



When women emerge as leaders: Effects of extraversion and gender composition in groups[☆]

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ABSTRACT

Focusing on the gender of emergent leaders in initially leaderless groups, we explore contextual factors that may influence when women are likely to emerge as leaders. We take a multi-level perspective to understand and unpack the complex interplay between individual gender, group gender composition, and group personality composition. Drawing from perspectives such as social role theory and the social identity model of leadership, we theorize as to when women are most likely to emerge as leaders, even in groups composed predominantly of men. Results from two studies indicated that individual level gender does not interact with group gender composition to predict leadership emergence, suggesting that groups with more men do not disproportionately choose men as leaders, and groups with more women similarly do not tend to have women emerge as leaders. However, a three-way interaction consistently appeared in our studies when group-level extraversion was added to individual and group gender, in a pattern suggesting that group extraversion alters leader emergence patterns in groups with more men. Our findings demonstrate that women become more likely to emerge as leaders when their groups are both high in extraversion, and composed of more men than women. Implications for practice and future research directions are discussed.

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Introduction

The changing demographics of today's workforce, coupled with recent media attention on the role of women in leadership (e.g. the "Lean In" movement; Sandberg, 2013), have sparked renewed interest among academics and practitioners alike in understanding the complex relationship between gender and leadership emergence. As women have emerged more prevalently in modern organizational leadership, and as our understanding of leadership itself has changed from a formal title to a more fluid role (DeRue & Ashford, 2010; Uhl-Bien, Riggio, Lowe, & Carsten, 2014), it is an appropriate time to re-examine how and when women emerge as leaders. This need is also demonstrated by the current trend in organizations of replacing traditional hierarchies in favor of autonomous work groups as a means of driving empowerment, productivity, and morale (Armstrong & Priola, 2001; S. G. Cohen, Ledford Jr., & Spreitzer, 1996; Lawler, Mohrman, & Ledford, 1992). Such initially leaderless work groups tend to choose their leaders informally (DeRue & Ashford, 2010; Taggar, Hackett, & Saha, 1999), not limiting themselves to a single, titled group leader (D'Innocenzo, Mathieu, & Kuenenberger, 2014). Theories on adaptive (DeRue, 2011), shared (Pearce &

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Conger, 2003), and complexity (Uhl-Bien & Marion, 2008) leadership suggest that leadership in this modern context is claimed by some individuals and granted by others, dependent upon individual differences and contextual factors (DeRue & Ashford, 2010; Taggar et al., 1999). Altogether, these developments suggest a need to expand our understanding of informal leadership and re-examine the role of gender in these prevalent contexts allowing multiple informal leaders.

Gender has been identified as one of the most salient and important factors determining leadership emergence (Chaturvedi, Zyphur, Arvey, Avolio, & Larsson, 2012; Eagly & Karau, 1991), in line with a variety of perspectives including leader categorization theory (Lord, Foti, & De Vader, 1984) and social role theory (Eagly, 1987). Both perspectives suggest that men are more likely than women to emerge as leaders, all else equal, due to stereotypes regarding men, women, and leadership, with empirical studies generally supporting this view (Eagly & Karau, 1991). However, meta-analytic evidence indicates that leader stereotypes have become increasingly androgynous over time (Powell, Butterfield, & Parent, 2002), incorporating more feminine characteristics in addition to traditional masculine characteristics (Koenig, Eagly, Mitchell, & Ristikari, 2011). Concurrently, although women are still unequally represented at the top levels of organizations (ILO, 2015) and concerns remain over the quality of positions into which women are promoted (Ryan & Haslam, 2007), there have been notable increases in the number of women in organizational management roles (US Bureau of Labor Statistics, 2013). These increases might suggest changes in how women are viewed in regard to leadership, and reduce perceptions of women as incongruous with leadership, consistent with the demonstrated weakening of the “think manager, think male” stereotype (Koenig et al., 2011; Schein, 1973). Altogether, these findings and the growing proportion of women in leadership roles indicate a need to re-examine how gender and contextual characteristics may play a role in predicting leadership emergence within initially leaderless groups. We take a multi-level approach to investigate this question given that higher-level contextual factors may impact which group members tend to emerge as leaders (DeRue, 2011; Stoker, Van der Velde, & Lammers, 2012).

The question of how groups, rather than individuals, choose leaders remains fertile and mostly unexplored empirical territory. Although three excellent reviews and meta-analyses have been published on the topic of shared leadership – that is, informal leadership enacted by multiple group members – and its relationship with group effectiveness (D’Innocenzo et al., 2014; Nicolaidis et al., 2014; Wang, Waldman, & Zhang, 2014), none of them has addressed how and why leaders emerge. This lack of attention to antecedents of group leadership represents a gap in our understanding of leadership in the modern context, where initially leaderless groups have increasingly become a common vehicle for task accomplishment in organizations (Morgeson, DeRue, & Karam, 2009). In this paper, we help to fill this gap by theorizing and testing how individual member characteristics, in conjunction with group-level characteristics, influence leadership emergence.

One such group-level characteristic is the personality composition of the group. The extant literature on personality and leadership emergence has largely examined the personality of the leaders themselves (Uhl-Bien et al., 2014); however, much less work has examined how composition of group members’ personalities may serve as a contextual factor affecting what types of members emerge as leaders. Our theorizing of group personality composition involves the group’s overall level, or elevation – defined as “a team’s mean level on a particular personality trait or set of personality traits” (Neuman, Wagner, & Christiansen, 1999, p. 30) – given the importance of these mean levels to group norms and process development (Barry & Stewart, 1997; LePine, Buckman, Crawford, & Methot, 2011; Prewett, Walvoord, Stilson, Rossi, & Brannick, 2009). We examine extraversion specifically in conjunction with gender, as extraversion has a highly consistent relationship with leadership (Judge, Bono, Ilies, & Gerhardt, 2002) and has a powerful role in enabling group communication and cohesion (Barrick, Stewart, Neubert, & Mount, 1998). Might certain constellations of gender and extraversion within a group provide contextual factors which promote female leadership emergence, just as such group-level characteristics can affect performance and other processes (Barry & Stewart, 1997; Bell, 2007)? An examination of contextual factors at the group-level is likely to enable scholars to better understand the dynamics through which certain individuals emerge as leaders.

With this in mind, we conducted two studies testing the joint and cross-level effects of gender and extraversion on leader emergence. We expand the work on leadership emergence by examining how the contextual characteristics of a group, in concert with individual characteristics of the group’s members, may influence who emerges as a leader in initially leaderless groups, contributing to literature on shared leadership. In so doing, we expand our understanding of the role of gender in leadership emergence by theorizing and modeling how group gender composition (or the proportion of men and women in the group) and individual gender may interact. This multi-level approach, focusing specifically on the effects of individual gender, group gender, and group-level extraversion, builds on the predictions of social role theory and the social identity model of leadership (D. van Knippenberg & Hogg, 2003) to identify contexts in which women, rather than men, are most likely to emerge as leaders.

A contextual consideration of leadership emergence

Leadership emergence in groups

Leadership emergence is considered the extent to which a person is regarded as being leader-like by other group members; that is, guiding social interactions, providing direction, and helping the group and its members to develop and perform at high levels (Hogan, Curphy, & Hogan, 1994; Taggar et al., 1999). At the individual level, research on leadership emergence has often been based on leader categorization theory (Lord et al., 1984), which posits that the individuals most likely to emerge as leaders are those who match followers’ implicit ideas (or implicit leadership theories: ILTs) of how leaders should look and act. As suggested by this approach, many studies that have examined leadership emergence have focused on the individual differences of those who are ascribed leadership by group members, such as general mental ability (Judge, Colbert, & Ilies, 2004), personality

(Judge et al., 2002; Kenny & Zaccaro, 1983), and gender characteristics such as biological sex and masculinity/femininity (Eagly & Karau, 2002; Johnson, Murphy, Zewdie, & Reichard, 2008).

