Gender, Professional Networks, and Subjective Career Success within Early Academic Science Careers: The Role of Gender Composition in Inside and Outside Departmental Support Networks

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Abstract

The present study analyzed (a) gender differences in the gender composition (i.e., the proportion of male to female contacts) of professional support networks inside and outside an individual’s academic department and (b) how these differences in gender composition relate to subjective career success (i.e., perceived career success and perceived external marketability). Results showed that the networks’ gender composition is associated with subjective career success. Men’s networks consist of a higher proportion of male to female supporters, which, in turn, was positively related to subjective career success. Additional analyses revealed that the findings could not be accounted for by alternative factors, such as network size, networking behaviors, and career ambition.

*Key words: NETWORKING; NETWORKS; GENDER; CAREER; SUCCESS*
Gender, Professional Networks, and Subjective Career Success within Early Academic Science Careers: The Role of Gender Composition in Inside and Outside Departmental Support Networks

In Germany, academic science careers, such as professor positions with tenure (e.g., department director), are still dominated by men. The relative number of women who occupy a tenure track position is about 20 percent (Statistisches Bundesamt, 2012). Similar statistics were observed in the European Union (18% grade A academic staff; European Commission, 2009) and in the United States (despite more female university degrees: 44% women in professor positions with tenure; American Association of University Professors, 2012).

As these gender differences in objective career success have become more salient within the workforce, career research has focused more on the predictors and development of subjective career success (Hall & Chandler, 2005). Subjective career success can be defined as a self-evaluation of career progress or employment perspectives by an individual, for example, perceived career success or perceived marketability (Eby, Butts, & Lockwood, 2003; Ng, Eby, Sorensen, & Feldman, 2005). It has been shown that individual career development is meaningfully related to subjective career success. For instance, individuals with higher subjective career success evaluations show higher levels of career commitment (Poon, 2004) and develop higher occupational self-efficacy beliefs that, in turn, longitudinally and positively affect salary changes (Spurk & Abele, 2014). Additionally, studies have shown that measures of subjective career success are negatively related to turnover intentions and positively related to affective occupational commitment (Tschopp, Grote, & Gerber, 2014; Weng & McElroy, 2012).

Within early academic science careers (i.e., research associates after university graduation), a gender-specific analysis of subjective career success is crucial because objective academic science career success indicators, such as rank, salary, prestige of current
job, fellowships, presence on editorial boards, attracted research funds, and research awards (i.e., Judge, Kammeyer-Mueller, & Bretz, 2004; Parker & Welch, 2013), are associated with career stage-specific restrictions. Within early academic science careers, objective success indicators (a) show a high stability between individuals and (b) are contextually limited in their accessibility (e.g., research associates without Ph.D.’s cannot occupy official leadership positions). Against this background and from a career sponsorship perspective, it is essential to support subjective career success experiences in early career stages, especially regarding the goal to keep highly talented female researchers within academic science careers.

One factor contributing to a successful academic science career is networking. Networking has been proposed as a central strategy for objective career development, such as publication outcome, prestige, and leadership or tenure positions (Hadani, Coombes, Das, & Jalajas, 2012; Lowrie & McKnight, 2004; Parker & Welch, 2013; Pifer & Baker, 2013). Although the concept of networking is becoming increasingly prominent in organizational and career research, objective parameters that describe the shape and structure of social networks (e.g., size, gender composition) are often neglected (Borgatti & Foster, 2003).

The aim of the present study is to analyze (a) gender differences in objective parameters of career-related professional support networks within and outside a research associate’s department, and (b) how these differences in career-related professional support networks relate to different subjective career success indicators.

Our theoretical model is depicted in Figure 1. In the first step (model part a), we analyze gender differences in the gender composition (i.e., proportion of male to female contacts) of two different kinds of professional support networks (i.e., inside and outside the department). With professional support inside an individual’s department, we refer to the relative number of men and women from the department itself who support the focal person (e.g., other doctoral candidates, postdocs, or professors from the same department). Likewise,
with professional support outside an individual’s department, we refer to the relative number of men and women from outside the department who support the focal person (e.g., mentors, postdocs, professors from other universities, and professionals within industry). In a second step (model part b), we analyze how the gender composition of professional support networks is related to subjective career success. Doing so, we not only analyze the individuals’ perceived career success—which is an indicator of subjective career success that is frequently used (Abele, Spurk, & Volmer, 2011; Turban & Dougherty, 1994)—but we also analyze the individuals’ perceived external marketability. Perceived external marketability reflects success in relation to job mobility and employability, which has been shown to be critical components within academic science careers and women’s career development (Hadani et al., 2012; Livingston & Judge, 2008).

