Peterson et al., 2003). Thus, TMTs formulate and implement critical organizational policies and strategies under the constant and immediate influence of CEOs (Carpenter et al., 2004). In some cases, the power of the CEO constrains the functioning of a TMT, resulting in direct CEO influence on strategic choices. Yet, in most cases, the conceptual model within the TMT literature takes into account the unique dynamics of TMTs and examines how CEO attributes impact TMT functioning (or dysfunction) as a basis for explaining firm outcomes (Hambrick, 1995). The upper echelons perspective sheds light on TMT processes (Hambrick & Mason, 1984). This, along with more recent commentaries on upper echelons research (Hambrick, 2007), has sparked interest in how TMT functioning is impacted by CEOs and how this translates into organizational outcomes, notably how to account for TMT processes.

Early strategic leadership research focused mostly on the CEO's direct influence on organizational outcomes, but in the past two decades, researchers have started conceptualizing and testing the pivotal role of TMT processes in the relationship between CEOs and firm performance (Carmeli et al., 2011). Peterson et al. (2003) propose a number of TMT processes such as *TMT dynamics*, *flexibility*, *leader dominance*, *cohesiveness*, *corruption*, and *centralization*, which may result from CEO personality. TMT behavioral integration and risk-taking propensity have been identified as key processes that underpin the relationship between CEOs and firm performance. TMT behavioral integration refers to members' willingness to collaborate, share information, make joint decisions, and develop a shared vision (Hambrick, 2007), thereby reflecting the extent to which they engage in collective interaction (Ling et al., 2008). Ling et al. (2008) have shown that CEO transformational leadership is associated with higher levels of firm performance via TMT behavioral integration. Ou et al. have shown that CEO humility is a predictor of TMT behavioral integration (Ou et al., 2014) and TMT ambidextrous orientation (Ou, Waldman, & Petersen, 2018). The opposing conceptualization, TMT faultlines, exists when subgroups differ on multiple demographic features (Li & Hambrick, 2005). Such faultlines are associated with conflict, ultimate behavioral disintegration, and poor performance (Li & Hambrick, 2005).

TMT risk-taking propensity, or the proclivity of a TMT to engage in risky projects and bold acts to achieve firm objectives, has been cited as an explanatory mechanism for the CEO–firm performance relationship. Simsek (2007) found a positive relationship between CEO tenure and TMT risk-taking propensity, which in turn had a positive relationship with firm performance. Ling et al. (2008) found a positive relationship between CEO transformational leadership and TMT risk-taking propensity, which in turn had positive impact on corporate entrepreneurship within firms. Although some advances have been made in understanding TMT processes that link CEO attributes with firm performance, the area is ripe for future investigation. In particular, researchers have yet to investigate the roles of CEO cognition and emotion in associating CEO attributes and events with TMT processes to fully understand why CEOs have an effect on TMTs and how that translates into TMT processes.

BASELINE MODEL: STRATEGIC CHOICES

Hambrick and Mason (1984: 195) identified strategic choice as the main output of upper echelons theory. They described strategic choice as "a fairly comprehensive term to include choices made formally and informally, indecision as well as decision, major administrative choices (e.g., reward systems and structure) as well as the domain and competitive choices more generally associated with the term 'strategy.' Strategic choices stand in contrast to operational choices such as inventory decisions and credit policies, which lend themselves more to calculable solution." Hambrick and Mason (1984) built on the work of March and Simon (1958), arguing that because strategic choices have a large behavioral component, the idiosyncrasies of decision-makers are reflected in such choices, and this is one reason that they are strongly related to CEO or TMT attributes.

Some scholars have linked CEO attributes to a firm's overall strategic conformity or deviance—the extent to which its strategy is similar to or differs from that of other firms in the industry. For instance, strategic deviance (or some variant of the concept) has been associated with CEO dominance (Tang, Crossan, & Rowe, 2011), positive affective traits (Delgado-García, La Fuente-Sabaté, & Manuel, 2010), and CEO ties to actors outside of their industry (Geletkanycz & Hambrick, 1997). Other scholars examine CEOs' specific strategic choices, be they at the functional area level, such as R&D investment, growth-oriented actions, cost-cutting initiatives, or product launches. At the corporate strategy level, they can include acquisitions, divestitures, innovation, geographic expansion, and alliance partner selection.

Zhang and Rajagopalan (2010) found a connection between a CEO's outsider status—i.e., coming from outside the firm—and strategic decisions reflecting changes in resource allocation. Waldman, Siegel, and Javidan (2006) linked CEO transformational leadership behavior with strategic decisions to invest in corporate social responsibility. Herrmann and Datta (2006) associated CEO firm experience and age with strategic decisions pertaining to entry into new markets. Those with less firm experience preferred acquisitions and greenfield investments to joint ventures, whereas older CEOs were more likely to opt for joint ventures over greenfield investments.