Similarly, as work has become increasingly group-based and as different levels of analysis have become more of a focus within organizational research (Kozlowski & Klein, 2000; Salas, Sims, & Burke, 2005), scholars have expanded on these individual-level approaches to suggest cross-level perspectives on understanding leadership and leader emergence. For example, per new work on adaptive leadership theory (DeRue, 2011; DeRue & Ashford, 2010) and followership theory (Uhl-Bien et al., 2014), an individual emerges as a leader in an informal context primarily when he or she is “granted” a leader role by other members of the group. Another example is shared leadership theory (Pearce & Sims, 2001), an extension of emergent leadership to the group-level, suggesting that multiple members can emerge as group leaders, alternating or in tandem (Carson, Tesluk, & Marrone, 2007), thus challenging the assumption in most individual-level emergent leadership research that a single leader will be selected. Research on shared leadership, however, has to date focused much more on the outcomes of shared leadership than its antecedents (for exceptions, see Bligh, Pearce, & Kohles, 2006; Small & Rentsch, 2010). Another group-level perspective on leadership, the social network approach (Balkundi & Kilduff, 2006), conceptualizes leadership as a robust collection of relationship ties both within and outside of organizations. Again, research in this domain has generally been more concerned with network impacts on group effectiveness, rather than emergence (Balkundi & Harrison, 2006; Balkundi, Kilduff, Barsness, & Michael, 2007; Mehra, Smith, Dixon, & Robertson, 2006).

Group- and cross-level antecedents of emergent leadership are more central in approaches such as the social identity model of leadership (SIMOL), which predicts the emergence of informal group leaders based on their match to the group's own implicit prototypes (D. van Knippenberg & Hogg, 2003). These approaches often use characteristics of group composition (Barry & Stewart, 1997) to explain emergence phenomena, thereby suggesting the appropriateness of considering gender composition within a multi-level theoretical framework predicting leadership emergence in groups.

Gender and leadership emergence

There is evidence that individual gender and group gender composition may have meaningful effects on who groups identify as leaders. Early work on the interactions of leadership and gender suggests that leadership roles tend to be occupied by men according to the tenets of social role theory (Eagly, 1987), with support from leader categorization theory (Lord et al., 1984). According to social role theory, social stereotypes about the traditionally gendered roles of men and women in society give rise to expectations regarding the roles that men and women occupy and the attributes they possess for performing such roles. When women and men are observed holding different roles in society, inferences are drawn about the types of characteristics they possess in correspondence to these observations (Wood & Eagly, 2012). As women are often more likely to hold communal roles in society, such as domestic roles at home and other caregiving roles in employment, women in general are inferred to possess more communal traits, such as kindness, warmth, and an orientation toward others (Eagly & Wood, 2012). Conversely, observations of men in high-status roles lead to the belief that men are more agentic, with associated traits such as assertiveness and dominance (Eagly & Johannesen-Schmidt, 2001; Wood & Eagly, 2012). Consequently, research has demonstrated that the characteristics generally perceived as consistent with the male stereotype (e.g. assertive, dominant, etc.) are closely aligned to that of the stereotypical leader (Eagly & Karau, 2002), giving rise to the mantra “think manager, think male” (Schein, 1973, 1975).

Consideration of these stereotypes is particularly crucial in examining leadership emergence, in which cognitive schemas, implicit theories, and leadership prototypes within groups guide processes by which a particular group member (or members) is informally ascribed leadership (Lord, de Vader, & Alliger, 1986; Neubert & Taggar, 2004). Beyond these stereotypes, though, it is also important to consider the context of the group and its characteristics in considering leader emergence (DeRue, 2011); research has shown, for instance, that gender distributions could weaken employees' preferences for male leaders (Stoker et al., 2012). Hence, rather than holding to a constant and universal overall implicit idea of leadership, a group member's idea of the ideal and desired leader may change based on that group's gender composition.

With an emphasis on these cognitive mechanisms, the social identity model of leadership has been frequently applied as a theoretical base to explicate the process by which individuals are granted the leadership role within groups and deemed effective by the group (Hogg, 2001; D. van Knippenberg & Hogg, 2003). According to this model and the related self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987), group membership can influence what members perceive as the attributes of the in-group, culminating in the development of a group “prototype” that characterizes the group relative to non-members (Hogg, 2001). This self-categorization occurs as the individual depersonalizes their individual concept of self, relative to the larger group identity embodied by the prototype (Hogg & Terry, 2000). The prototype, then, consists of the larger set of attributes, norms, and behaviors that are representative of the group as a whole (Hogg, 2001).

This prototype is particularly important in regard to leadership within the group, as individuals who best embody the group prototype are considered to be particularly leader-like and influential (Hogg & van Knippenberg, 2003). These prototypical individuals are both more likely to emerge as leaders within groups, and more likely to be deemed as effective leaders by group members, because of their embodiment of these prototypical characteristics (Hogg & van Knippenberg, 2003). This view of leadership as a dynamic process in which individuals influence each other and construct identities as leaders and followers is particularly relevant to the idea of emergent leadership, in which leadership is informally ascribed in a group setting by claiming and granting of leadership roles (DeRue & Ashford, 2010).

In the context of this study, we apply these concepts of self-categorization and prototypicality to predict how gender might act as a salient factor, across levels, by which prototypical individuals are identified and ascribed leadership. After reviewing the

relevant literatures, [Randel \(2002\)](#) concluded that uneven gender compositions within groups (regardless of whether they were skewed toward men or women) would increase the salience of gender within those groups. This heightened salience due to gender composition, we argue, may subsequently impact the group prototype to become more masculine or feminine. This logic suggests that a group with proportionally more women might have a somewhat different idea of what their eventual leader should look like than a group with more male members.

Gender is one of the most frequent characteristics used by individuals to categorize others ([Stangor, Lynch, Duan, & Glass, 1992](#); [Taylor, Fiske, Etcoff, & Ruderman, 1978](#)), and such categorization may have a strong effect on social identities ([Chattopadhyay, Tluchowska, & George, 2004](#)). Although leader prototypes are often based on behaviors and group norms, gender and gender stereotypes can also be important components of these prototypes ([Hogg et al., 2006](#)), which can include several characteristics aligned with traditional gender roles such as sensitivity, tyranny, and masculinity ([Offermann, Kennedy, & Wirtz, 1994](#)). Combining the salience of gender in groups with the importance of gender and gender-related characteristics to leader prototypes, it is logical to argue that the prototypes of groups which are predominantly composed of men are more masculine, and of groups which are predominantly composed of women, more feminine. As such, an individual's gender is likely to act as a salient indicator of prototypicality. Thus, we suggest that gender similarity within a group may contribute to the development of a gendered prototype by which leadership emergence is determined, such that:

Hypothesis 1. *Individual gender and group gender composition will interact to predict leader emergence, such that women (men) will emerge as leaders in groups that have higher proportions of women (men), disproportionately more than would be suggested by their numerical representation in the group.*

Group personality composition

In addition to group gender composition, other compositional factors in the group that drive its processes and norms may help us identify the boundary conditions under which the prediction outlined above operates. Group composition encompasses a broad set of group inputs that may have a powerful influence on group functioning and processes such as communication, conflict, and cohesion among others ([Halfhill, Sundstrom, Lahner, Calderone, & Nielsen, 2005](#); [Kozlowski & Bell, 2003](#); [Levine & Moreland, 1990](#); [Neuman et al., 1999](#)). One such compositional factor thought to be especially important for work groups pertains to the personality of group members ([Barrick et al., 1998](#); [Driskell, Hogan, & Salas, 1987](#); [LePine et al., 2011](#)). The characteristic thoughts, feelings, and behaviors reflected in personality influence the manner in which members react and relate to each other in the course of functioning as a group ([LePine & Van Dyne, 2001](#); [LePine et al., 2011](#)). The group's personality composition influences its processes, norms, and climate ([Barrick et al., 1998](#); [Barry & Stewart, 1997](#); [LePine, 2003](#)), which may in turn alter the cognitive schemas and prototypes which groups use to informally select their leaders ([DeRue, 2011](#); [D. van Knippenberg & Hogg, 2003](#)). Studying group gender composition in conjunction with group personality composition is likely to aid in painting a broader picture of the contextual factors enabling men or women to emerge as leaders.