**Gender and Gender Composition of Networks**

It is important to distinguish the structure of social networks from networking behavior. Networking behaviors can be seen as personal antecedents for building different career-related social networks (Wolff & Moser, 2009). Past research has not found noteworthy gender differences concerning different networking behaviors (e.g., Forret & Dougherty, 2001; Wolff & Moser, 2009). Instead, gender differences appear rather in the use of social network resources or in the composition of social networks (Burt, 1998). However, past research on gender differences in career-related social networks has at least two important shortcomings. First, most studies have investigated workplace networks within single organizations or work groups, or mixed inside and outside organization networks within one overall network (Brass, 1985; Ibarra, 1997; Parker & Welch, 2013). Hence, past research was not accounting for separate relationships of inside and outside organization/work group networks with other variables. Second, support networks within the field of academic science were not the focus of this gender-specific network line of research. In a
recent comprehensive literature review about developmental networks (Dobrow, Chandler, Murphy, & Kram, 2012), only 3 out of 23 identified studies were conducted in academic science career environments. Thus, findings of the majority of these studies cannot be easily generalized to academic science careers.

For example, internal organizational job markets (i.e., other jobs within the same organization) are of minor relevance for careers in academic science, as opposed to careers in industry. In one specific university, other departments usually deal with substantially different research topics, and the department–research interest fit is questionable in other departments within the same university. Hence, the research focus of network studies within the field of academia is shifting from the whole organization to departments (i.e., inside and outside departmental networks, see also Hadani et al., 2012; Pifer & Baker, 2013). The reliance on the network of relationships with departmental peers and mentors is especially critical for pre-tenure or junior scientist faculty members’ success (i.e., Pifer & Baker, 2013). Network resources relevant to new faculty members, for example, include access to new knowledge prior to publication, financial resources, or career advancement opportunities (i.e., O’Leary & Mitchell, 1990).

We assume that women and men differ in the gender composition of their career-related professional support networks because in the so-called individual perspective on social networks, women and men have a higher probability to choose same-gender contacts because of interpersonal attraction based on similarity. The attraction-similarity model (Byrne, 1971) assumes that perceived similarities (i.e., demographic characteristics, such as gender) are crucial determinants of interpersonal attraction, and therefore gender itself is a major predictor of the gender composition of career-related networks. In other words, women primarily tend to build career-related social contacts with other women, whereas men tend to build such contacts with other men. Empirical results that underlie this rationale are still
sparse. One study, for example, has shown that male managers in a sample of 63 middle managers of a Fortune/Service 500 firm have more same-gender contacts relative to the total number of contacts (about 60 to 70 percent male managers, defined as homophile networks in this study) in career and information networks compared to female managers (Ibarra, 1997).

In sum, we therefore assume that the gender composition of career-related professional support networks shifts in the direction of the individual’s own gender.

**Hypothesis 1:** The proportion of male to female professional supporters is higher in males’ (a) inside and (b) outside departmental networks compared to females’ inside and outside departmental networks.

**Gender Composition of Networks and Subjective Career Success**

We argue that the gender composition of career-related networks relates to subjective career success for at least two reasons. First, it might be that individuals with a higher proportion of male to female contacts in their career-related networks actually have better access to several career-related resources, such as human and/or social capital. Because male contacts are still perceived as more career-oriented (Evans & Diekman, 2009), male dominated networks provide more recognition by potentially powerful occupational members in comparison to female dominated networks. Relatively more male contacts within one’s network signal more potential opportunities because men usually occupy higher status and more influential network positions (Brass, 1985; Burt, 1998), thus enhancing one’s feelings of a successful career. For example, a study by Parker and Welch (2013) showed that having a leadership position is associated with having a smaller number of women in one's collaboration network.