Scholars have also linked CEO or TMT attributes to direct or indirect measures of strategic choices with respect to innovation, entrepreneurship, and risk-taking at the firm level. Baron and Tang (2011) linked CEO positive affective traits to the number and radicalness of innovations pursued. Chatterjee and Hambrick linked CEO narcissism to a firm's risk-taking (2011) and acquisition decisions (2007). Miller and Breton-Miller (2011) linked CEO founder status to EO—a formative measure of innovation, reinvestment, and risk-taking at the firm level. Ling et al. (2008) linked transformation leadership at the CEO level with corporate entrepreneurship at the firm level (a measure of innovation, venturing, and strategic renewal). Simsek (2007) linked CEO tenure with risk-taking and the pursuit of entrepreneurial initiatives at the firm level.

Overall, while strategic choice has been proposed as an important element in the relationship between CEO attributes and firm performance in upper echelons theory, it needs to be more conceptually and empirically associated with other critical elements at the TMT and organizational levels to fully understand its role in linking CEO attributes to firm performance outcomes.

BASELINE MODEL: FIRM PERFORMANCE

To account for the CEO impact on a firm, it is important to conceptualize and measure relevant firm performance outcomes. The most prominent of these is financial performance, which is measured in a number of ways, such as revenue growth (Baum & Locke, 2004), profitability (including both mean and variance: Chatterjee & Hambrick, 2007; Judge & Miller, 1991), return on assets (Chung & Luo, 2013), return on equity (Chen & Hambrick, 2012), and return on invested capital (Henderson, Miller, & Hambrick, 2006). However, it is not the only relevant firm performance outcome. A few CEO studies account for alternative nonfinancial measures of firm performance, such as employee growth (Baum & Locke, 2004) or patent output (Wu, Levitas, & Priem, 2005). Researchers have also used self-report perceptional measures of firm performance, which ask organizational members—including CEOs themselves (Simsek, 2007) or other organizational members (Eisenbeiss, van Knippenberg, & Fahrbach, 2015)—to assess the perceived financial performance of a firm in relation to its industry competitors.

Overall, the four core elements of the baseline model (Figure 1) discussed previously—CEO attributes, TMT processes, strategic choices, and firm performance—provide a valuable foundation for examining and understanding the connection between CEO attributes and firm performance. Our review of the existing literature highlights the important advances made in understanding these connections, but it also signals some deficiencies in understanding this relationship.

INTEGRATING NEW ELEMENTS INTO THE BASELINE MODEL

To fill in the gaps in explaining why CEO attributes impact firm performance, it is important to unpack the underlying mediators for such a connection. A criticism of past research is the distal relationship between CEO attributes and firm performance. Because other factors can affect firm performance, making the connection is unreliable (Hambrick & Quigley, 2014). One way to overcome this is to systematically and comprehensively account for the multilevel sequential mechanisms (from the CEO level to the TMT level, followed by the organizational level) and critical contextual factors that may connect CEO attributes with firm performance. Here, we account for three new elements—mechanisms and contextual factors that fill the gaps in our current understanding: (1) micro mechanisms linking CEO attributes to TMT processes, (2) contextual factors moderating the connection between CEO attributes to TMT processes, and (3) organizational mechanisms linking strategic choices to firm outcomes.

Micro Mechanisms: CEO Emotion and Cognition

Whereas the literature directly examining the mediators between CEO attributes and firm performance is still emerging, our review points to the importance of accounting for CEO cognition and emotion as links between CEO attributes and TMT processes.

CEO cognition. Cognitive science seeks to understand the inner workings of the human mind. Since March and Simon's (1958) concept of bounded rationality, researchers have been interested in cognitive limitations in individual behaviors and decision-making. Research from the upper echelons' perspective suggests that in the presence of personal (attributes) stimuli, CEOs use their own cognitive bases and shortcuts to select, filter, and interpret information with which to construct their decision-making (Eggers & Kaplan, 2009; Hambrick & Mason, 1984; Wowak & Hambrick, 2010). Thus, CEO attributes will directly impact CEO cognitive mechanisms (Barr, Stimpert, & Huff, 1992; Daft & Weick, 1984; Eggers & Kaplan, 2013), which they may bring to bear on TMT processes, and, thus, the organizational mechanisms that directly underpin firm performance. Research has proposed executive cognitive models, such as cognitive content (what individuals know), structure (how the knowledge is arranged in mind), and style (how the mind works), and how they influence information processing by CEOs (Helfat & Peteraf, 2015; Huff, 1990; Sims & Gioia, 1986). By contrast, it has largely overlooked how CEO attributes influence the TMT process through cognitive mechanisms. We thus posit CEO capabilities, organization identification, role, and social identification as cognitive mechanisms linking elements in the process model.

Specifically, *CEO capabilities*, such as communication skills (Baum, Locke, & Kirkpatrick, 1998), attention (Kaplan, 2008), problem-solving and reasoning (Helfat & Peteraf, 2015), ambivalence (Plambeck & Weber, 2010), decision comprehensiveness (Simsek, Roche, & Kelly, 2009), metacognitive experience (Mitchell, Shepherd, & Sharfman, 2011), general ability and execution skills (Kaplan, Klebanov, & Sorensen, 2012), and time use (Bandiera, Prat, & Sadun, 2013), may connect CEO attributes to TMT processes and ultimately firm performance. For example, Baum et al. (1998) found that a CEO's ability to communicate a vision—as perceived by organizational members—was an important mediator in transforming the CEO's vision and content into venture growth.