From the individual perspective, research on personality has generally focused on the personality of the leader as predictive of emergence. Although all of the “Big Five” personality characteristics (extraversion, openness to experience, conscientiousness, agreeableness, and emotional stability) have been linked to leadership emergence ([Judge et al., 2002](#)), we focus on the role of extraversion given its importance in influencing group processes. Extraversion represents sociability, gregariousness, and talkativeness ([Barrick & Mount, 1991](#)), is characterized by vigor and positive affectivity ([Costa & McCrae, 1980](#)), and is likely to spur and guide social interaction among members of groups ([Kristof-Brown, Barrick, & Stevens, 2005](#)). Research on group personality composition has indicated that group-level extraversion may be especially relevant to understanding group behaviors ([Bell, 2007](#); [LePine et al., 2011](#)), and we argue that it may in turn influence the group environment to become more or less conducive to the emergence of certain types of leaders.

We conceptualize extraversion at the group level, consistent with the most common approach to studying group personality composition, as the overall group mean level of the characteristic, also referred to as its elevation ([Barrick et al., 1998](#); [Neuman et al., 1999](#)). In this approach, the group's mean level of a characteristic is considered as its collective “pool,” and each group member's individual score on the characteristic contributes to the pool, with higher levels often yielding stronger effects on group processes and outcomes ([Barrick et al., 1998](#); [Halfhill et al., 2005](#)). For example, characterizing a group as having high levels of extraversion would mean that for the group as a unit, members would be highly sociable and talkative. High group-level extraversion does not imply that all group members necessarily score high on this trait, but rather that the group as a whole is elevated by at least some members with high scores ([Tasa, Taggar, & Seijts, 2007](#)), and that elevated level (or group mean) may proportionately affect group processes ([Barrick et al., 1998](#)).

Groups with high levels of extraversion are likely to develop norms of free expression and communication ([Barry & Stewart, 1997](#)), with correspondingly greater communication, voice, and empowerment among the group's members ([Lin & Rababah, 2014](#)). Through greater communication and information sharing in the group ([Barrick et al., 1998](#); [Barry & Stewart, 1997](#)), such groups are likely to increase the pool of knowledge about group members from which the leadership prototype might be based ([Flynn, Chatman, & Spataro, 2001](#); [Gaertner et al., 2000](#)). High levels of extraversion have also been demonstrated to contribute positively to social cohesion ([van Vianen & De Dreu, 2001](#)), which reflects “synergistic interactions between team members, including positive communication, conflict resolution, and effective workload sharing.” ([Barrick et al., 1998](#), p. 382) and members of such groups offer assistance to one another more often ([Porter et al., 2003](#)). Groups with higher mean levels of

extraversion are, thus, likely to learn more about each other through open communication and helping behaviors, introducing new and salient elements to the group's prototype (D. van Knippenberg & Hogg, 2003) and reducing the relative importance of group gender composition. Hence, as a group's level of extraversion increases, and groups become more communicative and cohesive, it is likely that the salience of group gender demography in forming group prototypes and ascribing leadership will decline.

We therefore predict that higher levels of extraversion in the group should result in a weakening of our predictions made in the first hypothesis as other characteristics of the group become more salient.

Hypothesis 2a. *Group-level extraversion will further moderate the interaction between individual-level gender and group-level gender composition on leader emergence, such that higher levels of group extraversion will weaken the positive influence of an individual's match to the group gender composition on leader emergence.*

This hypothesis does not imply a reduction in the importance of the group's prototype for leadership attributions; rather, theory suggests the opposite effect. As group communication, cohesion, and helping behaviors increase within a group high in extraversion (Barrick et al., 1998; Kristof-Brown et al., 2005; Porter et al., 2003), the group becomes more cooperative and communal, as these are key features of communal groups (Blatt, 2009; Jowett & Chaundy, 2004). In more communal and cohesive groups, members may more strongly identify with the group (Blatt, 2009; Fielding & Hogg, 1997), and this identification increases the effects of prototypes on leader emergence (D. van Knippenberg & Hogg, 2003). Our argument for the previous hypothesis suggests that as a highly extraverted group engages in more communication and communal behaviors, the salience of group gender composition for the leader prototype diminishes; however, it also suggests that these behaviors may themselves become norms of the group and thus components of the leader prototype. Research has indicated that the presence of such communion in work environments is often highly salient to individuals, as other-oriented activities are not always considered to be the 'norm' in such contexts (e.g. Berkowitz, 1970; Grant, Dutton, & Rosso, 2008). We therefore propose that this emerging communal and cooperative nature of the group is likely to become a highly salient component of the group's basis for leader prototype.

Role congruity theory suggests that these communal and helping group norms may create an advantage for women in ascending to leadership roles, as communion and helping behaviors are aligned with traditional feminine stereotypes (Eagly & Karau, 2002; Helgeson, 1994; Johnson et al., 2008). This logic is consistent with theorizing by Hogg et al., (2006) that the masculinity or femininity of group norms may determine whether men or women are considered more prototypical of the group. If women are explicitly or implicitly perceived as more fundamentally communal, then a more extraverted, and hence communal, group should be relatively more likely to see women as better matches for leadership roles.

Thus, groups high in extraversion should have leader prototypes that are both (1) less dependent upon the effects of gender composition as suggested in our initial hypothesis, and (2) more communal, and thus potentially a better match for women in line with traditional feminine stereotypes. We note that in groups with higher proportions of women, these effects might be offsetting; that is, the first effect makes the influence of gender composition *less* important for female leadership emergence, but the second effect makes women *more* likely to match the prototype as they may best match the communal stereotype. However, in groups with higher proportions of men, both effects support the emergence of women as leaders, as men lose any advantage that would come from the effects of the group's gender composition, and women emerge as the best matches for communal group prototypes. Altogether, this logic suggests that the strongest effect on group leadership prototypes may arise in extraverted groups with more men, as both effects support the emergence of women as leaders in such groups.

Additionally, the idea that this effect might be stronger for groups with higher proportions of men is also supported by research showing that extraverted men tend to be more friendly and caring in their interactions with women (Simpson, Gangestad, & Biek, 1993), which may extend to their learning more about their distaff colleagues, treating them more seriously, and deferring to them more frequently as group authorities. We therefore predict that the moderation suggested in H2a may provide for an especially high likelihood of women emerging as leaders in groups with higher proportions of men, such that:

Hypothesis 2b. *The influence of group-level extraversion on the interaction between individual-level gender and group-level gender composition on leader emergence will be stronger as groups have a higher proportion of men, such that women are most likely to emerge as leaders in extraverted groups with more men.*

Method – Study 1

Participants and procedure

The participants in our first study consisted of 498 full-time first-year MBA students enrolled in a medium-sized Northeastern university in the USA, randomly assigned to 121 groups as part of an introductory management course. Thirty-four groups consisted wholly of members of the same gender, and were thus eliminated from the analyses, as was one additional group which did not complete the surveys. Seventy-three percent of the remaining participants were men, and their average work experience was 5 years. Forty-three percent of the participants were White, 37% Asian, 12% Hispanic, 5% Black, and 3% other. Data were collected from two different classes in consecutive years of the management course. The students worked in four- to five-member groups (with the exception of one 3-member group) to complete a multitude of tasks throughout the semester, including several case studies, decision-making exercises, business simulations, and a final project. These groups had full autonomy to

structure work and processes. Due to their initially leaderless structure, such groups present a context well-suited to the investigation of leadership emergence and gender.