Second, due to the salience of gender discrimination and career development within today’s organizational policies and within society itself, most women and men have a clear picture of supporting or constraining circumstances related to *objectively successful* future
career development. Organizations provide personnel development and mentoring, especially for women. Social mass media as well as different organizational training programs communicate “the good old boys’ network” and potential constraints that women especially face during their career paths. Hence, it may simply be the attention to and the perception of the gender composition of one’s own career-related professional support networks that relates to an evaluation of how successful these networks might be for future objective career development. More male as opposed to female supporters within one’s network thus signals more stable, secure, controlled, and supported long-term objective career success. Such positive visions about a future career might therefore affect one’s actual perceptions of subjective career success.

In the fields of academic science, people from inside the department are important with respect to subjective career success because, for example, they provide feedback in the publication process and information on departmental strategic considerations, and they can also be role models for career advancement opportunities (i.e., O’Leary & Mitchell 1990). Nonetheless, in academic science it is also important to receive support from outside departmental networks. For example, people from outside one’s department include mentors who can encourage the focal person and provide information about career opportunities within other departments. Thus, having external support should also strengthen the confidence in one’s abilities and the feeling that one is a value-added resource for other departments.

**Hypothesis 2:** The proportion of male to female professional supporters within (a) inside departmental networks and (b) outside departmental networks is positively related to subjective career success.
Integrating Hypotheses 1 and 2 in one theoretical model on gender, gender composition of social networks, and subjective career success, we formulate the following indirect effect hypotheses:

**Hypothesis 3:** Men have a higher proportion of male to female professional supporters in (a) their inside departmental networks and (b) their outside departmental networks, which subsequently leads to higher subjective career success.

**Method**

**Sample**

The sample consisted of 82 doctoral candidates who were currently working as research associates on their dissertations. Seventy-three percent of the participants were female. The mean age was 28.68 years (SD = 3.25). Overall, participants had attended university for 5.41 years (SD = 1.00) in order to complete their Bachelor’s and Master’s degrees or to obtain their Diplom, which is equivalent to a Master’s degree in Germany. Participants’ average final grade was 1.56 (SD = .41). German universities use a grading system ranging from 1 (very good) to 4 (sufficient). Because this study was conducted at a German university, participants qualified as faculty members and held regular positions within their departments. Doctoral candidates at German universities usually do not have to take any courses, but instead engage in teaching and research activities. On average, participants worked at their respective departments for 1.95 years (SD = .93); 32% held a full-time position and 46% held a part-time position (22% missing on this item). Most participants planned to finish their dissertation within the next two years (M = 1.97, SD = 1.43). All participants did their doctorate within the so-called MINT research fields: 1% mathematics, 10% informatics/computer science, 46% natural sciences, 43% technology/engineering. There were no gender-specific differences among these variables except for full-time positions, which were more frequent among male participants.
Procedure

The collected data was part of a research program focusing on the career support of female academic scientists. All participants took part in our study by accessing an online survey. Participants were recruited through (a) promotional presentations held in the respective departments by members of the project team or (b) mailing lists. Beside a graduate school mailing list, we sent promotional emails to central departments within the university (e.g., equal opportunity commissioner) with the request to forward the emails to potentially interested people. After the promotional presentations, doctoral candidates who joined the presentations were emailed an invitation to complete the online survey. Out of these potential participants, 75% filled out the online survey. This group made up a total of 40% of our overall sample. For the remaining participants, it was not possible to specify the exact response rate. Overall, the mailing group made up 60% of our sample.

Measures

*Gender composition of professional support networks.* Each participant was asked to indicate the individuals in their social networks whom they turn to when they need professional support. The items for the professional support network inside (outside) the department were: “Please name the most important people inside (outside) your department who support you when you are in need of professional help.” Participants could name up to ten people, and were asked to provide their gender and hierarchical status inside the department (i.e., doctoral candidate, postdoc, or professor).

We measured the absolute size of the support networks as the sum of people named by the participants. Gender was coded as 0 and 1 for women and men, respectively. We measured the proportion of male to female professional supporters in the career-related professional support networks inside and outside the department using social network analysis. According to Ibarra (1997), we defined this network parameter as the proportion of
male gender contacts relative to the total number of contacts. Thus, we divided the number of male contacts by the overall number of people in the support network. If all supporters in the network were male, the gender composition index would be one. If all supporters in the network were female, the gender composition index would be zero.

