

Developmental Networks: Enhancing the Science and Practice of Mentoring

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Mentoring is a transformative relationship in which an experienced person helps a less experienced person realize their personal and professional goals. (Kram, 1985; Levinson, 1978). It is traditionally perceived as a dyadic relationship between a mentor and a protégé. Yet, a single mentor is not sufficient to meet a person's developmental needs, particularly in today's volatile, uncertain and fast-paced work environment (Baugh & Scandura, 1999; Murphy & Kram, 2014). Consider the people who are actively involved in your development. It is likely that the people who come to mind include one or more formal mentors and also other informal mentors. This suggests that mentoring occurs not just in formal mentoring relationships, but across multiple developmental relationships, a constellation that has been described as a developmental network (Higgins & Kram, 2001).

In this chapter, we review research on *mentoring as a developmental network* and provide suggestions for future research. In particular, we examine how research on developmental networks enhances the understanding of mentoring through a focus on *mentoring functions* as they occur across multiple developmental relationships. A person's developmental network may include one or more formal mentors and may also include other developmental partners, such as a boss who provides developmental opportunities, or a family member who provides personal and professional counsel. Members of a developmental network are described as developers and their relationships with the focal individual as a developmental relationship.

In the first section, we begin with a review of current research on developmental networks and its contributions to the mentoring literature. In the second section, we describe methods to collect data on developmental networks. This is followed by a discussion on approaches to analyzing developmental networks data. In the fourth section, we describe organizational applications using a developmental network approach to mentoring. In the final

section, we close with a discussion of the role of developmental networks within a broader mentoring ecology.

Developmental Networks and Mentoring

A significant body of research has established that people learn and develop with the support of multiple developmental relationships (Chandler, Kram, & Yip, 2011; Dobrow, Chandler, Murphy, & Kram, 2012; Kram, 1985). As Levinson (1978: 98) notes, “mentoring is defined not in terms of formal roles but in terms of the character of the relationship and the function it serves. Similarly, Kram (1985) found that mentoring functions, such as coaching, sponsorship, and personal counsel, are not exclusive to formal mentoring. Instead, they can be found in a variety of developmental relationships with peers and developers from different social spheres. The constellation of these developmental relationships are what Higgins & Kram (2001) define as a developmental network - “people a protégé names as taking an active interest in and action to advance the protégé’s career by providing developmental assistance.” (Higgins & Kram, 2001: 268).

The characteristics of developmental networks are an extension of Kram's (1985) study of mentoring and developmental relationships in organizations. Grounded in qualitative interviews with managers and their direct reports, Kram found that developmental relationship functions converged into two, broad categories: career and psychosocial functions. Career functions of mentoring include coaching, sponsorship, exposure and visibility, protection, and the provision of challenging assignments. Psychosocial functions, on the other hand, involve role modeling, acceptance and confirmation, counseling, and personal friendship. These primary developmental functions have been empirically validated in numerous studies (Noe, 1988;

Ragins & McFarlin, 1990; Scandura & Ragins, 1993). In addition researchers have demonstrated that higher levels of these functions are associated with positive protégé outcomes (Allen et al., 2004; Wanberg et al, 2003; Chandler et al, 2011).

In recent years another set of functions have been identified as relational functions (Ragins & Verbos, 2007). These go beyond the basic career and psychosocial functions first defined by Kram (1985) to include a number of functions that enhance the quality and closeness of such developmental relationships. For example, Ragins (2012) developed a Relational Mentoring Index (RMI) that includes the following functions: Personal Learning and Growth, Inspiration, Self-affirmation, Reliance on Communal Norms, Shared Influence and Respect, and Trust and Commitment (Ragins, 2012). In an in-depth qualitative study of professional developmental networks, Janssen et al (2014) identified five relational functions occurring within developmental networks - intimacy, self-disclosure, emulation, genuine interest, and caring.