In addition, prior psychological research has suggested that *CEO organizational identification* (Peterson et al., 2012), and *role and social identification* (Miller & Breton-Miller, 2011) serve as individual-level cognitive mediators between CEO attributes and firm performance. CEO organizational identification is the extent to which a CEO perceives his/her self-identity as intertwined with the organization's identity or defines him/herself in terms of the attributes of the organization (Ashforth & Mael, 1989; Dukerich, Golden, & Shortell, 2002). Peterson et al. (2012) develop and test a process model in which CEO organizational identification mediates the relationships of CEO narcissism and founder status with servant leadership, which in turn predicts firm performance. They argue that narcissistic CEOs struggle to conceive themselves as part of the collective—have low organizational identification—whereas founder CEOs more naturally see themselves as part of the collective and will in turn more eagerly pursue actions that help their organization and its members (Bartel, 2001; Bergami & Bagozzi, 2000; Boivie, Lange, McDonald, & Westphal, 2011; Dukerich et al., 2002; Dutton, Dukerich, & Harquail, 1994; Riketta, 2005), ultimately boosting organizational performance.

Role and social identification research covers a CEO's identification within a particular group, adoption of a related role, and how it shapes their loyalties, priorities, and conduct (Stryker & Burke, 2000). Founder CEOs have been found to take on an entrepreneur role identity, whereas family member CEOs of family firms invoke a nurturing role (Miller & Breton-Miller, 2011; Miller, Breton-Miller, & Lester, 2011). These different identities mediate the focal link: the entrepreneurial identity is associated with better firm performance compared with the family nurturer identity. We believe that research on the CEO attributes–firm performance relationship needs more explicit consideration of CEO cognition in modeling how their attributes translate into organizational outcomes.

CEO emotion. Individuals differ in their internal tendency to experience certain emotions (Revelle & Scherer, 2009), so it stands to reason that CEO emotion may translate CEO attributes into firm performance outcomes. Although cognition and emotion are major paradigms in micro research on leadership and decision-making (Fischer et al., in press; Gross, 1999; Schwarz, 2000; Zajonc & Markus, 1982), emotion warrants closer attention at the CEO level. Guided by upper echelons theory, scholars who strive to unveil the mediators between CEOs and firm performance generally concentrate on cognition variables (Barr et al., 1992; Eggers & Kaplan, 2009; Finelstein et al., 2009), whereas CEO emotion largely remains a blind spot.

Whereas there is some debate about emotion and cognition being separate, partially independent, or totally intertwined with each other (Leventhal & Scherer, 1987; Zajonc, 1980), it is relatively clear that emotion can influence individual decision-making (Vuori, Vuori, & Huy, 2018; Schwarz, 2000). For instance, executives are more likely to recall information (from memory) that is congruent with their current feelings (Bower, 1981; Schwarz, 2000). When CEOs determine how information will be perceived, encoded, and acted on, the effect of emotion will surface. A CEO's emotion influences how he or she conveys or communicates views and perspectives to the TMT and thus influences the TMT's behavioral integration and other processes.

Among the very limited research on CEO emotion, Delgado-García et al. (2010) find that CEO emotion matters in influencing strategic and performance conformity. Using a sample from the Spanish banking industry, they show that managers' negative affective traits are related to conformist strategies, whereas positive affective traits have a different impact, yielding outcomes that deviate from the core tendencies of the industry. Given the importance of individual emotion and limited research at the CEO level, examining the emotional states or affective traits of CEOs would contribute substantially to our understanding of the mediating mechanisms that link CEO attributes to firm performance.

The CEO–TMT Interplay

Several studies have verified that CEOs and TMTs play a significant role in organizational effectiveness because as the highest level of management they are in charge of formulating and implementing strategies toward organizational success (Carmeli & Halevi, 2009; Lubatkin, Simsek, Ling, & Veiga, 2006). Interestingly, scholars appear to either center on the overall impact of a TMT (Mihalache, Jansen, Van den Bosch, & Volberda, 2014; Steinbach, Holcomb, Holmes, Devers, & Cannella, 2017) or the unique influence of CEOs (Chadwick, Super, & Kwon, 2015; Petrenko, Aime, Ridge, & Hill, 2016). It is rare to see research that considers both CEOs and TMTs simultaneously. As discussed earlier (see the section on Baseline Model: TMT Processes), only a few studies have started unpacking the mediation role of TMT processes in linking CEO attributes to firm outcomes (Ma & Seidl, 2018; Ou et al., 2014, 2015). Ling et al. (2008: 558) pointed out that "the upper echelons theory's argument (Hambrick & Mason, 1984) may have conceptually constrained such pursuits by not precisely distinguishing between the impact of a firm's CEO and that of the firm's TMT."

