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Do leadership role occupancy and transformational leadership share the same genetic and environmental influences?

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ABSTRACT

Using data collected from 107 pairs of identical and 89 pairs of fraternal female twins, this study examined the genetic and environmental associations between transformational leadership and leadership role occupancy. Results show that 78% of the covariance between the two leadership variables was attributable to overlapping genetic factors, while 22% of the covariance to overlapping environmental factors. In particular, 13% (2%) of the variance in leadership role occupancy was accounted for by the same genetic (environmental) factors related to transformational leadership. Unique sets of genetic and environmental variables, which are not associated with transformational leadership, explained 16% and 69% of the variance in leadership role occupancy, respectively. The results suggest that multiple manifestations of leadership (i.e., transformational leadership and leadership role occupancy) are differentially heritable. Although the association between these two variables is largely due to overlapping genetic rather than environmental factors, unique (i.e., non-overlapping) genetic and environmental influences still play an important role in impacting these leadership variables.

1. Introduction

There is growing evidence that two distinct types of leadership conceptualizations – transformational leadership and leadership role occupancy – are influenced by genetic and environmental factors (Arvey, Rotundo, Johnson, Zhang, & McGue, 2006; Arvey, Zhang, Avolio, & Krueger, 2007; Johnson et al., 1998; Johnson, Vernon, Harris, & Jang, 2004). Transformational leadership denotes leadership behaviors which transform subordinates beyond their self interests to pursue the good of a group or organization (Bass & Bass, 2008). Leadership role occupancy refers to whether people occupy positions of leadership in organizations (Arvey et al., 2006). A question that remains unanswered, however, is whether the same genetic and/or environmental factors affecting transformational leadership also affect leadership role occupancy? That is, is there a common set of genetic and/or environmental factors that influence the two types of leadership? The existence of an overlapping set of genetic factors on the two leadership variables is often referred to as whether there is a "genetic correlation" between them. Genetic correlation is defined as the degree of overlap between observed variables accounted for by overlapping or identical genetic factors that are independent of the overall genetic influence on the two variables (Kovas & Plomin, 2007, p. 284). Although for some variables genetic factors may have only moderate levels of effects, the genetic correlation between two variables can range from 0.0 to 1.0 (Plomin & Spinath, 2002, p. 169). The same is true for "environmental correlation", which refers to the overlap between two observed variables attributable to overlapping environmental factors (Kovas & Plomin, 2007).

An investigation of the overlapping genetic and environmental factors associated with transformational leadership and leadership role occupancy is of both theoretical and practical significance. First, estimating the magnitude of genetic and

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environmental correlations can help to explain in greater details why transformational leadership behaviors are positively related to one's obtainment of leadership roles in organizations. One reason for a positive relationship between these two leadership constructs is that people exhibiting transformational leadership behaviors are likely to have high level of job performance (Judge & Piccolo, 2004). Moreover, people with high level of job performance are likely to be perceived as being competent. As such, they tend to be promoted by their superiors and organizations into leadership roles[1] (Hogan, Curphy, & Hogan, 1994). There are two potential underlying mechanisms for such an association. The observed relationship may be mainly due to the person (i.e., the same genes make a person display transformational leadership behaviors and also help them to occupy leadership positions). Or, it could be largely because of environmental/developmental events that simultaneously impact leadership behaviors and the attainment of formal leadership positions (e.g., clan culture emphasizing cooperation, cohesion, and employee development may give rise to both transformational leadership behaviors and leader development, Cameron & Quinn, 1999). By simultaneously examining these two potential mechanisms and comparing their magnitudes of effect, this study has the potential to offer unique insights into leadership research and provide effective guidelines for leadership development practices.

Second, exploring the overlapping and unique genetic influence is helpful in understanding the relative locus of influence for a particular variable. If one is looking at one leadership construct, it would be helpful to know if the same genetic structures (i.e., DNAs) affect other leadership variables, or whether the leadership construct is under predominantly unique genetic influences. Modern molecular genetics are beginning to explore specific gene linkages to individual characteristics and behavior such as personality (Ebstein et al., 1996), voting behavior (Fowler & Dawes, 2008), financial decision making (Dreber et al., 2009), and more recently job satisfaction (Song et al., in press). It is also theorized that potential brain functions may mediate these associations (Senior, Lee, & Butler, 2010). Arvey and Bouchard (1994) suggested utilizing this approach to study relationships between specific genes and work-related constructs such as job satisfaction as well as leadership. Indeed, Senior et al. (2009) have reported significant correlations between self-report transformational leadership behaviors and two specific genes. Based on prior research on genetic correlation between diverse types of cognitive abilities (Pedersen, Plomin, & McClearn, 1994; Petrill, 1997), we expect that if the genetic correlation between transformational leadership and leadership role occupancy is high, then the same genetic structure may influence both types of leadership behaviors. Particularly, if one specific gene or set of genes is identified to be associated with transformational leadership behaviors, it can be expected that the same gene or gene set can also be related to leadership role occupancy (Plomin & Spinath, 2002). The results of prior research on cognitive abilities have been summarized in the "generalist genes" hypotheses, positing that the same genes or gene sets modulate most cognitive abilities and disabilities (Kovas & Plomin, 2006, 2007). Consequently, if a high genetic correlation can be found between transformational leadership and leadership role occupancy, then similar "generalist genes" hypotheses can also be formulated in the leadership domain.

In addition, investigating the influence of overlapping environmental factors on the two leadership constructs has critical practical implications. Previous studies (e.g., Arvey et al., 2007) show that both family and work experiences significantly contributed to leadership role occupancy. Identifying overlapping and unique environmental factors which can affect transformational leadership and leadership role occupancy can not only shed light on whether critical experiences exist that are important for both of the two leadership constructs, but also has implications on whether the same type of leadership training methods can help one individual behave as a transformational leader and occupy formal roles in the organizational hierarchy. If there are much overlapping environmental influences on the two types of leadership, then we could implement the same training interventions to develop people to become a transformational leader and become a leader. If the overlapping environmental influences do not exist, then different training programs should be utilized.

In summary, the objective of the present study is twofold. First, we investigate the "genetic correlation" between transformational leadership and leadership role occupancy, attempting to quantify the extent of overlap between the genetic factors influencing the two leadership variables. Second, we estimate the extent of overlap between the environmental factors associated with the two leadership constructs. In doing so, this study contributes leadership research by providing a deeper understanding why multiple manifestations of leadership are related.

2. Theoretical development

2.1. Genetic and environmental influences on transformational leadership and leadership role occupancy

Previous research has documented that transformational leadership and leadership role occupancy are influenced by both genetic and environmental factors. Johnson et al. (1998, 2004) demonstrated that transformational leadership has a genetic basis and also is influenced by environmental factors. In particular, in their study of twins using the Multifactor Leadership Questionnaire (MLQ; Bass & Avolio, 1991) to measure transformational leadership, it was estimated that 57% of the variance in transformational leadership was associated with genetic factors, while 43% of the variance was associated with unique environmental variables (Johnson et al., 2004). Moreover, Arvey et al. (2006, 2007) presented two twin studies showing that genetic factors accounted for approximately 30% of the variance in leadership role occupancy, while environmental factors (e.g., work and family experiences) explained a substantial portion of the remaining variance.

[1] We thank our anonymous reviewer for pointing this out.