Integrating perspectives from social network research (Granovetter, 1982; Burt, 1992) and two decades of research on dyadic mentoring relationships and associated developmental functions, Higgins and Kram (2001) developed a typology of developmental networks based on two primary dimensions: (1) strength of developmental tie, and (2) diversity of network, which included range (the number of social systems from which relationships stem) and density (degree of connectedness of developers). This typology offered a new lens on how multiple developmental relationships might enhance individual outcomes related to personal and professional development.

The strength of a person's developmental networks has since been found to predict important job outcomes such as career advancement (Murphy & Kram, 2010), confidence (Higgins, 2001), optimism (Higgins et al., 2010), job satisfaction (Higgins, 2000; Higgins &

Thomas, 2001; Murphy & Kram, 2010), organizational commitment (Higgins & Thomas, 2001) and a strong sense of professional identity (Dobrow & Higgins, 2005). Further, developmental networks have been found to be a stronger predictor of individual's career outcomes than dyadic relationships such as traditional mentoring or coworker relationships (Higgins & Thomas, 2001). This suggests that people will achieve better outcomes when they rely on a small network of developmental relationships, rather than one strong dyadic relationship such as traditional mentoring or supervisory support.

Assessing Developmental Networks

Developmental networks can be assessed both qualitatively and quantitatively through a network elicitation approach, consistent with methods used in social network analysis (Cummings & Higgins, 2006). The method involves a three step process, starting a (1) *name generation* process, eliciting the names of developments in the network. This is followed by a (2) *name interpretation* process, with questions on the content of the developmental relationships. The final step is questions related to (3) *network structure*, where respondents are asked to describe the relationship between developers. We describe these steps, with examples below. It should be noted that these methods have been useful for both research and educational purposes.

Step 1. Name Generator

The first step in collecting data on a person's developmental network, is to elicit the names of people within the respondent's developmental network. Table 1 presents an example of this approach, commonly used in research on developmental networks (eg. Dobrow & Higgins, 2005; Higgins & Thomas, 2001; Murphy & Kram, 2010).

[Insert Table 1 about here]

Step 2: Name Interpreter

The second step of name interpretation involves questions about people within the developmental network and their relationship with the focal respondent. The purpose of this question is to obtain both the characteristics of developers and the nature of their developmental relationship with the respondent. This data can be analyzed at the dyadic level, for specific relationships, or at an aggregate level, as a measure of network content. Table 2 provides examples of name interpreter questions. These questions have been used in prior research on developmental networks (Higgins, 2001; Cummings & Higgins, 2006)

[Insert Table 2 about here]

Step 3. Network Structure

The final step in a developmental network interview or survey, is a move towards understanding the structural properties of a person's developmental networks. This could be done in a visual manner, by asking respondents to draw lines representing relationships between respondents (see Cross). A more typical approach would be to ask respondents to fill out a network matrix, a common method in social network research (Burt, 1992). An example of this matrix is provided in Table 3.

[Insert Table 3 about here]

A developer data matrix such as the example in Table 3 allows for subsequent analyses on network structure and patterns of relationships between developers. It complements from traditional analyses of mentoring relationships in that it allows for additional consideration on the structure of the interactions between developers and the ways in which this interaction affects the focal protégé.

Analyzing Developmental Networks

The analysis of developmental networks data can be computed through UCINET (Borgatti, Everett, & Freeman, 2002; Borgatti, Everett, & Johnson, 2013) for moderate to large samples or compared qualitatively across cases for smaller samples (Eg. Janssen, van Vuuren, & de Jong, 2013; Richardson & McKenna, 2014; Shen & Kram, 2011).

In this section, we describe key constructs that are useful in analyzing this data. These constructs include:

Network size. The size of a developmental network refers to the number of people who an individual can name as actively supporting them in their personal or professional development. Prior research has identified that the size of a person's developmental network is positively associated with outcomes of job satisfaction (Higgins, 2000; Higgins & Thomas, 2001; van Emmerik, 2004) and performance (Peluchette & Jeanquart, 2000).