We argue that to expand on the upper echelons literature, future research may explore how a CEO and his or her TMT interplay to generate strategic choices and crucial organizational outcomes. This new stream of research can be built in accordance with situational strength theory and research, which underscores the notion that one's external work environment may produce implicit or explicit cues to accelerate or alleviate the functioning of one's internal characteristics (Judge & Zapata, 2015; Meyer, Dalal, & Bonaccio, 2009; Mischel, 1977, 1999). A CEO interacts with TMT members frequently; they therefore constitute the CEO's proximate work environment (Peterson et al., 2003). The functioning of CEOs is, thus, subject to the contextual influence of TMT processes. To produce a nuanced view of the CEO–TMT interplay, researchers can borrow Meyer, Dalal, and Hermida's (2010) situational strength framework, which proposes a four-dimensional operationalization of situational strength: constraints (situational cues constraining an individual's freedom of decision and action), consequences (situational cues reducing the possibility of negative outcomes or enhancing the possibility of positive outcomes), clarity (clear situational cues regarding work-related requirements and responsibilities), and consistency (compatible situational cues regarding work-related responsibilities and requirements). For instance, in line with the logic of consistency, when TMT members have a high degree of coordination and collaboration, a strong team situation may emerge to minimize the unique influence of CEO emotion and cognition on strategic choice.

Future research on CEO–TMT interplay can also benefit from a clearer boundary of who should be counted as the TMT members in certain strategic decisions. Recent research has started questioning the whole TMT as a meaningful unit of analysis (Arendt, Priem, & Ndofor, 2005; Hambrick, 2007), as not every executive has the same amount of influence on strategic decisions. Depending on the nature of tasks (e.g., financing vs. operation) and the power dynamics at the apex (e.g., personal connection with the CEO), some non-CEO executives have much more say than others (Finkelstein, 1992; Hambrick, 2007) and their impact should accordingly be given more weight when trying to study the TMT process. Indeed, Hambrick (2007) suggests that the focus on "subteams" of TMTs, who are relevant decision-makers, can improve the predictive strength of upper echelons theory. We further argue that the theory can be more powerful if we study how CEO and the "subteams" interplay to influence the mediating process in predicting firm performance.

Contextual Contingency Factors: Novel, Disruptive, and Critical Events

The aforementioned sequential mediation process through which CEO attributes affect firm performance may vary depending on contextual factors. Drawing on a comprehensive review of prior research that takes context into account, Johns (2017: 584) points out that "if there has been a deficit in contextual theorizing, it is most apparent in a basic lack of theories that treat discrete events as context." The situations that CEOs confront can change dramatically from one day to the next. Significant external events, such as rapid changes in market conditions due to a broad financial crisis or a natural disaster that disrupts a firm's supply chain or target market, can make a CEO's job much more challenging. Internal events, such as the resignation of a key employee, an internal accounting scandal, or sexual harassment claims, also require significant attention from a CEO. By contrast, there may be extended periods of time when a CEO does not confront such significant or challenging events. During these times, a firm may operate from one day to the next relying largely on standard routines and operating procedures. Prior literature has largely assumed that the situations confronting CEOs are relatively similar over time. Even the research that accounts for managerial discretion as a moderator strengthening the relationship between CEO/TMT attributes and firm performance tends to assume that managerial discretion is relatively stable over time and does not change dramatically from time to time (Finkelstein & Hambrick, 1990; Li & Tang, 2010).

However, to account for the reality that leaders often confront sudden significant events that demand their time and attention, scholars have recently called for more event-based investigation to expand on the leadership literature (Fischer et al., in press). The most useful theoretical perspective to account for events confronting CEOs, TMTs, and firms is event system theory, which "suggests that events become salient when they are novel, disruptive, and critical (reflecting an event's strength)" (Morgeson et al., 2015: 515). The few studies that account for organizational events tend to compare organizational outcomes under the dichotomous occurrence and nonoccurrence of such events (Faccio & Parsley, 2009; McWilliams & Siegel, 1997; Sun, Mellahi, Wright, & Xu, 2015). Yet, Tilcsik and Marquis (2013) demonstrated that research models that treat events as a continuous variable have more explanatory power and generate a more complete understanding of the underlying factors and features that determine the degree to which events are influential in firm performance.

To account for the continuous nature of event strength, event system theory breaks it into three dimensions—novelty, disruption, and criticality (Morgeson et al., 2015). *Event novelty* reflects the extent to which an event distinguishes itself from current and past behaviors, features, and events, therefore emerging as a new or surprising phenomenon (Morgeson, 2005). *Event disruptiveness* reflects how it prevents entities or actors (e.g., individuals, teams, and organizations) from getting their work done and impedes their routines (Hoffman & Ocasio, 2001; Morgeson et al., 2015). *Event criticality* refers to the degree to which an event is a priority to an entity and requires the investment of valuable resources and efforts (Morgeson & DeRue, 2006). By operationalizing events on the aforementioned three dimensions, scholars have opened up new lines of inquiry with respect to leadership effectiveness. For instance, Morgeson (2005) studied the role of disruptive events in team leader functioning and found that active leader intervention activities (active coaching and sense-making) were more positively related to leader effectiveness when events become more disruptive. In addition, Morgeson and DeRue (2006) showed that the more critical disruptive events are, the more disruption such events will cause to teams.

