Developmental Networks and Professional Identity: A Longitudinal Study

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Structured Abstract

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Purpose
This paper examines the relationship between individuals' developmental mentoring networks and a subjective career outcome, clarity of professional identity. We explore (1) whether developmental networks change over time, and if so, how, and (2) how developmental network characteristics are related to professional identity over time.

Design/methodology/approach
This is a three-wave, longitudinal survey study, covering a span of 5 years (1996-2001). The participants (n=136), who were full-time MBA students at the inception of the study, provided complete developmental network data on each of the three surveys. We leveraged our unique longitudinal data using two analytical methods, individual growth modeling and multiple regression models.

Findings
Developmental networks change over time. Further, developmental network density, which reflects the professional identity exploration process, is negatively related to clarity of professional identity.

Research limitations/implications
The study is limited by our use of graduating MBA students from a single, top-20 business school as participants.

Practical implications
Our findings suggest that people might be able to improve their careers through making changes in their developmental networks, particularly during the early years of their careers.

Originality/value
This paper provides novel insights to the mentoring, identity, and careers literatures, as well as applying an underutilized statistical technique, individual growth modeling. Given the previously uncharted territory of understanding the dynamics of developmental networks and its relationship to career outcomes, our study opens up avenues for future research, while also answering questions about developmental networks and the ways they change with time.

INTRODUCTION

One of the most important functions of mentoring is the cultivation of professional identity (Kram, 1985). Yet the extent to which developmental relationships enhance the clarity of people's professional identity has not been examined. Consistent with recent conceptualizations of the mentoring support individuals receive during their careers (Higgins and Kram, 2001, Seibert *et al.*, 2001), this paper focuses not just on dyads of mentoring support but on networks of developmental relationships.

Careers researchers have begun to examine the effects of developmental networks on a variety of career outcomes (Higgins, 2001a, Higgins and Thomas, 2001, van Emmerik, 2004). However, the *dynamic* nature of developmental networks has not been examined, and accordingly, the role that an evolving developmental network may play in enhancing the clarity of professional identity remains unexplored. This paper begins to address this gap by studying both the changes that may occur in developmental network structures over time and the relationship between these network characteristics and one important subjective career outcome, clarity of professional identity.

In the challenging career context of the new economy (see Sullivan, 1999 for a review), it is critical that researchers develop a solid understanding of identity, particularly *professional* identity, and the factors that influence its development. Research has suggested that people develop their professional identities through the exploration of multiple selves, relationships, or organizations (e.g. Hall *et al.*, 1997, Ibarra, 1999, Kram, 1996). This view is consistent with Arthur and Rousseau's notion of boundaryless careers (1996). Compared to traditional organizational settings, boundaryless career environments act as weaker situations (Bell and Staw, 1989, Weick, 1996), thus allowing individuals' identities to serve as a key force in shaping

their careers (Hall, 2002). Further, Hall (2002) has articulated that in order for people to successfully realize their career potential in the current career context, it is imperative that they develop two metacompetencies: self-knowledge or identity awareness and adaptability. Only with adequate identity awareness can this adaptability be utilized appropriately (Hall, 2002).

Professional identity development, such as through the exploration of multiple selves (Ibarra, 1999) or self-awareness processes (Hall, 2002), occurs over the course of time. Given that developmental networks deal with professional and psychosocial support in the context of careers, which by definition unfold over time (Hall, 2002), the element of time also plays a key role in this perspective. Both professional identity development and developmental networks necessitate a longitudinal view of their changes or stability over time, rather than taking a snapshot view of a network or an individual's professional identity at a single point in time. Yet research has not examined developmental networks over time or how these network dynamics might relate to professional identity development. In part, this dearth of research stems from methodological constraints, such as the difficulty of studying both individuals and their networks of relationships over time. Thus, the majority of social network research centers on the consequences of existing network structures and/or employs cross-sectional designs (e.g., Burt, 1992, Burt and Minor, 1983, Granovetter, 1973, Higgins, 2001a, van Emmerik, 2004).

The present research addresses these issues with a unique, longitudinal dataset of individuals' complete developmental networks. During the 5-year timeframe of the study, the participants made the transition from graduate school into the workforce and spent several years working. This context allowed us to capture the most important phase of professional identity development, the early-career years (Ibarra, 1999, Schein, 1978), and so, examine the relationship between individuals' developmental networks and their professional identities.

Thus, the research presented here addresses the following questions: First, do developmental networks change over time, and if so, how? Second, how are developmental network characteristics related to professional identity over time?

THEORETICAL BACKGROUND AND HYPOTHESES

Developmental Networks

Traditionally, mentoring has been viewed as occurring between two people, a junior and senior person within a single organization. Recent work in this area has broadened the conceptualization of mentoring considerably. Higgins and Kram (2001) put forth the developmental network perspective which suggests that individuals gather both professional and psychosocial support from a number of people who may be connected to one another. Thus, individuals receive career and psychosocial support from "the set of people a protégé names as taking an active interest in and action to advance his or her career by providing developmental assistance" (Higgins and Kram, 2001: 268) rather than from one focal mentor. Further, multiple mentoring relationships can occur across hierarchical levels, including superiors, peers, and subordinates, as well as within and outside of the organizational context (de Janasz *et al.*, 2003, Higgins and Kram, 2001, Higgins and Thomas, 2001). Recent research has shed light on the relationship between developmental networks and work satisfaction (van Emmerik, 2004), intentions to remain with a firm, organizational retention and promotion (Higgins and Thomas, 2001), career success (de Janasz *et al.*, 2003), protégé attitudes toward the work setting (Baugh and Scandura, 1999), and the decision to change careers (Higgins, 2001a).