*Subjective career success.* We measured subjective career success via standardized questionnaires. Participants based their responses on a 6-point rating scale each (1 = *not at all* to 6 = *very much*). We decided to use two frequently used measures of subjective career success that tap different facets of the construct (Abele et al., 2011; Ng et al., 2005). First, we measured *perceived career success* with a German version of a four-item scale developed by Turban and Dougherty (1994). The items were: “Compared to my coworkers, my career is successful”; “Up to now my career is successful”; “How successful do your significant others feel your career has been?”; and “Given your age, do you think that your career is on ‘schedule’; or ahead or behind schedule?” Cronbach’s $\alpha$ reached a value of $\alpha = .75$. Second, we measured perceived external marketability. External marketability reflects the perceived value of an individual for other organizations (also for other departments of the same research field within other universities). *Perceived external marketability* was measured by a German version of a scale reported by Eby and colleagues (2003), composed of three items (original items: “I could easily obtain a comparable job with another employer”; “There are many jobs available for me, given my skills and experience”; “Given my skills and experience, other organizations view me as a value-added resource” Cronbach’s $\alpha = .91$).

*Control variables.* We controlled for *final university grade* (i.e., the Master’s degree or Diplom) because past academic success might be an indicator of future career success. The final university grade can range from 1 (very good) to 4 (sufficient). Furthermore, we controlled for *age, contract type* (0 = *part-time*, 1 = *full-time*), *network size*, and *research field*. Due to small subsamples, we combined the research fields of mathematics, computer
science, and natural sciences into one cluster (coded 0; technology/engineering coded 1).

Moreover, we controlled for internal and external network behavior using a German scale by Wolff and Moser (2009) to account for individual differences in networking. To consider individual effort, we controlled for career ambition using a German scale by Schaarschmidt and Fischer (1996). All items were answered on a 6-point Likert-type scale ranging from 1 (not at all) to 6 (very much). We controlled for the effects of all variables on both subjective career success measures.

Finally, from a structural perspective, social networks can also be viewed as a product of the availability of different types of contacts (Ibarra, 1997). Because the gender distribution or gender base rate is unequal in most occupations, structural constraints are one additional reason why the gender composition of career-related networks might differ between women and men. To ensure we analyzed “true” gender instead of occupational effects, we controlled for the effect of research field on the gender composition of the support networks because the field of technology/engineering is more male-dominated than other fields.

Analytical procedure. The software used for all analyses was MPlus version 6.1 (L. K. Muthén & Muthén, 1998–2010). In addition to the paths that test the hypotheses and the paths of the control variables, we allowed correlations between the networks and the two subjective success indicators. Finally, correlations between all exogenous variables (e.g., control variables) as standard setting in path analysis were estimated (Schweizer, 2010). To account for missing data in parameter estimation, we used full information maximum likelihood estimation (FIML). This procedure is based on a less restrictive assumption of missing at random (MAR), in comparison to other procedures, for treating missing data, such as list-wise deletion (Little & Rubin, 2002). We used manifest rather than latent variables for our psychometric measures to reduce model complexity, which is recommended for small
samples (MacCallum & Austin, 2000). In our path model, all path coefficients were estimated simultaneously. The advantage of this approach is that we were also able to detect specific indirect effects (Hypotheses 3a and 3b). Concerning control variables, only significant results are reported.

Results

Preliminary Analyses

Means, standard deviations, and Pearson’s correlations between the study variables are presented in Table 1. More male than female doctoral candidates held full-time positions in their respective departments ($r = .22, p < .10$).

Description of networks. The average support network inside the department was comprised of about five people ($M = 4.74, SD = 2.47$), which mirrors findings by Parker and Welch (2013) who surveyed a big sample of American scientists working in STEM fields (S = Science, T = Technology, E = Engineering, M = Mathematics). We found no significant difference in network size between men ($M = 4.23, SD = 2.47$) and women ($M = 4.93, SD = 2.46$) for inside departmental networks ($t(80) = 1.15, ns$). The average support network outside the department was comprised of about three people ($M = 2.87, SD = 2.29$). Network sizes of outside departmental networks did not differ between men ($M = 2.73, SD = 2.31$) and women ($M = 2.92, SD = 2.29; t(80) = .33, ns$), either. Thus, male researchers did not accumulate more people within their respective support networks than did female candidates. The absolute sizes of the career-related professional support networks inside and outside of the department were positively correlated ($r = .29, p < .01$).