Drawing on a comprehensive and in-depth review of articles published in various fields such as economics, management, psychology, and sociology journals, Morgeson et al. (2015) advanced event system theory to extend the organizational research and provide a much needed research paradigm shift from static attributes to dynamic events. Their theory highlights that organizational studies are dominated by feature (or attribute)-oriented studies that examine relatively stable internal aspects of organizational leaders (e.g., personality traits) leading to a limited and static understanding of organizational phenomena (Morgeson et al., 2015). Although organizational leaders are constantly exposed to relatively stable internal features, they also experience discrete events that emerge in different contexts (e.g., inside or outside of work) (Morgeson et al., 2015). Accordingly, *event-driven models* are useful to consider whether events experienced by CEOs in the workplace (e.g., facing an organizational crisis, Isabella, 1990; Weick, 1988; or experiencing a peer-director death, Chen et al., 2016) or outside of work (e.g., having a child, Dahl, Dezsö, & Ross, 2012; or going through a divorce, Larcker, McCall, & Tayan, 2013) have a *unique influence* on firm performance above and beyond CEO internal characteristics. Such studies add valuable insights to the current CEO literature which centers exclusively on CEO internal attributes.

To shed more light on the impact of events experienced by CEOs on firm outcomes, it is critical to investigate the ways events function as the *moderation mechanisms* underlying the CEO impact. As Pillemer points out, "in every life, the ongoing stream of mundane daily occurrences is punctuated by distinctive, circumscribed, highly emotional and influential episodes" (2001: 123). A major task for CEOs is to interpret and respond to discrete events (e.g., organizational financial crises and turnaround situations) (Bandiera et al., 2013; Chen & Hambrick, 2012; Hambrick & Mason, 1984); their interpretation and response may subsequently result in significant organizational changes (Isabella, 1990). Events in context may interact with CEO internal attributes to significantly affect CEO cognition and emotion (see the section on CEO Cognition and Emotion: the CEO-level Mediation Mechanisms Underlying the CEO Effects). Events may also alter the impact of CEO emotion and cognition on TMT processes (see the section on Baseline Model: TMT Processes), which subsequently determine strategic choices.

A recent integrative review of leadership theory and research has highlighted events as an additional level of analysis beyond individual, team, and organizational attributes and posits that the functioning of leader internal attributes and cognitive and emotional states may vary in the presence of discrete events in context (Dinh, Lord, Gardner, Meuser, Liden, & Hu, 2014). Importantly, event system theory also suggests that scholars should build *integrative models* to look at how CEO internal factors, along with experienced events, might jointly impact organizational outcomes. For example, when crises or critical events emerge, TMT members may be hesitant to make decisions and look to CEOs for advice and guidance (Staw, Sandelands, & Dutton, 1981). As a result, CEO attributes, such as career background and expertise, may be more influential in firm functioning in the presence of organizational crises or critical events.

When modeling CEO events, it is valuable to take into account *spatial and temporal cues associated with the events*. Researchers have pointed out that the impact of leaders can be geographically and temporally dependent (Fischer et al., in press; Hoffman & Lord, 2013). Events are distinct from personal attributes and psychological states because they are dynamic and can be operationalized based on spatial and temporal characteristics (Morgeson et al., 2015). Event system theory offers an integrative framework that accounts for the interplay between event strength (gauged by event novelty, criticality, and disruption) and spatial and temporal factors (e.g., event duration, timing, and event strength change) (Morgeson et al., 2015). Salient spatial factors include event origin (the hierarchical organizational level at which an event occurs), spatial dispersion (the number of organizational levels an event covers), and spatial proximity (the distance from an entity to the location where an event occurs). Significant temporal factors comprise event duration, timing (the extent to which an event meets the needs of entities' development stage), and event strength change (direction and amount of change in an event's strength). Although empirical research is still emerging, disruptive event duration has already been linked with interruption in team functioning (Morgeson & DeRue, 2006). When examining the interplay of CEO internal factors (e.g., attributes, cognition, and emotion) and events in context, probing the temporal and spatial cues associated with events may open new vistas and generate novel insights. For instance, CEO confidence may be more important to organizational effectiveness when long-lasting, pervasive, and disruptive events occur (e.g., a long period of industry consolidation). To summarize, incorporating event system theory and explicitly considering various events (and characteristics of events) in the model may substantially enrich our understanding of when CEOs may determine organization performance.

Macro Mechanisms: Organizational Processes

As discussed in the section on strategic choice, we contend that as the central decision-making body of a firm, a TMT may impact firm performance through their *strategic choices* (e.g., decisions about mergers and acquisitions, alliances, resources allocations to R&D, foreign market entry, innovation investments, and turnaround initiatives). However, the organizational mechanisms that translate strategic choices of CEOs and TMTs into firm performance outcomes remain largely a mystery in the baseline model we highlighted.

Some studies examine the direct influence of CEOs and TMTs on organizational outcomes without delving into the organization-level intervening mechanisms (Cannella et al., 2008; Carpenter, 2002; Jarzabkowski & Searle, 2004), whereas others consider the link between CEO or TMT attributes and the specific strategic choices they make without examining the impact of such choices on firm performance outcomes (Chatterjee & Hambrick, 2011; Tang et al., 2011; Zang & Rajagopalan, 2010). Hambrick noted that more research is needed to understand "the actual mechanisms that serve to convert group characteristics (and choices) into organization outcomes" (1995: 185). In particular, organizational processes that translate strategic choices into firm performance outcomes are a necessary conceptual link to operate across levels—from CEOs, to TMTs, to firm outcomes.