Professional Identity

Organizational researchers have increasingly paid attention to the importance of career or professional identity—"the relatively stable and enduring constellation of attributes, beliefs, values, motives, and experiences in terms of which people define themselves in a professional role" (Ibarra, 1999, Schein, 1978)—for achieving both objective and subjective success (Hall, 2002, Ibarra, 1999). Traditional adult development researchers (e.g. Levinson *et al.*, 1978, Super, 1957, Super *et al.*, 1996) suggested that people proceed through a fixed path of alternating stages and transitions. Accordingly, in this view, the development of professional identities occurs as a natural byproduct of the progression through each of the career phases.

In contrast to this passive notion of identity development, more recent careers research has found that people actively develop their identities through acquiring the ability to process feedback about the self and achieve self-awareness (Hall, 2002) and through improving their capacity to interact with the complexities of their environments (Kegan, 1982, Kegan, 1994). A key example of this new line of careers research is Ibarra's idea that people construct their professional identity by first experimenting with trial identities, or "provisional selves," before fully developing their professional identity (Ibarra, 1999). In her discussion of the individual and situational antecedents of identity development, Ibarra calls for empirical, organizational research that investigates the connections between networks and identity (Ibarra, 1999, Ibarra, 2003). The present research aims to fulfill this need.

Professional Identity Exploration and Developmental Network Density

Developmental networks are a key means by which people can explore their possible selves and construct their professional identities (Ibarra, 1999). Specifically, the mutual trust, interdependence, and reciprocity that characterize relationships in the developmental network (Higgins and Kram, 2001, Kram, 1996) offer a powerful medium for reflecting and shaping the

protégé's professional identity (Cooley, 1902, Goffman, 1959, Mead, 1934, Swann, 1987). Ibarra noted that identity adaptation and change are most likely to occur during career transitions (Ibarra, 1999), such as during the transition from school to work or between jobs. Thus, career transitions are a prime opportunity for developmental networks to have a significant impact on the protégé's professional identity development.

Research suggests that professional identity development is influenced by the amount of variety of assistance individuals receive in their careers. For example, Ibarra (1999) proposed that individuals who have a greater variety of role models gain a broader repertoire of possible selves. Having a broad repertoire enables individuals to engage in adaptation tasks that can increase their likelihood of successful professional adaptation, including developing a professional identity that suits their present context. The breadth of the repertoire of possible selves that people have at their disposal is affected by numerous individual and situational antecedents (Ibarra, 1999). Additional research has demonstrated that diversity in developmental mentors is associated with increased career-related cognitive flexibility and career change (Higgins, 2001a). This further suggests that the amount of variety in individuals' developmental networks enables increased exploration of one's professional identity.

In social networks research, variety within a network is represented by the notion of network diversity. According to this view, a critical attribute of an individual's network is the degree to which it provides access to different kinds of resources and information. In particular, the more diverse one's network, the greater one's access to non-redundant resources and information (Burt, 1992, Burt and Minor, 1983, Granovetter, 1973). Network diversity is generally conceptualized either as: 1) network range, the number of social systems from which the network members come, or 2) network density, the extent to which the members of the

network know and/or are connected to one another (Brass, 1995, Burt and Minor, 1983, Higgins and Kram, 2001, Krackhardt, 1994).

Developmental network range and density are exemplified as follows: In a high-range developmental network, developers would be drawn from multiple social contexts, such as from an employer, an educational institution, a professional association, and a community organization, whereas a low-range developmental network would consist of developers coming from a single context, such as all from the employment setting. In a high-density developmental network, developers would know one another, whereas a low-density developmental network would consist of developers who do not know one another. Both range and density tap into the degree of redundancy in the network (Brass, 1995, Burt and Minor, 1983). Therefore, the greater the range or the lower the density of the network, the less redundant the network is and the greater the access to important information (Higgins, 2001a, Higgins and Kram, 2001). In the present research, we employ density as our conceptualization of developmental network diversity. We chose to focus on density, rather than range, because of the precedent set by prior social network research (Wasserman and Faust, 1994).

Developmental network density and the breadth of one's repertoire of provisional selves fulfill similar functions in the development of professional identity. By providing access to non-redundant, career-related information, both low-density and hence high-breadth of repertoire facilitate professional identity exploration. Thus, we expect that our focus on developmental network density provides insight into professional identity exploration.

Hypotheses: Developmental Network Density over Time

To begin our investigation of relationships between professional identity exploration and developmental network diversity, we focus on examining the fundamental nature of developmental network density over time—that is, how does developmental network density change with time? This reflects our first research question. The literatures on feedback-seeking (Ashford and Northcraft, 1992, Levy *et al.*, 1995) and help-seeking (Fisher *et al.*, 1982, Higgins, 2001b, see Wills, 1991, for a review), both of which are foundational elements for developmental network construction, have shown that different types of individual- and organizational-level factors impact the degree of these network-related behaviors. For example, research has found that individual-level factors, such as perceptions of evaluation during a learning task (Higgins, 2001b), shyness (DePaulo *et al.*, 1989), and gender (Baugh *et al.*, 1996), impact help-seeking behaviors, while on the organizational level, feedback-seeking decreases in more public and more evaluative environments (Ashford and Northcraft, 1992, Levy *et al.*, 1995). Thus, given the host of variables at play in shaping individuals' propensity to seek out help and support in their careers, we expect that developmental network density varies across people. That is, at any common point in the early career, we expect that people will have different baseline levels of density with respect to their developmental network structures:

> *Hypothesis 1a. Developmental networks' early-career density levels vary across people.*