The average gender composition index was .68 ($SD = .30$) for inside departmental networks and .64 ($SD = .34$) for outside departmental networks, indicating that the support networks were rather male dominated in terms of gender distribution. In detail, female doctoral candidates reported an average gender composition index of .61 ($SD = .31$) for their
inside departmental networks. The gender composition of their outside departmental 
networks was slightly more balanced ($M = .57, SD = .33$). Male doctoral candidates, on the 
contrary, reported considerably stronger male dominated networks both inside the department 
($M = .86, SD = .18$) and outside the department ($M = .81, SD = .32$). Parker and Welch (2013) 
found that 86% of the network members in their study were male. Hence, our findings 
suggest that male doctoral candidates in our study matched this base rate (i.e., the typical 
gender composition in academic networks in the respective STEM fields) more so than did 
female doctoral candidates who scored below the base rate. 

Both male and female inside departmental networks were mainly composed of other 
doctoral candidates (61.29 %, 52.70 %, respectively), followed by postdocs (male networks: 
22.58 %, female networks: 24.32 %) and professors (male networks: 13.98 %, female 
networks: 15.54 %), with some missing (male networks: 2.15 %, female networks: 7.43%). 
Finally, we did not find a significant relation between network size and the gender 
composition for inside departmental networks ($r = -.11, ns$), nor for outside departmental 
networks ($r = -.01, ns$).

**Direct Effects**

Our empirical path model showed a good model fit ($\chi^2$/df = 1.01, RMSEA = .01, CFI 
= 1.00, SRMR = .01). Standardized regression coefficients are presented in Figure 2. As 
predicted, gender (0 = female, 1 = male) was positively related to the proportion of male to 
female professional supporters in the career-related professional support networks inside the 
department ($\beta = .33, p < .001$), supporting Hypothesis 1a. In support of Hypothesis 1b, we 
found a positive relation between gender (0 = female, 1 = male) and the proportion of male to 
female professional supporters in the career-related professional support networks outside the 
department ($\beta = .33, p < .01$). Thus, male participants had significantly more male contacts in
relation to female contacts in their inside career-related support networks and in their outside career-related networks in comparison to female participants.

Testing Hypothesis 2a, we found a significant relation between the gender composition of the career-related professional support network inside the department and perceived external marketability ($\beta = .23, p < .05$). In contrast to this finding, perceived career success was not significantly related to the gender composition of the career-related professional support network inside the department ($\beta = .10, ns$). These findings partially supported Hypothesis 2a. Concerning Hypothesis 2b, we found significant positive relations between the gender composition of the career-related professional support networks outside the departments and perceived external marketability ($\beta = .29, p < .01$) and perceived career success ($\beta = .25, p < .01$). Thus, Hypothesis 2b was fully supported.

**Indirect Effects**

In Table 2, we provide estimates of the standardized indirect effects. We found a significant specific indirect effect of gender on perceived external marketability via the gender composition of the career-related professional support network inside of the department (.075, $p < .05$). Thus, men had a higher proportion of male to female professional supporters in their career-related professional support networks inside the department that subsequently was associated with higher perceived external marketability. We did not find a significant specific indirect effect of gender on perceived career success via the gender composition of the career-related professional support network inside the department (.023, $ns$). These findings partially supported Hypothesis 3a. Testing Hypothesis 3b, we found significant specific indirect effects of gender on perceived external marketability and on perceived career success via the gender composition of the career-related professional support network outside of the department (.094, $p < .05$; .083, $p < .05$, respectively). Thus, Hypothesis 3b was fully supported: Men had a higher proportion of male to female
professional supporters in their career-related professional support networks outside the
department that, in turn, was related to higher perceived external marketability and perceived
career success.

**Additional Findings**

In addition, we found some significant effects of our control variables within the
department that, in turn, was related to higher perceived external marketability and perceived
career success.