The concept of *organizational processes*, discussed within the dynamic capabilities literature (Teece & Pisano, 1994), is a useful way to account for the general mechanisms linking strategic choices with performance outcomes. Organizational processes are "the way things are done in the firm, or what might be referred to as its 'routines,' or patterns of current practice and learning" that facilitate action and strategy implementation within a firm (Teece & Pisano, 1994: 541). Organizational processes may include issues pertaining to culture, structure, procedures, ambidexterity, adaptability, accountability, and strategic change implementation within a firm (Teece & Pisano, 1994). CEOs and TMTs rely on organizational processes to facilitate the adoption and implementation of their strategic choices within an organization.

A few scholars have proposed and tested specific organizational processes that mediate between CEO or TMT attributes and firm performance outcomes. For example, Nadkarni and Herrmann (2010) and Herrmann and Nadkarni (2014) focused on firm-level *strategic flexibility* and *strategic change implementation* as mediators between CEO personality factors—measured using the five-factor model—and firm performance. O'Reilly, Caldwell, Chatman, and Doerr (2014) examined *organizational culture* defined as "a system of shared values defining what is important, and norms, defining appropriate attitudes and behaviors" (O'Reilly & Chatman, 1996: 166) as a mediator linking the personality dimensions of CEOs to firm performance outcomes. Work examining organizational-level mediators is fairly recent and has been somewhat sporadic and selective, based on the theoretical perspective of the scholars doing the research. There are rich opportunities to more systematically and holistically consider organizational-level mediators that significantly explain the CEO impact.

Another related fruitful avenue of research is to examine the unique ways different CEO attributes may directly impact organizational processes. Research has implied that compared with TMT members, the CEO may exert a more direct effect on organizational processes, which in turn are related to firm performance outcomes (Ling et al., 2008; Thomas, 1988). Therefore, our more holistic model of CEO attributes and firm performance accounts for a direct link between CEO attributes and organizational processes. It is argued that CEOs imprint their attributes (e.g., attitudes and values) on organization processes (e.g., organizational designs and moral climate), such that organizational processes become (or are) reflections of a CEO's attributes (Berson, Oreg, & Dvir, 2008; Marquis & Tilcsik, 2013; Lewin & Stephens, 1994; Schminke, Ambrose, & Neubaum, 2005). This contention aligns with upper echelons theory proposals that "executives act on the basis of their personalized interpretations of the strategic situations they face, and . . . these personalized construals are a function of the executives' experiences, values, and personalities" (Hambrick, 2007: 334). In other words, a CEO's attributes may shape his or her interpretations of how things should work and their power within an organization provides them with the influence to change organizational processes, thereby resulting in organizational processes that reflect CEO attributes. For instance, a CEO with more conservative values may stress the importance of organizational stability and safety and institute rigorous evaluation processes, with checks and balances, before making any investment decisions. This may lower the entrepreneurial culture within their organization (Ling et al., 2008).

Taken together, it is reasonable to conclude that the CEO attribute effect on firm performance transpires through a sequential mediation process that includes CEO, TMT, and organizational mechanisms. Furthermore, the organizational mechanisms may include a variety of organizational processes such as organizational culture, strategic action, and the initiation and implementation of strategic change, among other things yet to be examined.

METHODOLOGICAL OPPORTUNITIES AND IMPROVEMENTS IN EXAMINING THE IMPACT OF CEO ATTRIBUTES ON FIRM PERFORMANCE

Thus far, by bringing together insights from diverse perspectives, we have developed and shared a holistic understanding of past research accomplishments and revealed valuable new perspectives and opportunities for future research connecting CEO attributes to firm performance. In addition to the theoretical extensions discussed earlier, our review exposes the need, and the opportunity, to improve the research methodologies applied in examining the impact of CEOs on firm performance. This can be done by (1) accounting for discrete events, (2) moving beyond surveys in measuring CEO attributes, (3) using more multilevel modeling, and (4) examining longitudinal case studies. Table 1 summarizes proposed methodological advancements for future research. In the following paragraphs, we discuss each of these methodological improvements separately.

Engaging Discrete Events in Research

Engaging events is not only important as a theoretical extension but also critical for promoting the empirical rigor in this line of research. Like many other studies, research examining the effect of CEO attributes on performance outcomes suffers from possible reverse causality. For instance, we are not clear on the directional effect of the positive relationship between CEO tenure and firm performance

TABLE 1
Future Research Opportunities: Methodological Improvements

Methodological Suggestions	Opportunities for Improvement
Engaging discrete events	Events may create an exogenous change in an explanatory variable allowing researchers to test causal effects with greater levels of confidence.
	Events may allow researchers to address endogeneity concerns as many events are not expected or chosen by CEOs (e.g., natural disaster and sudden death).
Beyond surveys	Identify other feasible and novel ways to measure CEO attributes (e.g., linguistic approaches, sentiment analysis, social media profiling, and facial expression analysis).
	Use behavioral genetics measures to explore the joint effects of CEO genetic and organizational contextual features on firm performance.
Multilevel modeling	Model between-firm/CEO effects (i.e., model the impact of contextual factors at levels of analysis higher than CEOs and firms).
	Assess random slopes of within-level coefficients across firms (and predictors of such slopes).
Longitudinal case studies	Analyze longitudinal case studies to investigate complex, critical, and dynamic linkages between CEO attributes and firm performance.
	Collect both quantitative and qualitative data and include cases from diverse cultures as a means to bolster the validity and generalizability of longitudinal case studies.