In addition to considering baseline differences in developmental network density, we consider how this network characteristic changes over the course of time. More specifically, we investigate how this network characteristic unfolds in conjunction with individuals' careers, which consist of periods of transition and stability (Levinson *et al.*, 1978, Super, 1957, Super *et*

al., 1996). Since career transitions are often accompanied by advice-giving and receiving (e.g., Higgins, 2001a), the density of individuals' developmental networks should vary over the course of their careers, possibly increasing during the periods of transition and decreasing during the periods of stability. At a more fundamental level, we expect the following:

> *Hypothesis 1b. The density of people's developmental networks changes over time.*

Hypothesis 1b allows us to examine two elements of change simultaneously: 1) Does the density associated with a "population" of individuals change over time? and 2) Is there change in developmental network density occurring within individuals over time? Regarding the first question, if the answer to this question is yes, then this indicates that, on average, individuals in the population are exhibiting change in the same direction. If the answer is no, this suggests that either the entire population's density levels are remaining stable over time or that individuals are changing, but in different directions than one another (resulting in a mean rate of change of zero). The second issue Hypothesis 1b taps into is whether individuals' developmental network structures are changing, regardless of what the mean level of change is within the population.

Our third hypothesis builds on the notion that people differ in the degree to which they engage in help-seeking in their careers. Building on prior work which suggests that help-seeking behavior and, thus, mentoring relationships and developmental networks are dynamic (e.g., Hall, 2004, Higgins and Kram, 2001, Kram, 1985), we hypothesize that this difference occurs not just during the early career stage (as in Hypothesis 1a) but over time. In other words, the rate at which developmental network density changes should vary across people. Therefore, we expect

that within the group of individuals whose density levels are changing over time, some are changing more rapidly while some are changing at a slower pace.

Hypothesis 1c. There are different rates of change in density across people.

Hypotheses: Developmental Network Density and Professional Identity

Our second research question focuses on the relationship between developmental network density during earlier career stages with individuals' clarity of professional identity during a later career stage. In other words, we ask, are early-career developmental network structures linked with greater clarity of professional identity at a subsequent career stage?

Ibarra proposed that the greater the variety of role models, the greater the opportunity for increased self-knowledge (Ibarra, 1999). A developmental network of highly varied mentors consists of members who do not know one another. In density terms, this example translates into in a *low* density network. At the other end of the spectrum, a narrow group of mentors in which all members know one another is a *high* density network. Prior research suggests that greater diversity of developmental network structures is associated with greater variety in information and resources as well as greater cognitive flexibility (Higgins, 2001a), which should enhance an individuals' professional identity exploration. Thus, since, as Ibarra suggested (1999), exploration leads to professional identity clarity, we expect that the relationship between developmental network density and clarity of professional identity will be negative.

As with the previous hypotheses, we examine several aspects of the time and timing of developmental network density as it relates to professional identity clarity. First, as with Hypothesis 1a, which examines whether there is variance in early-career density levels, Hypothesis 2a investigates the relationship between early-career density levels and professional

identity clarity several years into one's career. As previously argued, we expect to find a negative relationship, such that:

> *Hypothesis 2a. Early-career density is negatively related to clarity of professional identity.*

Early-career density represents a snapshot view of individuals' developmental network density at the beginning of their careers. In addition, we explore the relationship between general density—or the density level that characterizes a broader timeframe of one's early career—and clarity of professional identity. In line with prior arguments, here too we expect to find a negative relationship:

> *Hypothesis 2b. General density is negatively related to clarity of professional identity.*

Finally, we examine a third view of density, density dynamics, and its relationship to clarity of professional identity. The importance of understanding identity as the product of an unfolding, dynamic process has been highlighted by careers researchers, including Hall's recent depiction of the relationship between self-awareness, identity, and leader development (Hall, 2004). More generally, careers researchers have proclaimed the need for understanding the evolution of career phenomena over time through longitudinal methods (e.g., Barley, 1989, Hall, 2002).

Examining how change in density relates to clarity of professional identity provides insight into the professional identity exploration *process*. If the density of an individual's developmental network increases, such that the network is becoming more insular, this indicates that the exploration process is diminishing, yielding a decreased sense of clarity with respect to professional identity. In contrast, if density decreases, such that the network is broadening, this

reflects a greater engagement in the exploration process and leads to increased clarity of professional identity. Hence, we hypothesize that density dynamics are associated with clarity of professional identity as follows:

> *Hypothesis 2c. Density dynamics are negatively related to clarity of professional identity, such that a positive change in density (e.g., density is increasing over time) is associated with a decrease in clarity of professional identity and such that a negative change in density (e.g., density is decreasing over time) is associated with an increase in clarity of professional identity.*

METHODS

Sample and Procedures

Participants in this three-wave, longitudinal study were students from a top-20, East Coast, full-time MBA program. The first survey was administered during the spring of 1996, the peak career search and decision-making period for this group of individuals. The survey was developed following open-ended interviews and open-ended surveys with 50 volunteers from one section of the 87 MBA students of the class of 1996. Prior to the study, the authors had no direct contact with this section. Participants were told that this was a longitudinal project called *Building Career Foundations*.

At the end of February 1996, a representative group of 20 students took a pilot version of the survey. Changes were made based on recommendations from the pilot survey respondents, and a final survey was administered in early March. The final survey included four main sections: personal and career history, important relationships, job search and career planning, and current organizational environment and activities. Respondents completed a fifth section regarding their final career choice once they had accepted an offer of employment and knew the specifics of their jobs and compensation packages. Pilot tests suggested that the survey took an average of 1.5 hours to complete.