At the beginning of the study, all participants completed measures of gender and a personality questionnaire, described below. Data on leader emergence were collected 1 month later to allow time for leadership to emerge.

Measures

Gender

Gender was measured at the individual level through a single survey item. The results were dummy-coded such that a score of zero indicated a man and a score of one indicated a woman. At the group level, gender composition was computed as the percentage of women within the group, which we refer to as group gender below.

Personality

Extraversion was measured at the individual level using the 12 items associated with extraversion from the NEO Five Factor Inventory (Costa & McCrae, 1992) on a five-point scale from 1, “strongly disagree,” to 5, “strongly agree.” The Cronbach’s alpha was .79. At the group level, we computed the mean of the extraversion scores of all group members, consistent with previous work on group personality composition (Barrick et al., 1998).

We also collected data from the respondents on the other four facets of the Big Five (agreeableness, conscientiousness, neuroticism, and openness) as well as on honesty–humility, which is considered by some scholars as a sixth fundamental personality trait (Ashton & Lee, 2005). Although not hypothesized within this study, as we describe at the end of the results section we analyzed similar interactions with gender for each of these personality constructs as we did with extraversion, to provide evidence for our arguments and ensure that any findings for extraversion were not statistical artifacts. All Big-Five variables were measured using the NEO Five Factor Inventory as described above, and honesty–humility was measured with the full scale from the HEXACO-60 (Ashton & Lee, 2009). The reliability coefficients for these personality measures ranged from .67 to .83, and the group level aggregation for each was computed consistent with the logic presented above.

Leader emergence

Each member of the group was asked to list the names of all group members who served as leaders with the following question: “Please list the names of people on your team who you feel are operating as a leader. Include yourself if appropriate.” The participants could nominate no members, one member, a combination of members, or even all members of the group as leaders. Our leader emergence score was calculated as a ratio of the number of members in the group who nominated the focal individual as a leader, divided by the total number of members in the group. The scores on this ratio therefore ranged from 0 to 1, with a mean value of .35, representing the total amount of leader emergence for each member of the group as perceived by all members of the group. To account for differences among the 2 years of classes used in this study, this ratio was standardized by year before being entered into our analyses. By operationalizing leadership at the individual level rather than at the group level, we captured the possibility of multiple leaders emerging within the group, and helped to reduce any confounding variance that might be caused by the percentage of men or women within the group. That is, a group-level leader emergence variable that captured, for instance, how many men versus women emerged in a group would be naturally affected by the group’s composition of men and women. By measuring leader emergence at the individual level, we minimize this bias, as each individual member should logically have as much opportunity to exhibit leader behaviors as any other member, holding other factors equal.

Control variables

We controlled for two group-level variables in all analyses in order to rule out other effects of leader emergence based on group structure, and thus focus more explicitly on our hypothesized relationships (Becker, 2005). Specifically, we controlled for group size and the total amount of leadership that emerged within each group (the latter a measure of shared leadership, operationalized here as density, or the total number of leaders selected by the group divided by the group size; Carson et al., 2007; D’Innocenzo et al., 2014), as both of these group contextual factors can alter the opportunities for individuals to emerge as leaders. As we added group-level extraversion to our model testing Hypothesis 2, we also controlled for individual extraversion to control for any individual-level effects of that variable on leadership emergence.¹

Data analysis

In our sample, the participants were nested within groups, violating the OLS regression assumption of independence of observations (J. Cohen, Cohen, West, & Aiken, 2003) and suggesting the appropriateness of multilevel modeling through a random

¹ We also ran our analyses without including these control variables, to ensure the stability of our results. We found no meaningful differences in the magnitudes of the hypothesized coefficients, and the significance of those coefficients did not change, regardless of the inclusion or removal of these control variables.

Table 1

Study 1: Descriptive statistics and intercorrelations for the individual- and group-level variables.

Variable	Mean	SD	1	2	3
Individual level					
1. Gender ^a	.36	.48			
2. Extraversion	3.60	.51	.13*		
3. Leader emergence	.34	.30	-.02	.04	
Group level					
1. Group size	4.19	0.40			
2. Total group leadership	.41	.27	.13*		
3. Group gender ^b	.36	.14	.20**	-.12*	
4. Group extraversion	3.60	.23	-.08	-.01	-.08

Note. *N* (individuals) = 351; *N* (groups) = 86.^a Gender is coded as 0 = male, 1 = female.^b Group gender is coded as the percentage of group members who are women.* $p < .05$.** $p < .01$.

coefficient approach. We first tested a null (or empty) model to determine whether group membership was a salient clustering factor, described below. With this verification, we tested our hypotheses using hierarchical linear modeling (HLM) analyses with residual maximum likelihood estimation (Snijders & Bosker, 2011). We created level 1 (individual) and level 2 (group) variables for our two main constructs of interest, gender and extraversion. Consistent with the recommendations of Enders & Tofighi (2007), the individual variables were centered within cluster (CWC), and the group variables were centered to the grand mean (CGM), in order to aid in interpretation and separate our between- from within-level variance. As HLM procedures do not generate standard R-squared values, we used the Snijders & Bosker (2011) pseudo-R-squared equation to calculate variance explained within our analyses. Given uncertainty around calculating the degrees of freedom for multilevel models and associated challenges with accurately producing *p*-values based on these approximations (Kackar & Harville, 1984; Schaalje, McBride, & Fellinghama, 2001), we instead used bootstrapping (with 5000 bootstrapped simulations) to generate the confidence intervals reported for our fixed-effect coefficients, using the lme4 package for R software.

Results — Study 1

The means, standard deviations, and correlations of our study variables at the individual and group levels are presented in Table 1.

Before testing our hypotheses, we analyzed a random coefficient null model to determine whether clustering within the data supported an HLM framework for analyzing leadership emergence. This test, which regresses leader emergence on an empty model with a random intercept established between groups, indicated a between-group variance (τ^2) of .31, and a within-group variance (σ^2) of .95. The intraclass correlation was therefore .25, indicating that mean group differences accounted for 25% of the total variance in leadership emergence. This result suggests the appropriateness of using hierarchical linear modeling to test our hypothesis.

The first model of Table 2 shows the results for a test of our first hypothesis, testing the interaction of individual and group gender on leader emergence, and reporting confidence intervals for each reported coefficient. Interestingly, no gender variables were significant in this model, including our hypothesized interaction. This indicated no effects of gender alone on the likelihood that a group member would emerge as a leader, failing to support Hypothesis 1.

The results for the final step of our HLM test of our second hypothesis, including all control variables, two-way, and three-way interactions, are shown in Model 2 of Table 2. We hypothesized a weakening of the positive interaction proposed in H1, but as that interaction was not significant, we looked instead for support in the form of a negative interaction (as such a coefficient would serve to weaken existing relationships). As in the previous analysis, the only significant main effects on leadership emergence were the control variables of group size and overall group leadership.