discussed earlier. We can argue that CEOs with a longer tenure accumulate greater firm-specific human capital and better understand the nuances of the company and thus have a positive influence on firm performance. On the other hand, it is also possible that firms with better performance are more likely to retain their CEOs, thus resulting in longer CEO tenure. Similarly, firm performance may influence the composition of directors, TMTs, or CEO selection. Scholars can potentially leverage discrete events, such as change in laws, change in enforcement of regulations, or even death events, to capture the exogenous change in an explanatory variable, such as female proportion in TMTs because of death of male executives, and how it predicts organizational outcomes. Scholars who use events in empirical research designs, and who use difference-in-differences analysis, should be able to establish greater confidence in the claimed causal effect.

Similarly, one of the challenges in studying the impact of CEO background, such as career experience, is the degree to which such experiences are themselves influenced by CEO personality. For instance, Crossland et al. (2014) recently showed that CEOs with greater experience variety in their early careers tended to be associated with greater subsequent firm-level strategic novelty. However, it is difficult to tease out whether this occurs because (1) a broad variety of career experiences provides a wide career variety, provides cognitive breadth, and helps to generate a menu of different strategic choices or (2) individuals with open-mindedness and dispositional tendencies toward experimentation and change will both opt for a wide variety of career experiences and will have an ingrained preference for novel strategic actions. Thus, studying the experience of discrete events, such as natural disasters and sudden death events, that are neither endogenously chosen by CEOs nor often expected, might help to address endogeneity concerns.

Beyond Surveys

Many prior studies rely on surveys in which CEOs, or their social and workplace contacts, report on CEO attributes such as leadership styles and personality traits (Ling et al., 2008; Nadkarni & Herrmann, 2010). This measurement approach may suffer a number of biases (e.g., halo effects and social desirability bias; Landy & Farr, 1980; Nederhof, 1985). Furthermore, given their busy work schedules, CEOs are reluctant to respond to surveys (Chatterjee & Hambrick, 2007). We suggest that researchers identify other feasible and novel ways to measure CEO attributes (e.g., linguistic approaches, sentiment analysis, social media profiling, and facial expression analysis). Psychologists, for instance, use several unobtrusive measures of personality, such as word usage, to gauge individual differences (Pennebaker, Mehl, & Niederhoffer, 2003). Offices and bedrooms are operationalized as physical manifestations of personalities (Gosling, Ko, Mannarelli, & Morris, 2002). Using content analysis, Chen et al. (2015) used news articles and magazine reports to measure CEO overconfidence. Researchers have also studied personal websites as indicators of identity claims (Vazire & Gosling, 2004) and have viewed consumption symbols (e.g., cars and clothing) as carriers of personality constructs (Aaker, Benet-Martinez, & Garolera, 2001). Chatterjee and Hambrick (2007) examined the prominence of the CEO's photograph in the company's annual report and verbiage in press releases to assess CEO narcissism, whereas Chin et al. (2013) have evaluated public records of philanthropic activities to assess CEO values. It could also be valuable to examine CEO biographies and use Q-sort methods to analyze CEO personality (Peterson et al., 2003).

With an abundance of data available from personal social media accounts (e.g., Twitter and Facebook), CEO comments on certain events, and information on company websites, researchers have new avenues to capture CEOs' attributes, interactions with TMT members, responses to events, and organizational activities. For example, the Apply Magic Sauce application (https://applymagicsauce.com) was developed to assess one's personality and sexuality by collecting data from one's Facebook activities (Kosinki, Matz, Gosling, Popov, & Stillwell, 2015). Researchers have also used CULTR (a suite of web-based applications, http://www.cultrtoolkit.com/) to traverse more than 650,000 webpages and gather data on company category promotion (Gehman & Grimes, 2018).

In a recent review of the articles on the genetics of complex human behaviors, Arvey, Li, and Wang (2016: p. 171) noted that "enormous amounts of DNA information are becoming increasingly available to researchers" and "behavioral genetics, and molecular genetics in particular, provide a useful way to unpack intriguing interplays between the human body and the work environment." Research on the role of genetic features in leadership has emerged (Chaturvedi, Zyphur, Arvey, Avolio, & Larsson, 2012; De Neve, Mikhaylov, Dawes, Christakis, & Fowler, 2013). Researchers can thus leverage behavioral genetics to explore the joint effects of CEO genetic and contextual features on firm performance (Heaphy & Dutton, 2008; Senior, Lee, & Butler, 2011; Song, Li, & Arvey, 2011; Turkheimer, 2000). A lingering methodological weakness in prior studies using psychological measures is that the interaction between CEO attributes and contextual factors may be confounded by correlations between CEO attributes and contextual factors. Behavioral genetics research provides a unique methodological advancement using genetic variables, to effectively isolate persona related from environment-related effects. As some individual differences stem from genes, behavioral genetics research also excels in investigating aggregate influence of multiple individual attributes (Arvey et al., 2016; Bouchard, 2004).