The final written survey was administered to people solicited through two different methods. First, the survey was administered to one MBA section of 87 students in a group meeting. Approximately 70 percent of the section attended this two-hour meeting; those who were unable to attend the meeting were mailed a survey. Of this group of 87 people, 67 ultimately returned fully completed surveys, representing a 77 percent response rate. Second, surveys were sent to a random selection of 300 individuals from the MBA class of 1996. The demographic composition of this second group accurately reflected the composition of the entire class of 1996 in terms of race and gender. For this second method of data collection, surveys were placed in student mailboxes. Of the 300 surveys distributed, 69 were fully completed by students, representing a response rate of 23 percent for this second group and a total combined response rate for both methods of data collection of 50 percent.

Comparing answers from the approximately equal number of completed surveys from the two methods of participant solicitation (n=67 and n=69), no statistically significant differences were found with respect to the means of any of the main variables of interest. Therefore, the two samples were pooled for a total combined sample size of 136. Finally, to guard against possible response bias, data were also gathered from the career services department and school records and compared those who responded to the survey with those who did not respond. There were no significant differences between the two groups for the demographic variables such as gender, marital status, and age.

Of the initial sample of 136 students, 28 percent were women, 34 percent were non-U.S. citizens, 32 percent were married, and 24 percent had one or more graduate degrees when they entered business school. The average age of the respondents was 27 years (S.D.=2.23), and their average full-time work experience was 3.85 years (S.D.=1.84). Prior to attending business

school, approximately 75 percent of the respondents worked in service industries; 25 percent worked in manufacturing industries. The jobs they held varied considerably—approximately 27 percent were in consulting, 26 percent were in finance or business development, 19 percent were in general management, 15 percent were in marketing, and 7 percent were in manufacturing management. The pre-graduate-school base salary ranged from US$40,000 to US$60,000, while the average post-graduation salary was US$75,793 (S.D. = US$15,192).

The second data collection in this longitudinal study occurred two years after the initial data collection, in Spring 1998 (n=108, 79 percent response rate), and the final survey was completed in 2001 (n=87, 64 percent response rate). These second and third surveys consisted of repeated measures from the initial survey, including measures of participants' developmental networks, and questions about up-to-date employment information. No significant differences between those who did and those who did not return surveys after graduation were found along any of the main variables of interest, including developmental network characteristics.

Developmental Network Measures

The name-generator device used in this study asked respondents to list those people who "currently (i.e., at some time over the last year) [took] an active interest in and concerted action to advance [their] career[s]…. [and who] may assist [them] in personal and professional development." Consisent with recent research that has encouraged researchers to examine both extraorganizational as well as intraorganizational helping relationships (Higgins and Thomas, 2001, Thomas and Higgins, 1996), respondents were given clear instructions to "think broadly" when they named individuals, including those they "work or have worked with, friends, or family members." On average, participants identified 4 people in their developmental networks,

which is consistent with prior content-specific network research (Podolny and Baron, 1997). In total, detailed information was collected on 583 relationships.

Developmental network diversity: density. On the surveys, participants filled out a complete network chart. For each possible pair of people in the network, participants indicated whether the members of the pair knew one another or not. Consistent with social networks research, density was calculated as the number of these "knowing ties" divided by the number of possible ties in the entire developmental network (Anderson *et al.*, 1999).

Professional Identity Measure

We measured professional identity on both the second and third surveys in this longitudinal study. Measuring this construct at the end of the study (Survey 3) allows us to view it as an outcome of the developmental network dynamics that occurred in the years preceding this measurement, while also controlling for professional identity in the previous time period (Survey 2). Four items were used to measure professional identity, including, "I have developed a clear career and professional identity" and (reverse coded), "I am still searching for my career and professional identity." The chronbach alpha for these four items was .90. These items were rated on a 7-point agreement scale, where 1=strongly disagree, 4=neutral, and 7=strongly agree. These items reflect previous theory and research on identity (Markus and Nurius, 1986, Yost *et al.*, 1992).

Statistical Analysis

We leveraged our unique longitudinal data using two different analytical methods. Hypotheses 1a, 1b, and 1c are addressed using individual growth modeling, while Hypotheses 2a, 2b, and 2c utilize multiple regression models.

Individual growth modeling. Individual growth modeling techniques, which can simultaneously address within-person and between-person questions about change, were utilized to assess whether and how developmental network density changes over time. In this method, linked models are generated to predict growth trajectories at two different levels. The first stage, Level-1, estimates within-individual effects and thus describes each person's individual growth trajectory, or the way his or her outcome values rise and fall over time. In the second stage, Level-2, inter-individual differences in change are estimated. In other words, this level assesses whether different people manifest different patterns of within-individual change or how the changes differ across people.

The two main parameters estimated by these models are initial level (intercept) of the growth trajectories and the rate of change over time (slope) of the growth trajectory. The unconditional linear growth model, in which time is the only predictor, offers a baseline model for investigating *whether* there is any variance in the growth trajectories and *where* the variance is (e.g., within or between individuals) (Singer and Willett, 2003). We use this baseline model to examine the fundamental question of whether and how developmental networks change over time.[1]

There are several requirements for utilizing individual growth modeling, all of which our study meets. First, there must be three or more waves of data. For three waves of data only, as in our study, we must assume that individual growth is linear (Barnett *et al.*, 1992, Singer and Willett, 2003). Next, there must be a continuous outcome whose values change systematically over time, including that the same measure of outcome must be used at each time point, the outcomes must be equally valid across all measurement occasions, and the outcome should be as

[1] This baseline model attempts to elucidate whether any variation exists in the growth trajectories, rather than seeking to explain this variation.

precise as possible over time. Lastly, there must be a "sensible" metric for clocking time. One beneficial feature of using individual growth modeling is that there is no requirement for "balanced" data (i.e., this method does not require the same number of waves for each person) or collecting data from all participants on the same schedule. In other words, each individual's growth trajectory can include a unique number of waves with unique time spacing, thus allowing participants with missing time points to remain in the analyses (Singer and Willett, 2003).