Correlations between the control variables in our empirical path model further
revealed that career ambition was positively correlated with internal and external networking
behavior ($r = .27, p < .01; r = .29, p < .01$, respectively). The interrelation between internal
and external networking behavior was .71 ($p < .001$). Both scales were positively correlated
with the network size of the career-related professional support network outside the
department ($r = .31, p < .01; r = .29, p < .01$, respectively). Finally, and most interestingly,
gender was unrelated to internal ($r = -.05, ns$) and external ($r = -.03, ns$) networking behavior,
as well as to career ambition ($r = -.15, ns$) and network size (inside: $r = -.12, ns$; outside: $r = -.04, ns$) within the empirical path model. Hence, no further indirect gender effects analyses
were conducted.

**Discussion**

The present study analyzed (a) gender differences in the gender composition of
career-related professional support networks within and outside early academic scientists’
departments and (b) how these differences in gender composition relate to different subjective career success indicators (see also Figure 1). Men build career-related professional support networks consisting of a higher proportion of male to female professional supporters both inside and outside the studied department that subsequently (and indirectly) relates to more subjective career success (Hypotheses 1–3).

Past studies have mostly analyzed gender as a moderating or direct influence variable, but have not analyzed indirect effects of gender on career outcomes (e.g., Kirchmeyer, 2005). Our study expanded this research because we (a) analyzed indirect effects of gender on subjective career success and (b) added an understudied but—particularly for academia—important subjective career success indicator, namely perceived external marketability. In a study by Eby and colleagues (2003), perceived external marketability was related to career insight, career identity, experience with a mentor, career/job related skills, and internal/external networking (measured by a subjective rating scale). As women perceived slightly lower external marketability in our study, a perceived external marketability enhancement for women via gender sensitive network building might be a fruitful strategy to support the career development of women.

Past research on gender differences and workplace networks mostly analyzed specific networks of managers or academic scientists within one organization/department, or did not differentiate between inside and outside organizational or departmental networks (Brass, 1985; Ibarra, 1997; Parker & Welch, 2013; Pfen & Baker, 2012; Seibert, Kraimer, & Liden, 2001). When inside and outside networks were considered simultaneously, studies operationalized these networks with subjective scales and not by objective network parameters (Eby et al., 2003; Metz & Tharenou, 2001). We expanded the research in this field by demonstrating that the gender composition of two different support networks (i.e.,
networks inside and outside an individual’s department) is related to subjective career development.

However, inside and outside departmental support networks were not related to all subjective career success indicators in the same manner. Contrary to our expectations, the gender composition of inside departmental networks was only related to perceived external marketability, but not to perceived career success. One explanation for this unexpected finding might be that individuals do not consistently rely on gender compositions within inside departmental networks when evaluating subjective career success. Young scientists might consider that structural occupational factors, such as gender base rates, may constitute at least a partial explanation for the gender distribution of their networks. Furthermore, factors which are more closely related to young researchers’ immediate work performance, such as number of publications and conference proceedings, or even teaching evaluations, might play a more prominent role when evaluating perceived career success.

In line with our hypotheses, the gender composition of inside departmental networks was related to external marketability. Beyond technical professional support, other researchers in one’s support network inside the department might provide assistance in terms of job search activities and career knowledge. Furthermore, young researchers develop skills through internal professional support, which they may transfer to outside departmental positions later on. Finally, supporters within inside departmental networks may also function as connectors, or so-called brokers (Borgatti & Foster, 2003), to outside departmental (research) networks.

The gender composition of outside departmental networks was related to both perceived career success and external marketability. Hence, it seems that the relative number of men within professional support networks is slightly more indicative of career development for outside departmental networks than for inside departmental networks. This
may also be related to the fact that academic careers are often global careers, and outside departmental networks play a central role within career planning and development. Today, (international) collaboration is more or less mandatory in research, and young researchers will usually leave their home departments after finishing their dissertations if they further pursue a career in academia. In sum, the differentiated findings underline the importance of studying different networks in a comprehensive model of support networks and career outcomes within early academic science careers.