However, bigger is not always better. In fact at some point it appears that diminishing returns set in. When an individual has many developers, it is difficult to find the time to deepen the quality of multiple relationships. There is clearly a balance to achieve between depth of

relationships and breadth of relationships. It appears that more often than not individuals seem to be satisfied if they have three to five close relationships in their developmental network at a given time. (Van Emmerick, 2004). And, when asked, mid-career professionals on average mention 12 to 15 developers overall (including relationships that are more instrumental and not particularly deep) (Murphy & Kram, 2014; Dobrow et al, 2011)

Strength of ties. In social network research, the strength of tie refers to a “combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie” (Granovetter, 1973, p.1361). In the context of developmental networks, the strength of tie refers to the quality of the developmental relationship between developer and protégé. The strength of tie can be measured along a number of dimensions, including psychological closeness (Cummings & Higgins, 2005; van Emmerik, 2004), frequency of communication (Cummings & Higgins, 2005; van Emmerik, 2004), or levels of career and psychosocial support (Murphy & Kram, 2010).

As with size of network, there is not an ideal number of strong ties and weak ties. Most scholars working in this area have suggested that the ideal balance of strong and weak ties depend on the personal and professional goals of the focal person, as well as their learning style and various personality factors (Higgins, 2007; Yan, Cotton, & Kram, 2015).

Range and Homophily. The concept of range refers to the diverse social identities represented by members within a developmental network. For example, a high range developmental network would consist of members from one’s organization, from other organizations, family members, and members of the community. In contrast, a low range, or homophilous developmental network is one that might consist of developers from similar communities and backgrounds. Given the nature of today’s workforce, an important part of

range is diversity in terms of race, gender, ethnicity, national origin, and age. A final source contributing to range would be the functional areas within a particular work context that developers come from.

Each type of diversity that is represented in a developmental network offers the possibility of new ideas and perspectives that can enhance the focal person's knowledge, understanding, skills development and preparedness for future opportunities that may appear. When developmental networks are low range, it is possible that the focal individual does not have access to thought provoking ideas that foster learning, risk taking and other growth-enhancing actions.

Network reachability. This concept of reachability refers to access to high status members within a developmental network and varies by how status is defined within a particular context. For example, in a study of scientists, professional reachability could be defined by the developer with the highest academic status within the developmental network. The concept of reachability has not been theorized or examined to date in research on developmental networks. Yet, it is a valid network construct, developed in research on social capital (Lin, 2002). We propose that the concept of reachability will be particularly useful in examining the role of sponsorship and access to expert knowledge in developmental networks.

For example, reachability will be important for the individual who wants to advance to senior executive status within a particular organization. Without such access over time, it is unlikely that the individual will experience sufficient sponsorship at critical moments that would provide access to necessary interim positions and networking opportunities to garner the support for further advancement.

Network density represents the extent to which a network is closely knit. It refers to the interconnectedness of ties within a network and is measured by dividing the total number of identified relationships between network members by the total possible number of ties (Wasserman and Faust, 1994). In research on elite MBA graduates, Dobrow & Higgins (2005) found a negative association between the density of their developmental network and the outcome of professionally identity exploration. This can be a negative for individuals who aspire to change careers or organizations, since developers who know each other well may have similar perspectives and similar contacts thus making it difficult to discover new opportunities that are more distant from the current context.

The difference between dense and sparse developmental networks is illustrated in figure 1. 1. A dense network is one that is characterized by strong connections between developers. While this is characteristic of a strong support network, it has the unintended consequence of reinforcing similar perspectives. In contrast, a sparse developmental network is one where developers are not connected and are likely to be from difference social spheres. A hybrid network, that is neither dense nor sparse, is likely to comprise of one or more mentoring sub-groups, where some developers are connected to others. Examples of these sub-groups could be developers who are within the same organization, or friends who are part of the same community. The differences by network density in developmental networks is illustrated in Figure 1.