Multiple regression models. To investigate the relationship between developmental network dynamics and professional identity, we used multiple regression analyses. The models for testing Hypotheses 2a, 2b, and 2c included the following identical elements: The dependent variable was Professional Identity at Time 3 and independent variables included Professional Identity at Time 2 and controls for gender, years of work experience, age, and self-esteem (items based upon Rosenberg's scale (1965). The model to test Hypothesis 2a, which addresses the relationship between early-career developmental network density and professional identity, includes the measure of developmental network density at Time 1 as the key predictor of interest. The model to test Hypothesis 2b, which addresses the relationship between general developmental network density and professional identity, includes a measure of the average density Time 1 and Time 2 as the key predictor of interest. Lastly, the model to test Hypothesis 2c, which addresses the relationship between developmental network density dynamics and professional identity, includes a difference score between density at Time 1 and Time 2 as the key predictor of interest.[2]

[2] In estimating a model where change in density is a predictor in the model, it is not a statistical possibility to use slope estimates from the individual growth models as predictors. Instead, we use difference scores, which provide the benefit of using actual data, rather than *estimated* slopes (whose goodness-of-fit varies considerably across people, given the limitation of having only three time points of data).

RESULTS

Control variables

Descriptive statistics for the control variables in these analyses are reported in Table I. None of these variables, gender, years of work experience, age, and self-esteem, were significant predictors of clarity of professional identity in any of the multiple regression models.

Take in Table I

The results are presented in accordance with our two initial research questions.

Do Developmental Networks Change over Time?

Hypotheses 1a, 1b, and 1c, which address the growth trajectories of developmental network density, were examined using individual growth modeling analyses. We found that initial density levels vary across people (Hypothesis 1a); the density of developmental networks changes on an individual level (Hypothesis 1b), and the rate of change in density differs across people (Hypothesis 1c) (Table II). A graph of prototypical individuals' and the population's growth trajectories illustrates our findings (Figure I). The dark line indicates the population average, while the other lines represent prototypical individual growth trajectories.

Take in Table II

Take in Figure I

Our within-individual Level-1 linear change model is defined by the following equation:

$$Y_{it} = \beta_{0i} + \beta_{1i}TIME + \varepsilon_{it},$$

where Y_{it} is the measure of developmental network density for $Person_i$ at $Time_t$, β_{0i} is the intercept for $Person_i$ for each model (the value of Y when time = 0), β_{1i} is the linear slope coefficient (or rate of change in Y) for each $Person_i$ per unit change in time (e.g., 2 years, the

space between each of the surveys), and ε_{it} is a random error term (assumed to be normally distributed with mean 0 and constant variance σ^2) for $Person_i$ at $Time_t$.

In Level 2, the parameters from Level 1 become the outcome variables. The Level 2 equation for $\beta_{0i,}$ the intercept for $Person_{i,}$ is

$$\beta_{0i} = \lambda_{00} + u_{0i}$$

where λ_{00} is the average intercept (i.e., the average density level for the population at time = 0) and u_{0i} is the conditional residual (the difference between $Person_i$'s intercept and the average intercept). The Level 2 equation for β_{1i} is

$$\beta_{1i} = \lambda_{10} + u_{1i}$$

where λ_{10} is the average linear slope for the population and u_1 is the conditional residual (the difference between $Person_i$'s rate of change and the average rate of change). In these models, there are two fixed effects, λ_{00} and $\lambda_{10,}$ and two random effects, u_{0i} and $u_{1i.}$

In individual growth modeling, the unconditional linear growth model partitions and quantifies outcome variation across both people and time. Level-1 residual variance summarizes the scatter of each person's data around his/her own "true" linear change trajectory (not his/her person-specific mean), while Level-2 variances summarize between-person variability in initial status and rate of change. Estimating these variance components allows us to distinguish level-1 variation from the two different kinds of level-2 variation and to determine whether the inter-individual differences in change are due to inter-individual differences in true initial status or true rate of change.

The Level-1 and Level-2 models can be combined into a single equation, which is useful for interpreting the results. In this fitted model, the error terms disappear:

$$\hat{Y}_{it} = \beta_{00} + \beta_{10}TIME_{it}$$

With the parameter estimates from our model, this equation becomes:

$$\hat{Y}_{it} = .562 + .017*TIME_{it}$$

Hypothesis 1a. We tested whether early-career developmental network density varies across people and found that variation exists. (In Figure I, see the variation in starting points of the trajectories—e.g., above T1 on the x-axis.) The estimated average level of individuals' developmental network density at Time 1, as estimated in the unconditional linear growth model, is .58 (S.E.=.04).[3] We found significant variation in initial level of density across individuals. The Level-2 variance component, τ_{00}, assesses the variance of the intercept. The null hypothesis for this estimate is that variance equals 0. By virtue of the fact that the p-value for the intercept estimate is .02, we reject the null hypotheses that the variance equals 0 and conclude that there is variation in initial density levels. Thus, Hypotheses 1a was supported.