Multilevel Modeling

Previous studies using panel data tend to focus on within-firm/CEO effects (i.e., estimating how CEO attributes affect firm performance across time). Consequently, little attention has been paid to between-firm/CEO effects (i.e., modeling the impact of contextual factors at levels of analysis higher than CEOs and firms). The relationships between CEO attributes and firm performance may indeed be altered by higher level contextual factors (e.g., industry dynamics, regional institutions, and firm culture dimensions). Therefore, to better capture contextual influence, researchers should engage in multilevel theorizing and testing to examine the cross-level moderation effects of contextual variables on the relationships between CEO attributes and firm outcomes across time (Dalton & Dalton, 2011; Georgakakis & Ruigrok, 2017; Heck & Thomas, 2015; Mazutis, 2013). Methodologically, more effort can be devoted to assessing random slopes of within-level coefficients across firms (and predictors of such slopes) (Woltman, Feldstain, MacKay, & Rocchi, 2012). Considering both within- and between-firm CEO effects allows researchers to integrate multiple theoretical lenses and develop a more complete picture of the functioning of CEO attributes across time and levels of analysis. For example, Simsek, Veiga, Lubatkin, and Dino (2005) theorized on the extent to which CEO-, team-, and firm-level determinants shape behavioral integration in TMTs. They found that although determinants at each level explained some variance in behavioral integration, considering all three levels in concert explained the most variance.

Longitudinal Case Studies

Longitudinal case studies are intensive investigations of research units such as individuals, groups, events, or organizations based on qualitative and quantitative data collected through archives, interviews, questionnaires, and observations over time (Eisenhardt, 1989; Yin, 2014). Despite the increased scholarly attention to case studies (Bluhm, Harman, Lee, & Mitchell, 2011; Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Yin, 2014), only a few on CEO and firm functioning have been published. One such study was conducted by Eisenhardt and Bourgeois (1988)—using a multiple case design, they studied eight firms in the microcomputer industry and advanced a midrange theory linking power, politics, and performance to address an intriguing research question related to the ways politics affect top executives' strategic decision processes. Another longitudinal case study outlined the long-term multilevel consequences of psychopathic leadership. This was done via multiple rounds of interviews with followers of a UK CEO who had a high corporate psychopathy score (Boddy, 2017). Longitudinal case studies (e.g., those on strategy process and practice) can generate unique theoretical and practical insights that quantitative research methods are unlikely to produce (Kouamé & Langley, 2018; Yin, 2014). In this vein, scholars can adopt longitudinal case studies to investigate a number of complex and critical questions on the dynamic link between CEO attributes and firm performance. Examples of such questions are as follows: How do CEOs interpret the role of their internal attributes in their decision-making? How do CEO attributes shape organizational culture over time? When do CEO attributes prompt CEOs to interact differently with executives and managers? What are the underlying cognitive, affective, and behavioral processes that simultaneously translate CEO attributes to firm performance? Which multilevel organizational mechanisms may factor in the enactment of CEO attributes?

It should be noted that to bolster the validity and generalizability of longitudinal case studies, researchers should strive to collect both quantitative and qualitative data and include cases from diverse cultures. Eisenhardt and Bourgeois (1988) used both qualitative personality accounts and quantitative survey data, to show evidence of construct validity. Cross-cultural case studies are well suited for identifying research boundaries, unveiling the prevalence of links between CEO attributes and firm performance, and generalizing those relationships to different cultures (Burgess, 2000; Ghauri, 2004).

CONCLUSION

In sum, if the link between CEO and firm performance was not important, then the field of management would likely not exist today as it does. As guided by the scholarship showing the influence of CEOs on firm performance, firms place a significant emphasis on securing the appropriate CEO and on incentivizing that person with generous financial rewards. Yet, the CEO–firm performance link is dynamic, complex, and at times tenuous because it requires CEO influence to be transferred (and understood) across multiple levels of analysis over time. Also, the link is often altered by contextual factors such as discrete events (Morgeson et al., 2015). Furthermore, it is difficult to investigate because of the challenges related to collecting data: measuring relevant constructs; understanding, moderating, and mediating mechanisms; and controlling for alternative explanations. Recognizing all of these challenges, we developed a holistic view to understand the relationship between CEO attributes and firm performance. Our goal was not to build a fully comprehensive model to incorporate all the potential factors that may account for such a relationship. For instance, we deliberately exclude the prior literature on managerial discretion (Hambrick & Finkelstein, 1987) and compensation design (Finkelstein et al., 2009) so as to focus only on issues that further advance our understanding of this relationship significantly. In addition, we do not discuss reverse effects, where, for instance, better firm performance may increase a CEO's confidence or impact the CEO–TMT interface. By integrating the most relevant literature from diverse theoretical backgrounds (e.g., event system theory; Morgeson et al., 2015) to propose a multilevel sequential mediation model, we deepen insight into the long-studied relationship between CEO attributes and firm performance and point to novel theoretical and methodological perspectives for future inquiry.

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