 [Insert Figure 1 about here]

Multiplexity. This refers “the extent to which two actors in a network are connected through more than one kind of relationship (Wasserman & Faust, 1994). In the context of developmental networks, multiplexity refers to the occurrence of multiple developmental functions within one relationship. For example, a developmental relationships that involves both sponsorship and coaching can be referred to as a multiplex relationship. In contrast, a non-multiplex relationship is one that is limited to a single developmental function. In research on the developmental networks of baseball hall of famers, Cotton et al. (2011) found that baseball professionals with extraordinary career achievements had developmental networks consisting of greater numbers of multiplex relationships.

It is generally the case that multiplex relationships are characterized by greater tie strength than relationships which only provide one developmental function. Accordingly, these stronger ties are characterized by greater intimacy and deeper learning opportunities. They are what Positive Organizational Scholarship scholars define as high quality connections which lead to increases in self-esteem, sense of empowerment, new knowledge and skills, and the desire for more connection (Dutton & Ragins, 2007; Dutton & Heaphy, 2003; Fletcher & Ragins, 2007). For example, a developer who offers challenging assignments and sponsorship, as well as affirmation, friendship and/or role modeling, is likely to know the protégé better than if they only provide challenging assignments. When the relationship is deep in familiarity and mutual respect, both individuals have greater opportunities to learn and benefit more fully from the connection.

Fostering Developmental Networks in Practice

It has been over a decade since this new mindset on mentoring - the developmental network perspective - has been part of the discourse about mentoring (Higgins & Kram, 2001;

Kram & Higgins, 2008; Dobrow et al, 2011). Yet, we are only beginning to see its application in various settings such as healthcare (DeCastro, Sambuco, Ubel, Stewart, Jagsi, 2013), public administration (Kim, 2014), higher education (De Janasz, S. C., & Sullivan, S. E, 2004), and with entrepreneurs (Gruber-Muecke & Kailer, 2015). For the most part, the idea of mentoring as a small network of developers, in contrast to a single relationship, is beginning to take hold as part of education and training opportunities on the subject of mentoring. In particular, organizations have begun to experiment with alternatives to formal dyadic mentoring program, such as group mentoring and mentoring circles, where developmental networks are formed in support of the development of a target group of employees (Emelo, 2011; Murphy & Kram, 2014).

In higher education, for example, in MBA and undergraduate classrooms we have been including mentoring as a core topic to increase students' awareness of the important role that developmental relationships play in personal and professional development. In contrast to two decades ago, we now define mentoring in its original form as well as in its new form as a developmental network. Students are invited to reflect on their experiences with mentors as well as their current developmental networks. Using one of the assessment tools now available (Murphy & Kram, 2014; Higgins, 2004), students have the opportunity to assess whether their current developmental network aligns with their current personal and professional goals. Most often they identify a gap in shared reflection exercises with their classroom peers. The outcome of this work is an action plan for inviting new developers into their developmental network and perhaps letting go of one or more relationships that are no longer vital or relevant to their ongoing learning and development. This same kind of education and training practice has been introduced in leadership education offered within corporate settings, as well as in leadership

development programs offered by external centers for leadership development (Bossen & Yost, 2013; George, George, Baker, & Leider, 2011).

While historically, mentoring and coaching were topics covered as dyadic relationships that are essential for leaders to build with more experienced colleagues and less experienced colleagues, participants are now encouraged to consider these individual relationships in the context of their developmental networks. Some are now referring to this concept as a “personal board of advisors” (Yan, et al, 2015). In doing so, participants are encouraged to consider potential developers (advisors) both inside and outside their organization, as well as the critical dimensions of the structure of their developmental networks including size, density, diversity, strength of ties, reachability, and multiplexity. Chandler et al, (2010) have aptly described developmental networks as a low cost alternative to talent development.

It should be emphasized that the shared reflection among classroom participants that lead to new insights regarding the strengths and limitations of one’s developmental network. Frequently, in the dialogue between peers, members see in another’s story an opportunity for a new developmental relationship that they had not yet considered. In some instances, peer mentoring or peer coaching is introduced as an explicit part of a leadership development program so that participants experience a new developmental alliance while in a program which they can continue to nurture afterward (McCauley & Guthrie, 2007; Parker et al, 2014; Parker et al, 2008). Thus, the pedagogy includes both content and process elements which enable participants to strengthen the mentoring they receive from their developmental networks as they move forward from the education they have experienced.