Neither gender nor extraversion, at the individual or group levels, served to significantly predict leadership emergence within groups while taking our interactions into account. Although two of the two-way interactions approached significance, neither of them had 95% bootstrapped confidence intervals which excluded zero. Our proposed three-way interaction of group-level extraversion, gender, and group-level gender, however, was significant according to both of these tests, suggesting some support for H2a. To determine the exact pattern of this multi-level interaction² and whether it fully supported H2a–b, we plotted these results at one standard deviation above and below the mean levels of group-level extraversion and group gender composition (Aiken & West, 1991; Stone & Hollenbeck, 1989), and the resultant graph is shown in Fig. 1.

The pattern of relationships shown by this interaction provided support for Hypotheses 2a–b. Whereas the two lines for female and male members of groups with more women (represented by lines with triangles) were relatively flat, with neither

² Although we theorized group-level extraversion as linearly influencing the interaction of individual and group gender in predicting emergent leadership, we recognize that considering curvilinear relations of extraversion to group outcomes has been fruitful in recent research (e.g. Barrick et al., 1998). To help verify the accuracy of our linear theorizing, we reran our analyses including a quadratic term for group-level extraversion (with and without an individual quadratic extraversion control) and interacting this quadratic term with our individual and group gender predictors. In none of these models were the curvilinear interactions significant, and our proposed three-way interaction remained significant in all models, demonstrating the stability of our findings and confirming the appropriateness of our linear interaction approach.

Table 2

Study 1: Hierarchical linear modeling results testing the influence of gender and extraversion on individual leadership emergence.

Variables	Model H1				Model H2			
	γ	SE $_{\gamma}$	BSLCI	BSUCI	γ	SE $_{\gamma}$	BSLCI	BSUCI
Individual level								
Intercept	-.06	.50	-1.06	.90	-.25	.50	-1.25	.71
Gender ^a	.02	.10	-.18	.22	-.01	.10	-.21	.18
Extraversion					.08	.10	-.13	.28
Group level								
Group size	-.16	.12	-.40	.08	-.12	.12	-.36	.11
Total group leadership	1.80	.18	1.45	2.14	1.84	.18	1.49	2.19
Group gender ^b	.05	.34	-.61	.72	-.08	.35	-.77	.60
Group extraversion					.06	.20	-.33	.45
Cross-level interactions								
Gender \times group gender	-.64	.73	-2.14	.79	-1.00	.74	-2.47	.47
Group extraversion \times gender					.74	.44	-.13	1.61
Group extraversion \times group gender					-.29	1.43	-3.10	2.54
Group extraversion \times gender \times group gender					-6.60	3.07	-12.69	-0.62
Pseudo-R ²	.22				.26			

Note. N (individuals) = 351; N (groups) = 86. The values are unstandardized parameter estimates for the regression weights (γ). SE $_{\gamma}$ = standard error of gamma coefficient. BSLCI = bootstrapped test lower bound of 95% confidence interval. BSUCI = bootstrapped test upper bound of 95% confidence interval. Pseudo-R² values were calculated via formulas from Snijders & Bosker (2011).

^a Gender is coded as 0 = male, 1 = female.

^b Group gender is coded as the percentage of group members who are women.

slope significantly different from zero nor different from one another ($p = .730$), the two lines for men and women within groups with more men (represented by lines with squares) differed substantially ($p = .013$). Although this result indicated that, in groups with more men, men became less likely to emerge as leaders as groups become more extraverted, this slope was not statistically significant ($\gamma = -.15$, $p = .133$). Women in groups with more men, on the other hand, were more likely to emerge as leaders when the group had high levels of extraversion ($\gamma = .20$, $p = .040$). Thus, the interaction of individual gender, group-level gender, and group-level personality was stronger for groups with more men when compared to groups with more women, as hypothesized in H2b.

We lacked the statistical power to simultaneously test the interactions of other group-level personality constructs with our individual and group gender moderators to predict leadership emergence, but we still wished to determine whether the interactions described above were unique to extraversion. To test this, we reran all analyses described above five additional times, in each iteration replacing individual and group-level extraversion with one of five other personality constructs: agreeableness, conscientiousness, honesty–humility, neuroticism, and openness. Bootstrapped confidence intervals did not reveal any significant

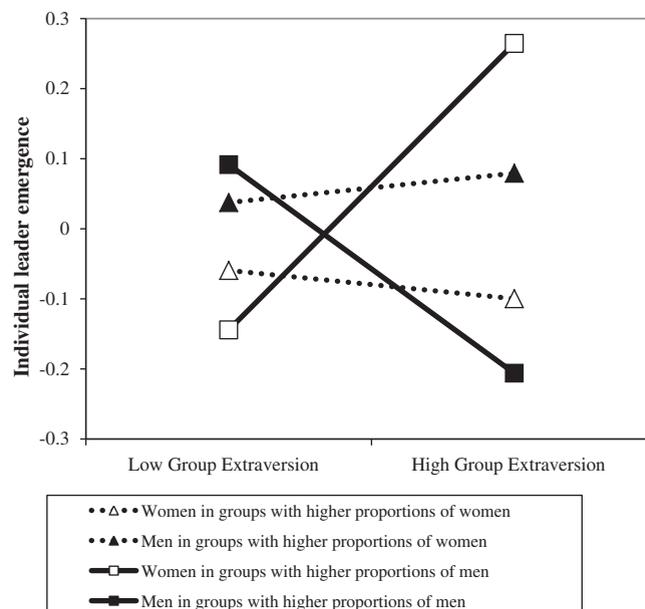


Fig. 1. Interaction effects of group extraversion, gender, and group gender composition on individual leader emergence (Study 1).

interaction coefficients involving any of these personality constructs, providing some evidence for the uniqueness of our arguments, and these effects, to group-level extraversion.

Given the recognized methodological difficulty of detecting three-way interactions in moderated multiple regression (Aguinis & Stone-Romero, 1997; McClelland & Judd, 1993), this study provided encouraging evidence for the interactive role of group-level extraversion and group gender composition in determining when women emerge as leaders. However, given that Study 1 was based on a single sample, we recognized the possibility that our findings were fortuitous rather than meaningful. Additionally, even assuming the validity of our results, we still had questions as to whether these effects would generalize to other types of groups, such as the shorter-term groups which some researchers consider more conservative contexts for examining informal leadership (D'Innocenzo et al., 2014). There was also some concern that although our hypothesized three-way interaction was significant and patterned in a way that matched our predictions, the groups we studied generally had somewhat low proportions of women (mean: 36%), and we therefore hoped to study groups with more gender variance in composition. With these considerations in mind, we conducted a second study to see whether our findings would replicate in short-term groups.

Method – Study 2

Participants and procedure

The participants in our second study consisted of 484 undergraduate students enrolled in a medium-sized university in the southeastern USA, randomly assigned to 115 short-term class groups as part of their management courses. These groups performed short decision-making and creative problem solving tasks in exchange for class credit. As in our first study, we only included groups in this analysis which had some level of gender diversity (not all-male or all-female). Forty-one percent of our Study 2 participants were women, and 57.4% were Caucasian (with 17.5% Asian, 2.6% African-American, and 8.2% Hispanic or of other racial background). As in Study 1, the students worked predominantly in four- to five-member groups, with the exception of a few three-member groups. These groups were initially leaderless and newly formed as their tasks began, allowing for leadership to emerge during their interactions.

Prior to being assigned to groups and beginning the class projects, all of the participants completed questionnaires recording their gender and extraversion. Emergent leadership was measured via in-class surveys, after the completion of the group tasks but before the task results and the groups' relative performance scores were shared, so as to limit any biasing of results. Gender at the individual and group levels was measured in the same manner as in Study 1; operationalizations of other constructs are described below.

Measures

Extraversion

Extraversion was measured at the individual level using the 10-item extraversion scale from the International Personality Item Pool (i.e. IPIP; Goldberg et al., 2006), with responses on a five-point Likert scale. The reliability coefficient for the ten items was .97. We again computed the group's mean extraversion score from these individual results to represent the group's overall extraversion.