Hypothesis 1b. This hypothesis examined whether the density of people's developmental networks changes over time, both at a population level and within individuals. The estimated average rate of change of individuals' developmental network density, as estimated in the unconditional linear growth model, is .017 (S.E.=.02). The interpretation of this coefficient is that for each additional unit of time (which is one time period, in this study), network density increases by .017. This parameter estimate was not significantly different from 0. Thus, we can conclude that on *average*, there was no change in the network measures in the population. In other words, the entire population did not exhibit change in the same direction. The dark line in Figure I represents the population's growth trajectory. However, this result does not rule out the possibility that there is change within individuals. Level-1 variation captures the scatter of participants' actual observations around the growth trajectory predicted by the model.

[3] The *t* value for this fixed effect, which is <.0001, is not a substantive finding. Rather, it indicates that this value is significantly different from zero, which would be expected given that the possible range of network density is zero to one.

In this case, we found significant variation within individuals ($p<.0001$), thus demonstrating that there is within-individual change in density over time. In other words, some people's networks become more dense over time (e.g., Person A in Figure I), some became less dense (e.g., Person E in Figure I), and some stayed the virtually the same (e.g., Person D in Figure I). Therefore, Hypothesis 1b was not supported at the population level, but it was supported at the within-individual level.

Hypothesis 1c. We investigated whether the rate of change in density differed across people. From the Level-2 analyses, we found significant variation in rate of change of density *across* individuals. The Level-2 variance component, τ_{11}, assesses the variance of rate of change. As with $\tau_{00,}$ the measure of intercept variation, the null hypothesis for τ_{11} is that variance equals 0. The p-value for $\tau_{11\ is}$ .03, thus showing that there was variation in rate of change across individuals. This demonstrates that the density levels of people's developmental networks were changing, but they were not all changing at the same rate as one another. For instance, within the group of individuals whose density levels were increasing over time (e.g., Person A and Person C in Figure I), some were increasing more rapidly (Person A) while some were increasing at a slower pace (Person C).[4] Therefore, we found support for the hypothesis that the rate of change in density varies across individuals.

[4] Through assessing the relationship between the level-2 residuals, the population covariance estimate ($\tau_{01,}\ \tau_{10)}$ quantifies the population covariance between true initial status and true change. This allows us to assess whether people who start out higher increase more (or less) rapidly over time. In our model, this covariance is not significant, so we can conclude that there is no significant relationship between initial density level and rate of change.

How are Developmental Network Characteristics Related to Professional Identity over Time?

Hypotheses 2a, 2b, and 2c, which examine the relationship between developmental network density and professional identity, were investigated using multiple regression analyses. While the three hypotheses are unified by their examination of this general relationship, each examines the dynamics of density from a different perspective. Hypothesis 2a focuses on "early" career density as a measure (the measure of density from the Time 1 survey), Hypothesis 2b leverages a "general" measure of density (the average of Time 1 and Time 2 measures of density), and Hypothesis 2c examines density dynamics (the difference score between Time 1 and Time 2 measures of density). In sum, we found suggestive evidence that early developmental network density is negatively associated with professional identity (Hypothesis 2a); a significant relationship between general density and professional identity (Hypothesis 2b); and suggestive evidence of a negative relationship between density change and professional identity (Hypothesis 2c) (Table III).

Take in Table III

Clarity of professional identity. The 4-item scale of clarity of professional identity, measured on the Time 3 survey, served as the dependent variable in the multiple regression analyses for Hypotheses 2a, 2b, and 2c. On the 7-point scale, the mean clarity of professional identity score was 4.63 (S.D. 1.41, n=78). Thus, on average, the research participants felt a slight degree of professional identity clarity after they had been out of graduate school for about 5 years. The mean of clarity of professional identity at Time 2, which was used as a control variable in these analyses, was 3.96 (S.D. 1.52, n=78). Overall, there was a statistically

significant increase in professional identity clarity from Time 2 to Time 3 (M=.67, S.D.=1.30, t=-4.57, p<.0001).

Hypothesis 2a. This hypothesis examined early developmental network density as a predictor of clarity of professional identity. The mean for early-career density was .56 (S.D.= .31). We found suggestive evidence of a negative relationship between early-career density and clarity of professional identity five years later (β=-.71, p=.09), consistent with Hypothesis 2a. In other words, the more dense one's early-career developmental network, the less clear one's professional identity several years later on.

Hypothesis 2b. This hypothesis focused on general developmental network density (the average of Time 1 and Time 2 density) as a predictor of clarity of professional identity. The mean for general density was .62 (S.D.=.24). There was a statistically significant negative relationship between general density and clarity of professional identity five years later (β=.1.30, p=.02). Therefore, Hypothesis 2b was supported.

Hypothesis 2c. This hypothesis tested whether developmental network dynamics, as measured by a difference score between Time 1 and Time 2 density, predict clarity of professional identity. The mean of .11 (S.D.=.36) for this difference score shows that density increased from Time 1 to Time 2. However, a closer look at the distribution of difference scores matches the results from Hypotheses 1b and 1c above: there was considerable variation in both the direction and degree of change across people. In the regression analyses, we found a trend toward a negative relationship between density dynamics and clarity of professional identity five years later (β=-.82, p=.09). The difference score was calculated as Time 2 minus Time 1. Therefore, the negative coefficient on the parameter estimate indicates that as the difference

score increases (e.g., as density increases from Time 1 to Time 2), clarity of professional identity decreases. Thus, we find suggestive evidence to support Hypothesis 2c.

In sum, the pattern of results is consistent across all three of these hypotheses: as density increases, clarity of professional identity decreases.