Self-assessment and action planning activities are substantially enhanced by the introduction of material on different types of developmental relationships including mentors,

sponsors, coaches, reverse mentors, and mentoring circles (Murphy & Kram, 2014). This information expands individuals' understanding of the alternatives to traditional mentoring relationships and makes it more likely that they will enlist a wider range of developers in to their developmental networks. We have begun to work with executive coaches as well, for when they bring a developmental network perspective to their one-to-one work with clients, they can encourage them to assess their current system of support, and to consciously plan how to enlist others with whom they can develop reciprocally rewarding connections.

In order for individuals to be able to leverage learning about different types of developers, and the developmental network perspective more generally, they will need the relational skills to initiate, nurture, and maintain or transform ongoing relationships (Schein, 2010). An understanding of the potential of a developmental network that is aligned with personal goals is only a first step. Self-assessment and shared reflection must be combined with skill practice in deep listening, empathy, self-disclosure, giving and receiving constructive feedback, and self-management (Sigetich & Leavitt, 2008; Pearce, 2007). Most recently, such relational skill training has been combined with a diversity lens so that individuals develop the capacity to build relationships that cross gender, racial and ethnic boundaries as well (Wasserman & Blake-Beard, 2010; Holvino, 2010).

Finally, and perhaps most obviously, are the formal mentoring programs that have been around now for several decades. These have produced some good results in terms of increased satisfaction, commitment and performance (Allen, Finkelstein, & Poteet, 2009; Allen, Eby, & Lentz, 2006), yet it is our view that the primary focus on matching of dyadic relationships may be limiting the impact of these initiatives. Such formal programs emphasize the one special mentoring relationship, rather than a small network of developers (perhaps including a formally

assigned mentor as one of these). There are several instances of such programs modifying their education and training infrastructure to emphasize the fact that the formally assigned relationship is one of several that participants should cultivate. Here, the message becomes that the matched relationship is one where participants can practice and develop the relational skills to bring to other relationships that have developmental potential.

Perhaps most importantly, a number of organizations are beginning to conceptualize formal mentoring programs as mentoring circles---groups of 8-10 participants whose primary purpose is to support the learning and development of its members. Sometimes these groups are comprised of peers, and sometimes they include one or more senior mentors to guide the group in its learning process (Murphy & Kram, 2014). The design is based on the premise that individuals will enhance their developmental networks by participating with peers (and potentially seniors) in an ongoing group characterized by support, confidentiality, positive regard, effective helping behaviors. In essence the mentoring circle program touts the foundational idea of having multiple developers, many of whom may come from this particular mentoring circle. The (usually) year long experience of monthly meetings provides members with the skills and experiences and practice to continue building developmental relationships, even after the program ends. Examples of these are evident today at Sodexo, CBIZ, Boston Scientific, and Brigham & Women's hospital in Boston, where physician mentors are meeting in year-long mentoring circles to enhance their skills in developing others, including their peer physicians (Tsen et al, 2012). Other examples include peer-advisory groups, such as those hosted by the Young Presidents Organization, for professionals at similar levels within an organization, and peer coaching groups in business schools (Parker, Kram, & Hall, 2014)

Directions for Future Research

Developmental networks represents a paradigm shift in the study and practice of mentoring – from mentoring dyads to mentoring as a constellation of developmental relationships. This shift requires new methods and suggests new questions that can be examined by mentoring scholars.