Leader emergence

In this study emergent leadership was operationalized via a three-item scale (Kent & Moss, 1990), with each group member rating each other group member on the degree to which that member “assumed a leadership role,” “influenced the team's goals and decisions,” and “led the conversation.” These items were measured on a seven-point Likert scale, ranging from strong disagreement to strong agreement, and the coefficient alpha of .89 indicated acceptable reliability. This approach is consistent with current social network approaches to measuring group leadership (Carson et al., 2007) and allows for the measurement of degrees of leadership, rather than a simple dichotomous assessment of whether a group member acted as a leader or not (Mayo, Meindl, & Pastor, 2003). In order to establish interrater agreement and further assess the reliability of the multiple items used in this scale, we calculated the $r_{wg(j)}$ for each set of member ratings (James, Demaree, & Wolf, 1984). This statistic is the most widely used measure of interrater agreement, and appropriate when multiple raters respond to a multi-item scale, as in this study (LeBreton & Senter, 2008). Our mean $r_{wg(j)}$ under the assumption of a slightly skewed distribution (a more conservative and realistic test of agreement than the more commonly used uniform distribution assumption; LeBreton & Senter, 2008) was .81, indicating strong agreement and providing support for aggregation of leadership ratings. The mean individual leadership emergence score within this sample was 4.94. As in Study 1, this individual approach to measuring leader emergence helps minimize any biases caused by various group gender compositions.

Control variables

In order to match this analysis to Study 1 as closely as possible, we again controlled for group size and total leadership amount. Consistent with our dependent variable and density approaches to shared leadership, the total amount of leadership

in the group was operationalized as the group mean score of the emergent leadership measure. Individual extraversion was again controlled in our final analysis as we added group-level extraversion to the model.³

Data analysis

Our analytical procedure was identical to that described in Study 1. Variables were again centered as appropriate to their level, and we again used bootstrapped confidence intervals to test the significance of our coefficients in R software.

Results – Study 2

The means, standard deviations, and correlations of our study variables are presented in Table 3. A comparison of these correlations with those from Study 1 (presented in Table 1) reveals some interesting differences, perhaps caused by the temporally shorter nature of the groups in Study 2, or by our somewhat different operationalization of leader emergence, as in this study individuals rated leadership on a Likert-scale, allowing for measurement of both weak and strong leadership, whereas in Study 1 the participants rated each other dichotomously, indicating whether each was or was not acting as a leader. Specifically, both gender and extraversion were significantly correlated with leader emergence (such that emergent leaders were more likely to be extraverted and men), whereas these correlations were insignificant in the previous study.

The empty model to determine whether the random coefficient approach was appropriate for this dataset resulted in a between-group variance (τ^2) of .28, and a within-group variance (σ^2) of .89, yielding an ICC of .24. With this evidence for hierarchical linear modeling in hand, we proceeded to retest our hypotheses. The results of our test of H1 are shown in the first model of Table 4. Similar to Study 1, neither gender term nor the interaction was significant. We note that the main effect for gender was negative (indicating a likelihood of men emerging as leaders) and marginally significant here, with a bootstrapped upper confidence interval bound of .0023. Regardless, we found a consistent lack of support for our first hypothesis across both studies.

Table 4 shows the results of the final step of our analysis of our second hypothesis (in Model H2), including all variables. Unlike Study 1, several terms reached significance in the bootstrapped confidence intervals, including the positive effect of individual extraversion, a negative effect of individual female gender, and a positive interaction of group-level extraversion by individual gender, such that more women were particularly likely to emerge as leaders of more extraverted groups. Of more importance to our research question, Hypothesis 2a again received some support in this study as our three-way interaction of gender, group gender, and group-level extraversion was significant and negative,⁴ similar to this coefficient in Study 1. To compare the exact pattern of leader emergence for different configurations of gender and extraversion, Fig. 2 illustrates our results at one standard deviation above and below the mean levels of group-level extraversion and group gender composition.

Although the overall pattern was slightly different, the configuration illustrated in Fig. 2 is highly consistent with the results from our first study in regard to our second hypothesis. Again, the slopes for women and men in groups with more women (lines with triangles) were similar and not significantly different from zero nor each other. We again found a significant and positive slope for women in extraverted groups with more men ($\gamma = .20, p = .047$). This was significantly different from the slope for men within these extraverted groups with more men ($p = .020$), although that slope, as in Study 1, was not itself significantly different from zero ($\gamma = -.14, p = .173$). Regardless, these results provided an encouraging replication of our results from Study 1, lending support to Hypotheses 2a–b.

Discussion

This multi-level study examines the complex interplay between individual and group characteristics as predictive of leadership emergence in initially leaderless work groups. In two studies, our results consistently indicate that women are likely to emerge as leaders in groups with higher proportions of men, when those groups are also high in extraversion. Consistent with Hackman's (2003) recommendation to investigate phenomena in organizational research by crossing levels, our study suggests that research on leadership emergence in groups and shared leadership should examine constructs of interest at multiple levels of analysis.

Whereas existing work has largely taken an individual view to understand how gender and personality factors influence leadership emergence, our research demonstrates that these factors may also have meaningful ramifications at the group level of analysis, as has been shown in other literatures on group personality composition (e.g. Bell, 2007; Halfhill et al., 2005). It is somewhat striking that in our first study of longer-term groups, we did not find the main effects of individual-level gender and extraversion on leadership emergence without considering extraversion and gender across levels, suggesting that the processes by which leaders emerge in longer-tenured work groups are complex and more strongly guided by group-level characteristics. Only in

³ We again ran our analyses without including these control variables to verify the stability of our results. Again, the inclusion or removal of control variables did not meaningfully influence our results, with one exception: the coefficient for the hypothesized three-way interaction (H2) dropped to marginal significance ($\gamma = -1.41$; bootstrap CI = $-3.02 < - > .17$) when we failed to control for the total amount of leadership in the group. We do not believe that this should affect confidence in our conclusions, however, as (a) the actual magnitude of the coefficient became slightly stronger, rather than weaker, without the control; (b) the controls used were consistent with those used in Study 1; and (c) controlling for the total amount of leadership in the group is methodologically appropriate as it is theoretically related to both our dependent variable of individual leader emergence, and independent variables such as extraversion (Becker, 2005; Judge et al., 2002).

⁴ We again reran our analyses to check for any curvilinear effects of extraversion through our proposed interactions on leadership emergence. As in Study 1, none of these effects were significant.

Table 3

Study 1: Descriptive statistics and intercorrelations for the individual- and group-level variables.

Variable	Mean	SD	1	2	3
Individual level					
1. Gender ^a	.41	.49			
2. Extraversion	3.52	.81	-.09*		
3. Leader emergence	4.49	.91	-.09*	.21*	
Group level					
1. Group size	4.76	0.51			
2. Total group leadership	4.96	.46	-.23**		
3. Group gender ^b	.41	.19	.01	-.09	
4. Group extraversion	3.52	.56	-.05	.20**	-.26**

Note. *N* (individuals) = 484; *N* (groups) = 115.^a Gender is coded as 0 = male, 1 = female.^b Group gender is coded as the percentage of group members who are women.* *p* < .05.** *p* < .01.

our study of shorter term groups were individual gender and extraversion significant in predicting leadership, but even those effects must be considered in the context of the multi-level interactions of those constructs.