DISCUSSION

Recent research has broadened the traditional views of both mentoring and professional identity development. These new views, as exemplified by Higgins and Kram's (2001) developmental mentoring networks and Ibarra's (1999) notion of provisional selves, offer fascinating theoretical frameworks for approaching their respective topics. However, there has been no work to investigate the links between developmental networks and professional identity development. Furthermore, there has been a call for research that truly understands the longitudinal nature of career-related phenomena (e.g., Barley, 1989, Hall, 2002). The present research engages in this inquiry by investigating whether developmental networks change over time, and if so, how. In addition, the present research examines how developmental network characteristics relate to professional identity over time.

The longitudinal study presented here began when the participants were second-year MBA students and followed them through the subsequent 5 years of their careers. Using developmental network density as our measure of network characteristics, we found that not only was there variation in people's early-career density levels, but that density levels changed over time. Most interestingly, the density levels of people's developmental networks changed in different directions and at different rates than one another.

Regarding the relationship with professional identity, we found that as developmental network density increased, suggesting less access to valuable, non-redundant resources, clarity of professional identity decreased. Specifically, our analyses showed a statistically significant relationship between general career density levels and clarity of professional identity several years later. We also found a pattern of results suggesting a relationship between both early-career density levels and density dynamics with clarity of professional identity. In sum, this study offers insight into the uncharted territory of whether and how developmental networks evolve and provides evidence for the longitudinal links between developmental network characteristics and one important subjective career outcome, clarity of professional identity.

Implications for Theory

This study contributes to two main lines of research. The first is research on mentoring, and in particular, developmental networks, a relatively new perspective in mentoring research. Our underlying assumption—that people construct their identities through their developmental network—constitutes a relational perspective, consistent with recent career theory (Hall, 1996). We know little about the dynamics of identity development through the cultivation of important relationships over time. Therefore, it's important to understand the *dynamics* of developmental networks. Through its longitudinal approach, our research provides the first dynamic view of these networks. Our observation that network density varies is an important first step toward understanding the evolution of developmental networks because it allows us to raise questions about the antecedents of this variance. For instance, future research can examine the factors—such as work or educational background, personality variables, or demographic characteristics—that might influence the initial formation of developmental networks. Likewise, we observed

that people's networks change differently over time, but it remains for future research to elucidate the underlying reasons for these differences.

Our research further advances the understanding of developmental mentoring networks through examining these networks' connection with a salient career outcome. Whereas previous research has attempted to measure developmental networks and career outcomes either simultaneously (on the same survey) (e.g., Higgins, 2001a, Higgins and Thomas, 2001, van Emmerik, 2004) or across two timepoints (Higgins and Thomas, 2001), this is, to our knowledge, the first empirical study that includes three timepoints of data. This amount of data allowed us the flexibility to examine network characteristics from Time 1 alone ("early-career density"), the average of Time 1 and Time 2 ("general career density"), and the change between Time 1 and Time 2 ("density dynamics") as predictors of our outcome, clarity of professional identity, at Time 3, controlling for this outcome at Time 2. While our study cannot proclaim a causal link between increasing developmental network density and decreasing clarity of professional identity, our methods provide a much more rigorous initial step toward examining this question than any pre-existing studies.

The second research stream to which our research contributes is professional identity development. In particular, our work builds on Ibarra's notion of provisional selves (1999) by proposing that developmental network density is an indicator of one's breadth of professional role models. This breadth, or lack thereof, may represent the degree of one's opportunity for professional identity exploration through the developmental network. Based on the negative relationship we see between developmental network density and clarity of professional identity, we conjecture that increased professional identity exploration is reflected in increased clarity of professional identity at a later point in time. Our research identifies that the link between

developmental network density and clarity of professional identity exists, and encourages future research to examine underlying mechanisms, such as identity exploration, suggested here.

At a broader level, our study builds on the recent trend in careers research to examine subjective career outcomes through our use of clarity of professional identity as our dependent variable. Beginning their work in the late 1930s to 1950s, the pioneers of career theory—known as the Chicago School—developed the notion that careers are comprised of both objective and subjective elements (e.g., Hughes, 1937). In spite of this early, broad vision of careers, recent career research has been limited in scope. For instance, Arthur and Rousseau found that of the careers articles published in major interdisciplinary journals between 1980 and 1994, more than 75% focused on objective perspectives (Arthur and Rousseau, 1996). Within the last several years, there has been a call for research that includes not only the subjective viewpoint of careers (e.g., Barley, 1989, Derr and Laurent, 1989, Hall, 2002), but also the extension of career research beyond the confines of a particular organization (Arthur and Rousseau, 1996, Sullivan, 1999). Thus, the present research contributes to careers research by exploring a subjective element of careers, clarity of professional identity, which transcends organizational boundaries.

Underlying our theoretical contributions to developmental networks and professional identity development is the element of time, or dynamics. This study makes important contributions to the careers literature not only through our longitudinal methodology, but more particularly through our use of a very powerful statistical approach, individual growth modeling. As powerful as this technique is, it has been underutilized in research, according to Singer and Willett's (2001) review of *American Psychological Association* journals from 1999. Although they identified more than 50 longitudinal studies, many of which would have leant themselves to the use of individual growth modeling, they found only four studies that used this method

(Singer and Willett, 2001). Thus, not only does the present study contribute to our understanding of a phenomenon, developmental networks, that has never been studied longitudinally, but it also makes a more general contribution to careers research through its application of an important, underexploited statistical technique.

Limitations

As unusual as our dataset is, in terms of its longitudinal measurement of complete developmental network, the present study is limited by our use of graduating MBA students from a single, top-20 business school as our participants. Given the relative homogeneity of this population in terms of education and profession, we might have expected individuals' growth trajectories to be strikingly similar to one another. We found just the opposite, however: we did not find population-level changes, but we found intra- and between-individual differences in developmental network density over time.