The following are some potential areas for future research:

1. Distributed Mentoring. With a focus on developmental networks, researchers could examine how mentoring occurs as a distributed function across multiple developers. This enables researchers to examine the distributed and sometimes coordinated characteristics of mentoring occurring in multiple mentor situations, such as developmental networks initiatives in professional education (Johnson, 2014) or group mentoring, often involving multiple peers in a formal mentoring initiative (Hooker, Nakamura, & Csikszentmihalyi, 2014; Huizing, 2012). In particular, group mentoring has been found to be more effective than traditional dyadic mentoring medicine in the training of physicians (DeCastro, Sambuco, Ubel, Stewart, Jagsi, 2013). Research from a developmental network perspective could unpack the mechanisms behind this.

2. Diversified Mentoring. Issues of social inclusion and diversity are important and longstanding concerns in mentoring research (Clutterbuck & Ragins, 2002; Kochan & Pascarelli, 2012). In particular, findings have established how both women face systemic social barriers in access to mentors (Ragins & Cotton, 1991). These dynamics can be explored further through a developmental network perspective. In particular, the longstanding concern about “old boys networks” in organizations (Kanter, 1977) could be examined through a closer inspection of

gender differences and dynamics in the developmental networks of men and women in management. More broadly, research on social identity dynamics within developmental networks could help advance what Ragins (1997) describes as diversified mentoring – relationships “comprising mentors and protégés who differ on the basis of race, ethnicity, gender, sexual orientation, class, religion, disability, or other group memberships associated with power in organizations” (Ragins, 1997: 482). We have yet to understand how different patterns of diversity in social group memberships amongst developers impact the support and development of a focal individual.

3. Individual Differences and Developmental Networks. Prior studies on developmental networks have focused primarily on the consequences of developmental networks for well-being and career success (Dobrow et al., 2012). Building on these studies, there is need for further research on the antecedents to developmental networks, and in particular, the role of individual differences in predicting the composition and content of a person’s developmental network. Individual differences, such as personality, developmental position, gender, and proactivity, have been proposed as important antecedents (Chandler et al., 2010; Dougherty, Cheung, & Flora, 2008) and have yet to been empirically examined.

4. Attachment dynamics within Developmental Networks. Research on dyadic mentoring processes have drawn substantive insights from attachment theory – a theory that examines how and why people seek (or avoid) close relationships (Bowlby, 1973; Germain, 2011). More specifically, studies have examined the influence of individual attachment styles on mentoring processes such as feedback seeking (Wu, Parker, and de Jong, 2014), feedback acceptance

(Allen, Shockley, & Poteat, 2010), and the willingness to mentor (Wang, Noe, Wang, Greenberger, 2009). Attachment styles refer to a person's internal working models of relationships and comprise of three different categories: anxious, avoidant, and secure attachment (Bowlby, 1973; Fraley, 2002). By focusing on the context of developmental networks, researchers interested in attachment dynamics, could study the conditions where convergence (or divergence) of attachment styles, across multiple relationships, could be developmentally beneficial. For example, one could examine the strength of attachment security within a developmental network by considering not only individual differences in attachment style, but by looking at levels of agreement in the attachment styles of developers within the network.

5. Organizational Interventions. With this relatively new understanding of mentoring as a developmental network, it seems critical to bring this in to organizational settings where dyadic mentoring has been a significant tool for employee development and leadership development for at least two decades (Allen, et al, 2009). Rather than encouraging individuals to form single dyadic relationship (often assigned through a formal program sponsored by HRM or Talent Development staff), a new mindset on mentoring would encourage individuals to look at their current developmental networks and consider how these could be strengthened through proactive planning and action designed to invite potential developers to take an interest in their learning and development. Such initiatives might be initiated in the context of a leadership development program, a mentoring training program, or as part of a mentoring circle initiative in which every member of the circle is encouraged to examine and strengthen their development networks. Accordingly, this opens up opportunities for research into the effectiveness of such interventions.