We consistently found no support for our initial hypothesis, in which we proposed an interaction between individual gender and group gender composition, with individuals of the predominant gender being more likely to emerge as leaders. An important consideration for interpreting our results, and a possible explanation for this lack of support for Hypothesis 1, is the idea of group salience, which is important for the development of group identification and a group prototype (Hogg, 2001; D. van Knippenberg & Hogg, 2003). As Hogg & Terry (2000) explain, “when group membership is salient, cognition is attuned to and guided by prototypicality” (p. 126). Our theorizing was based on the assumption that group membership was salient to group members in the context of our studies. Although the tenure of groups differed between Study 1 and Study 2, in each study individuals were assigned to groups for collaborative tasks, which we believed would foster group identification and the development of a group prototype with meaningful ramifications for leadership emergence. However, it is possible that our initial hypothesis was not supported because group membership was not in fact salient enough to drive emergent leadership based on group prototypicality. Perhaps only when the communication and social interaction fostered by high group-level extraversion were present was group identification and group membership salient enough to group members to encourage emergence of prototypical leaders as would be predicted by the social identity model of leadership (D. van Knippenberg & Hogg, 2003).

Altogether, perhaps consistent with the both the increased representation of women in today's modern workforce and evidence of a shift toward more gender-neutral and communal prototypes of leadership (Ehrhart & Klein, 2001; Kark, Waismel-Manor, & Shamir, 2012; Powell et al., 2002), our results suggest that the effect of gender on leadership emergence may be declining, at least when considering gender as a simple demographic factor as we did in our unsupported first hypothesis. These results are consistent with research suggesting that the mismatch between the leader role and the female role suggested by social role theory may be attenuated by the incorporation of more feminine behaviors, alongside existing masculine emphases, to ideas of

Table 4

Study 2: Hierarchical linear modeling results testing the influence of gender and extraversion on individual leadership emergence.

Variables	Model H1				Model H2			
	γ	SE $_{\gamma}$	BSLCI	BSUCI	γ	SE $_{\gamma}$	BSLCI	BSUCI
Individual level								
Intercept	-.25	.52	-1.29	.79	-.28	.57	-1.40	.85
Gender ^a	-.14	.07	-.27	.00	-.17	.08	-.32	-.01
Extraversion					.23	.06	.11	.34
Group level								
Group size	.01	.07	-.13	.14	.02	.07	-.12	.15
Total group leadership	1.04	.07	.91	1.17	1.04	.08	.88	1.20
Group gender ^b	-.13	.17	-.47	.22	-.11	.19	-.48	.25
Group extraversion					.06	.07	-.09	.19
Cross-level interactions								
Gender \times group gender	-.52	.39	-1.30	.24	-.28	.43	-1.13	.57
Group extraversion \times gender					.32	.16	.01	.62
Group extraversion \times group gender					.03	.32	-.58	.67
Group extraversion \times gender \times group gender					-1.40	.72	-2.78	-.03
Pseudo- <i>R</i> ²	.31				.34			

Note. *N* (individuals) = 484; *N* (groups) = 115. The values are unstandardized parameter estimates for the regression weights (γ). SE $_{\gamma}$ = standard error of gamma coefficient. BSLCI = bootstrapped test lower bound of 95% confidence interval. BSUCI = bootstrapped test upper bound of 95% confidence interval. Pseudo-*R*² values were calculated via formulas from Snijders & Bosker (2011).

^a Gender is coded as 0 = male, 1 = female.^b Group gender is coded as the percentage of group members who are women.

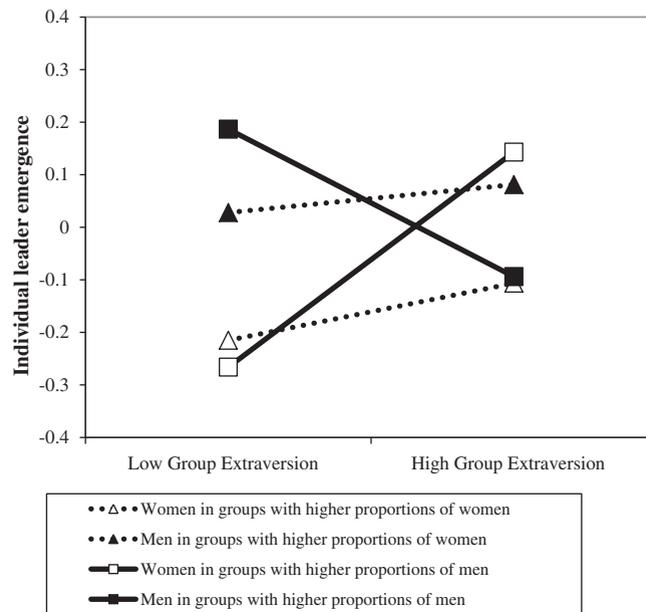


Fig. 2. Interaction effects of group extraversion, gender, and group gender composition on individual leader emergence (Study 2).

successful leadership. The general conceptualization of leadership held by individuals “has incorporated more feminine qualities in more recent years, in moderate-status leader roles, in certain occupational domains, and in the minds of women,” (Koenig et al., 2011; p. 637) as communal characteristics and behaviors have emerged as increasingly representative of effective approaches to leadership such as transformational (Duehr & Bono, 2006) and servant leadership (Lemoine, 2015). It is also somewhat notable that the interaction of individual gender and group-level extraversion did not consistently predict leader emergence, whereas the three-way interaction adding group gender was more consistent. Although our logic focused on the role of group gender composition interacting with other factors, our overall argument suggests that women might be more likely to emerge in all highly extraverted groups, due to their gender role match to the communal group prototype. That this relationship existed in groups with more men, but not in groups with more women, suggests that other elements of gender or gender role are also at play. It is feasible that it is more difficult for a woman to “stand out” from other women as a communal and prototypical leader in a predominantly female group, or that women gain an advantage in groups with more men by the nature of their interactions with them, as extraverted men tend to have especially positive relationships with women (Simpson et al., 1993).

By examining patterns of leadership emergence across levels, we add to extant work on gender and leadership to help understand when, and under what conditions, groups might “think leader, think female.” As the groups in Study 1 had clear tasks, boundaries, authority, and worked together over several months, they constituted “real teams” (Hackman, 2002), similar in structure and length to many modern organizational groups (Hollenbeck, Beersma, & Schouten, 2012), which contributes to the generalizability of our results. By examining group leadership after the groups had already worked together for a month, in our first study, we were better able to understand the complexities that may predict how and under what circumstances group leadership roles are “taken” and “granted” by members of autonomous work groups. Our second study showed that these effects are consistent even in much shorter-term groups, over and above the main effects of individual extraversion and gender on leadership emergence (which did not manifest in our first, longer-term, study). Our research was designed to use groups consisting of individuals who did not have prior experience working together to reduce any bias introduced by group-member familiarity, and individuals were randomly assigned to groups to increase internal validity. By studying groups from the time of formation, we aimed to cleanly observe patterns of leadership emergence to increase both internal and external validity. In addition, through our second study, we sought to bolster the confidence and generalizability of these findings; the replication of our results in shorter-term groups allows for increased confidence in the interactive effects of individual gender, group gender composition, and group-level extraversion on leader emergence.

Theoretical and managerial implications

This research makes several contributions to the current literature on leadership emergence in groups. By considering both individual-level and group-level characteristics that determine the ways in which groups interact, we demonstrate that leader emergence might best be understood by considering these various factors, across levels, together. In this research we explore boundary conditions to extant research on social identity theory and the effect of group prototypicality on leadership emergence. The usefulness of these approaches has been consistently demonstrated (Hogg et al., 2005; B. van Knippenberg & van Knippenberg, 2005), and our results build on the literature by showing how different contingencies and boundary conditions

may be worthy of consideration. Our research identifies certain contextual conditions which may alter and the typical expectations of group prototypicality and implicit leadership heuristics, such that women can emerge as leaders even when the group as a whole is predominantly composed of men.