Second, although we explored developmental network structure, we did not examine the exact content of the help that was provided to the protégé. Given this, we were not able to discern the processes through which developmental network density affects professional identity exploration. Such an investigation would advance the present research.

Implications for Practice

This research takes a first step toward painting a picture of developmental networks over time, and thus offers several practical implications. While much remains to be understand about both *why* developmental networks change as they do and the relationship between developmental networks and a wider range of career outcomes, the fact that they do change and that we find a relationship between network density and clarity of professional identity offers the prospect that people might be able to improve their careers through changing their developmental networks.

This opportunity for intervention may be most striking during the early portions of people's careers. Our finding that general density is significantly associated with clarity of professional identity supports the overarching notion that beginnings are critical (e.g., Gersick, 1988, Lieberman, 1956). Building on the idea that less density in a network is associated with greater access to important, non-redundant resources and information (e.g., Burt, 1992), the present study provides additional support for advising young people to strive for diversity in their developmental networks. Not only can this diversity improve short-term outcomes, as described in previous research (e.g., Higgins, 2001a, Higgins and Thomas, 2001, van Emmerik, 2004), but it can also lead to improved long-term outcomes, as our findings suggest.

Conclusion

In summary, this study presents the results of a unique, longitudinal study of developmental networks and their relationship to a subjective career outcome, clarity of professional identity. We found not only that developmental networks change over time, but also that developmental network density, which reflects the professional identity exploration process, is negatively related to clarity of professional identity. This research provides novel insights to the mentoring and careers literatures, as well as applying an underutilized statistical technique, individual growth modeling. Given the previously uncharted territory of understanding the dynamics of developmental networks and its relationship to career outcomes, our study opens up avenues for future research, while also answering questions about developmental networks and the ways they change with time. It is our hope that future research will build upon the present study to examine how and why developmental networks evolve, and the impact of this evolution on careers.

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Table I. Means, standard deviations, and correlations (n=78)

	X	*S.D.*	1	2	3	4	5	6	7	8
1. Gender[a]	0.28	0.45								
2. Self-esteem[b]	6.04	0.89	0.03							
3. Years of work experience (prior to MBA)	3.79	1.61	-0.26 *	-0.18						
4. Age	27.77	2.11	-0.15	-0.17	0.63 **					
5. Clarity of Professional Identity at Time 2	3.96	1.52	-0.05	0.41 **	-0.09	0.08				
6. Early career developmental network density[c]	0.56	0.31	-0.12	0.12	0.01	0.00	0.06			
7. General developmental network density[d]	0.62	0.24	-0.03	0.18	-0.06	-0.04	0.03	0.82 **		
8. Developmental network dynamics[e]	0.11	0.36	0.18	0.03	-0.09	-0.06	-0.07	-0.66 **	-0.11	
9. Clarity of Professional Identity at Time 3	4.63	1.41	-0.17	0.22	-0.07	0.11	0.61 **	-0.10	-0.20	-0.08

* p<.05. ** p<.01. ***p<.001

[a]0=male; 1=female

[b]1=lowest self-esteem; 7=highest self-esteem

[c]Density at Time 1

[d]Average of Density at Time 1 and Density at Time 2

[e]Difference between Density at Time 2 and Density at Time 1

n=78 as this was the number of respondents included across all three timepoints of data collection

Table II. Results of fitting a multilevel model for change to the developmental network data (n=138; observations=331)

			Parameter	Estimate	*s.e.*
Fixed Effects					
Initial status, π_{0i}	Intercept		λ_{00}	0.56***	0.04
Rate of change, π_{1i}	Slope		λ_{10}	0.02	0.02
Variance components (Random effects)					
Level 1:	Within-person	Residual	σ^2	0.06***	0.01
Level 2:	In initial status	UN (1,1)	τ_{00}	0.07*	0.03
	In rate of change	UN (2,2)	τ_{01}	0.01*	0.01
	Covariance	UN (2,1)	τ_{00}	-0.02	0.02

* p<.05. ** p<.01. ***p<.001

Table III. Multiple regression models for Hypotheses 2a, 2b, and 2c: the effects of developmental network density variables on clarity of professional identity at Time 3 (n=78)

	Hypothesis 2a		Hypothesis 2b		Hypothesis 2c	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	2.92	2.28	3.09	2.23	3.10	2.25
Control variables						
Gender[a]	-0.41	0.29	-0.38	0.29	-0.36	0.29
Self-esteem[b]	0.01	0.16	0.05	0.16	0.05	0.16
Years of work experience (prior to MBA)	0.10	0.11	0.09	0.10	0.08	0.11
Age	-0.02	0.08	-0.01	0.02	-0.01	0.08
Clarity of Professional Identity at Time 2	0.58 ***	0.09	0.56 ***	0.09	0.56 ***	0.09
Density variables						
Early career developmental network density[c]	-0.71 t	0.41			-1.33 *	0.55
General developmental network density[d]			-1.30 *	0.54		
Developmental network dynamics[e]					-0.82 t	0.48
R-square	0.42		0.44		0.45	
Adjusted R-square	0.37		0.40		0.39	

[t]p<.10 * p<.05 ** p<.01 ***p<.001

[a]0=male; 1=female

[b]1=lowest self-esteem; 7=highest self-esteem

[c]Density at Time 1

[d]Average of Density at Time 1 and Density at Time 2

[e]Difference between Density at Time 2 and Density at Time 1

Note: n=78 since this was the number of respondents included across all three timepoints of data collection

Figure I. Prototypical growth trajectories of developmental network density over time