6. Organizational Cultures and Developmental Networks. An organization's culture can shape the career orientation of its employees, with consequences on developmental relationships (Hall & Yip, 2014). Developmental networks can be a unique window to examine this dynamic. For example, we hypothesize that the effectiveness of developmental network interventions would be moderated by an organization's career culture. More specifically, in cultures that value relationship building, learning, and reflection as part of the everyday work of organizational members, the idea of periodically examining and re-building developmental networks will be considered an important and valued activity. In contrast, this same idea will be viewed less favorably (and as a distraction from the work itself), in a highly results oriented, hierarchical culture, in which learning and relational learning in particular, are not valued. (Murphy & Kram, 2014)

7. Evaluation of Mentoring Programs. The methodological tools of network analysis could be used to strengthen the understanding and evaluation of mentoring programs. In particular, a promising avenue of research would be to examine how dyadic mentoring relationships influence the broader composition of a protégé's developmental network. This could elucidate how the benefits of traditional mentoring extend beyond the dyad. For example, in a longitudinal quasi-experimental study, Srivastava (2015) found changes in the network composition of participants in a traditional mentoring program, and gender differences in the benefits that participants derive from these changes.

Situating Developmental Networks in a Mentoring Ecology

Mentoring relationships do not occur in a vacuum, but rather in a relational ecosystem comprised of multiple relationships, shaped by broader cultural norms and beliefs about mentoring. Developmental networks are situated within this ecosystem, comprised of dyadic mentoring relationships, and nested within a broader ecology of beliefs and practices about mentoring. The dynamic nature of these nested relationships suggests an ecological systems perspective on mentoring (Chandler, Kram, & Yip, 2011) – a perspective that considers how traditional dyadic mentoring and developmental networks are not exclusive, but rather co-existing relational systems.

In contrast, to an input-output model of mentoring, an ecological perspective suggests a consideration of mentoring as a property of a whole system, rather than an exchange that occurs between individuals. For example, a person may be engaged in a formal mentoring relationship, but may also be receiving mentoring support from peers and family members, whose mentoring may be influenced by their role and the social context that they are nested within. At one level, these relationships are nested within a person’s developmental network; at another level, these developmental relationships are nested within a broader social and cultural ecology. Figure 2 illustrates these broad nested systems in context.

 [Insert Figure 2 about here]

Figure 2 illustrates our proposed framework for understanding the role of developmental networks within a mentoring ecology. As represented in the model, mentoring relationships are nested within developmental networks, which in turn are nested in a broader cultural beliefs and practices about mentoring. This model is an extension of Bronfenbrenner’s (1979) ecological

systems theory – a theory which suggests that human development and relationships are not isolated, but rather occur within multiple reciprocal systems. As Bronfenbrenner (1979) notes,

“The understanding of human development demands more than the direct observation of behavior on the part of one or two persons in the same place; it requires examination of multi-person systems of interaction not limited to a single setting and must take into account multiple setting.” (Bronfenbrenner, 1979:21)

Research on developmental networks can inform and open up new ways of examining mentoring as an ecological system. In particular, developmental networks provide a link to examine how macro-systems (such as culture) can influence the composition, structure, and interaction across developers within a developmental network. This dynamics offers promise for future research in mentoring. For example, through research on developmental networks, it is possible to examine how people are shaped by diverse cultural influences, represented by relationships with developers from different cultures. Research by Mao and Shen (2015) for example, examine the process of cultural identity change in expatriates, through the lens of expatriate developmental networks. At a broader level, research on developmental networks have also revealed how macro-level institutional logics influence the composition of developmental networks within particular industries (Cotton, 2013).

In practice, an ecological approach to mentoring requires more than the selection, training, and assignment of competent mentors in a formal mentoring program – this is a common practice in organizations. Instead, an ecological approach to mentoring is about

creating environments for developmental networks to thrive – where people are engaged in multiple and diverse developmental relationships, in addition to relationships with formal mentors. As prior research has shown, informal mentoring is a stronger predictor of mentoring outcomes over formal mentoring (Ragins & Cotton, 1999; Eby, Allen, Hoffman, Baranik, Sauer, Baldwin, Evans, 2013). Further, organizational support for mentoring has been found, across studies, to be an important predictor of mentoring (Ghosh, 2014).