These boundary conditions represent an important extension of extant literature on leader emergence, with meaningful ramifications for the study of shared leadership (D'Innocenzo et al., 2014) as well. Our study design was consistent with shared leadership theory as groups could (and very nearly always did) have *multiple* leaders, and those leaders were operationalized in a manner consistent with social network analysis (Carson et al., 2007). Antecedents of shared leadership have seldom been examined in the literature, and our results suggest that those antecedents might be best examined across levels. Further, more may be learned about how groups choose their leaders by examining known antecedents of emergent leadership (such as extraversion or other Big-Five characteristics; Judge et al., 2002) concurrently at multiple levels. All in all, we add to a growing body of scholarship indicating the necessity of examining cross-level antecedents to group processes and outcomes (Kozlowski & Klein, 2000; Rousseau, 1985).

We also contribute to the literature examining gender and leadership by demonstrating the contextual conditions within groups related to a potential weakening of the classic “think leader, think male” paradigm, and spotlighting how women, rather than men, might actually have the “leadership advantage” in certain circumstances. Although further study is certainly needed to build confidence in our conclusions, this research provides additional evidence that context can play an important role in leader emergence (Stoker et al., 2012), and leadership itself may not be viewed as so exclusively masculine as it has typically been considered (Koenig et al., 2011). The growing importance of communal leadership characteristics and behaviors may have implications not just for studies of leader emergence, but also for consideration of positive leadership approaches such as ethical, authentic, and servant (Brown, Treviño, & Harrison, 2005; Gardner, Cogliser, Davis, & Dickens, 2011; van Dierendonck, 2011). Similarly, existing research has considered contextual aspects of the work itself (e.g. social vs. task-oriented; feminine vs. masculine in nature; Eagly & Karau, 1991) as predictive of when women may or may not emerge as leaders, and such factors as personality and gender composition of the group may now be similarly important.

An important factor in our research that is worthy of discussion is group tenure. Although our hypothesized three-way interaction was significant regardless of tenure, it is notable that individual gender and extraversion, both considered classic predictors of leadership emergence (Eagly & Karau, 1991; Judge et al., 2002), were only predictive of leadership in short-term groups. However, our results suggest some instability of these individual effects, whereas the cross-level effects we examined existed in groups regardless of whether leadership were assessed relatively quickly after formation, or several weeks into the group's collaboration. It is plausible that groups may initially choose their leaders by both traditional implicit prototypes and group prototypes when they first come together, but over time those implicit leader theories decline in salience as group context becomes more important. The meta-analysis by Eagly & Karau (1991) found that the tendency for men to emerge as leaders was reduced (but still present) in longer-term groups, but it is possible that the male advantage in long-term groups has further declined in the past decades as leadership has become viewed as more androgynous (Kark et al., 2012; Koenig et al., 2011). The effects of group tenure on leadership emergence were not the focus of our research, but differences among our two studies suggest several interesting research questions for the future, as groups are studied at different points in their development and growth (Morgeson et al., 2009).

Additionally, our results suggest the importance to modern organizations of placing individuals high in extraversion and communication skills within self-managing, leaderless groups. For groups lower in extraversion, organizations may intervene to encourage and facilitate communication among group members to discourage focus on surface-level attributes, which could in time lead to group faultlines and dysfunctional group processes (Lau & Murnighan, 1998; Pearsall, Ellis, & Evans, 2008), and different patterns of leader emergence.

Limitations and future research directions

Our examination of this phenomena is not without limitations. First, the temporal conditions of this study may act as a boundary condition influencing whether women emerged as leaders, as even our longer term groups in Study 1 were measured on leadership after a few weeks; a meaningful amount of time, but relatively early in the group's total lifespan. Our research leaves unanswered the question of how gender and personality might interact in more stable work groups (Hollenbeck et al., 2012), as tenures of longer durations could potentially influence the extent to which these results occur. Our two-study design does help to allay this concern, as we saw the same patterns of leadership emergence in new groups of short duration, as we did in groups which had been together for several weeks. Future work could examine whether our results predicting leader emergence hold for groups working with different tenures or whether time and extraversion might further interact to enable different group prototypes.

Second, our use of student participants may limit generalizability of our findings, as we did not study this phenomenon in an organizational context. However, this concern is attenuated by the fact that our first sample consisted of MBA students with an average of 5 years of work experience, whereas our second student sample replicated the results in a more typical sample of undergraduate students. Some scholars have suggested that if the phenomena being studied are themselves germane to students, studies using student samples may offer equivalent (Greenberg, 1987) or even conservative (D'Innocenzo et al., 2014) tests of hypotheses, as such results are often similar to those found in field studies, but of lower strength. A meta-analysis of emergent leadership in different settings has supported this pattern (D'Innocenzo et al., 2014), lending some confidence that the findings of this

study are generalizable. However, we consider it important to conduct additional research within organizational settings to better understand how these effects may translate and verify the generalizability of our research.

We examined group-level extraversion as the primary group-level personality variable predicting female leadership emergence in male-dominated groups. While this is consistent with our theorizing, such that group-level extraversion may enable groups to become more sociable, communal, and therefore traditionally feminine in nature, it is certainly not comprehensive of all group-level constructs that might influence when women do or do not emerge as leaders. Although we found no similar results for other facets of Big Five and HEXACO personality in our first study, this would not preclude the possibility of similar relationships emerging for group variables which might also spark communal behaviors, such as cohesion (Hackman, 1987) or psychological safety (Edmondson, 1999). Additionally, whereas power concerns mandated that we examine other Big Five differences one at a time, ideally it would be most useful to explore the interactions of other personality variables alongside each other, within the same model, given sufficient sample size. Future research should extend this study to examine how group-level extraversion might act in concert with other group differences, and whether other traits and group-level factors may interact to predict when women are most likely to emerge as leaders.

Specific to extraversion, though, some future research questions are suggested by our results. First, whereas a great deal of evidence has arisen that individual extraversion has a meaningful relationship with emergent leadership (Judge et al., 2002), we found support for this link only in our study of short-term groups. While one study is in no way sufficient to reconsider years of empirical evidence, the fact that this individual relationship with leadership did not manifest in longer-term groups is somewhat curious, and suggests the potential for future research on the role time may play in group leadership emergence processes. The nature of the interaction between group-level extraversion and individual gender is also of potential interest, as our theory that more extraverted groups are more communal and thus more likely to have feminine, communal prototypes, suggests that more extraverted groups might be more likely to select women as leaders. Although our proposed three-way interaction including group gender was significant in both studies, the simpler interaction of individual gender and group-level extraversion was consistently in the direction suggested by this theory, significant in Study 2 but only marginally significant in Study 1. These results indicate that group-level extraversion may be quite important to how groups form leadership prototypes, either on its own or in combination with other group constructs.

Conclusion

The “think leader, think male” paradigm may be one of the longer-standing idioms in the study of leadership, but this research indicates that this paradigm weakens and even inverts under some group conditions. Our results suggest that initially leaderless groups grant leader roles to their members based on complex combinations of individual- and group-level characteristics, such that group compositional factors that encourage communication and interaction, like extraversion, may lead to patterns of leader emergence that were previously unexpected. Our finding that women are more likely to emerge as leaders in groups with more men, in conditions of high group extraversion, not only suggests boundary conditions to social identity approaches to leadership, but it also implies an important advancement of our understanding of implicit leader prototypes. Perhaps due to the increasing communal components of modern approaches to leadership, women may, in fact, be perceived as more leader-like and emerge more often as leaders than in any previous time in recent history, especially in the context of modern work groups. More research is certainly needed to investigate how our perceptions of gender and leadership are changing in the modern world, and we hope our study represents one step along that path.

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