In conclusion, our chapter has described how research on developmental networks can enhance the science and practice of mentoring beyond traditional dyadic relationships. Research on formal mentoring relationships suggest that a single mentor is not sufficient to meet a person's developmental needs (Baugh & Scandura, 1999; Higgins and Thomas, 2001; De Janasz & Sullivan, 2004). As a complement to research on formal and dyadic mentoring relationships, a developmental network perspective offers an expanded understanding of how mentoring functions occur across multiple developmental relationships and how the composition and structure of these relationships influence outcomes related to learning and performance. By considering mentoring as a relational system involving multiple developers, a developmental network perspective opens up new approaches to further the science and practice of mentoring.

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Table 1. Example of a name generator

Think about the people who **currently (in the last year)** have taken an **active interest** and **action** to advance your career by assisting you with your personal and professional development. Think broadly, these may be people from your work or outside of work (eg.. mentors, coaches, family members, peers, professional contacts, friends, etc.).

In order of importance, please list their first names or initials in the spaces below:

Table 2. Example of name interpreter questions.

	Construct	Question
1.	Length of Relationship	How many years have you known this person?
2.	Social Arena (Higgins, 2001)	<p>Please indicate one of the following that best describes your relationship with each person</p> <ul style="list-style-type: none"> • Family member • Community member • Friend outside of your organization • Coworker from your organization • Professor/teacher • Someone you worked for • Co-worker from a previous employer
3	Frequency of contact	<p>How often do you communicate with this person?</p> <ul style="list-style-type: none"> • Less than once a month • Once or twice a month • 3-5 times per month • A few times a week • Daily
4.	Psychological Closeness	<p>How close do you feel to this person?</p> <ul style="list-style-type: none"> • Very close • Close • Less than close • Distant
5.	Psychosocial Support (Cummings & Higgins, 2006)	<p>Please indicate the extent to which the person does the following:</p> <ul style="list-style-type: none"> • Is a friend of yours • Cares and shares in ways that extend beyond the requirements of work • Counsels you on work and non-work related matters <p>Items are assessed on a 7-point scale (1, never; not at all to 7, to the maximum extent possible)</p>
6	Career Support (Cummings & Higgins, 2006)	<p>Please indicate the extent to which the person does the following:</p> <ul style="list-style-type: none"> • Provides you with opportunities that stretch you professionally

		<ul style="list-style-type: none"> • Creates opportunities for visibility for you • Opens doors for you professionally <p>Items are assessed on a 7-point scale (1, never; not at all to 7, to the maximum extent possible)</p>
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Table 3. Example of Matrix

Use the following grid to indicate if and how well these people know each other. Indicate 1 if the two individuals know each other and 0 if they do not know each other.

	a.	b.	c.	d.	e.	f.
a.						
b.						
c.						
d.						
e.						
f.						

Figure 1. Differences in Network Density

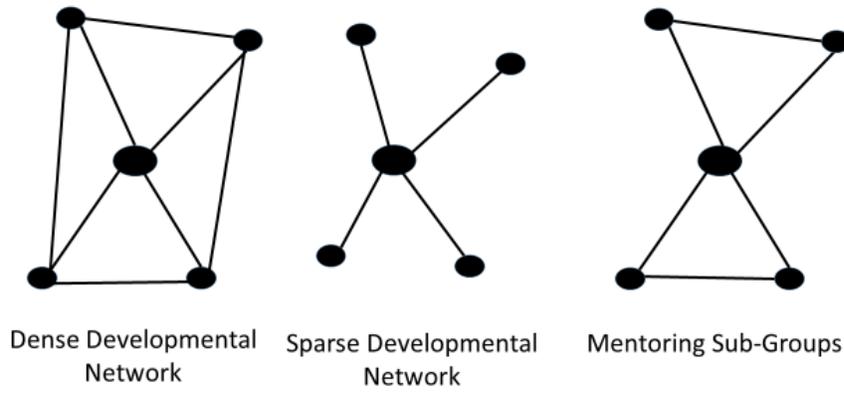


Figure 2. Levels of Analysis in Mentoring Research