Compared to diverse consequences of the analyzed networks, same gender differences occurred in the composition of both inside and outside departmental networks. For outside departmental networks, structural factors are hard to rely on because gender choice is not limited in terms of base rates. Furthermore, after controlling for research field (i.e., gender base rate) in the inside departmental networks, the gender effect remained stable. Taken together, these results strongly suggest that individual explanations, or attraction-similarity processes, are one core mechanism for building gender-specific professional support networks.

The inclusion of several controls revealed interesting additional findings. The relationship of the gender-composition of support networks analyzed herein remains stable after controlling for network size, networking behavior, career ambition, contract type, and final university grade as a proxy for past success or ability. This suggests that relatively fewer men in one’s network represent a constraining structural component in the career tournament in academic science. In addition, we found that more men than women hold full-time positions in their respective departments. This finding is rather alarming considering that women are already highly underrepresented in professor positions with tenure in Germany (Statistisches Bundesamt, 2012). Thus, our finding that women are less likely to have full-time contracts in the early stage of their academic careers might already constitute a form of
discrimination, which likely impacts the decision to further pursue a career in academic science later on.

**Practical Implications**

We derive two major practical implications for the support of women’s career development. First, scientific career support programs should account for the fact that the gender composition of professional support networks is crucial for perceptions of success in the early career stage. Moreover, career counselors or coaches might account for the results presented herein by analyzing network structures of the client and by focusing on the gender composition of these networks. Specific strategies for gender-sensitive contact building could be developed. We do not recommend connecting to either only women or only men, but women especially should develop more diverse networks (including more men) within male-dominated academic science fields. Given the importance of the gender composition of support networks for subjective career success, programs that address or rely only on female mentors/supporters seem to be less promising in light of our data.

**Limitations and Future Research**

Although our study has its strengths, a few limitations and recommendations for future research have to be considered. First, the cross-sectional design of our study limits causal conclusions. However, our hypothesized model was derived from theory, and gender as a stable personal characteristic clearly denotes the starting point of our model.

Second, the interpretation of the results of our study is restricted to a sample of highly educated scientists and cannot be easily generalized to other working populations, such as within industry. More studies that explicitly address the moderating role of academic science vs. industry should be conducted. It should be especially considered whether the gender base rate within the research fields studied herein is disproportional (i.e., more men than women)
and therefore perceived as more successful than in other occupational fields (e.g., social occupations or arts and humanities).

Third, we operationalized the gender composition of the networks by means of quantity and counted the number of male to total contacts. Future research should analyze network parameters, such as density or efficiency (Borgatti & Foster, 2003), to evaluate whether gender is also an important predictor for other network structures.
Literature


Table 1
Correlations, Means, and Standard Deviations of Study Variables (N = 82)

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<tr>
<td>3 Final grade (ranging from 1 = very good to 4 = sufficient)</td>
<td>1.56</td>
<td>.41</td>
<td>.11</td>
<td>-.00</td>
<td>–</td>
<td></td>
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<tr>
<td>4 Contract type (0 = part-time, 1 = full-time)</td>
<td>–</td>
<td>–</td>
<td>.22*</td>
<td>.26*</td>
<td>.02</td>
<td>–</td>
<td></td>
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<tr>
<td>5 Research field (0 = others, 1 = technology)</td>
<td>–</td>
<td>–</td>
<td>.15</td>
<td>.18*</td>
<td>-.12</td>
<td>.61***</td>
<td>–</td>
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<tr>
<td>6 Network size of career-related professional support network inside department</td>
<td>4.74</td>
<td>2.47</td>
<td>-.13</td>
<td>-.08</td>
<td>-.20*</td>
<td>-.13</td>
<td>-.16</td>
<td>–</td>
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<td>7 Network size of career-related professional support network outside department</td>
<td>2.87</td>
<td>2.29</td>
<td>-.04</td>
<td>.04</td>
<td>-.05</td>
<td>.02</td>
<td>.04</td>
<td>.29**</td>
<td>–</td>
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<tr>
<td>8 Internal networking behavior</td>
<td>4.22</td>
<td>.69</td>
<td>-.06</td>
<td>-.08</td>
<td>-.02</td>
<td>.22</td>
<td>.18</td>
<td>.06</td>
<td>.32**</td>
<td>–</td>
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<td>9 External networking behavior</td>
<td>3.73</td>
<td>.66</td>
<td>-.03</td>
<td>.09</td>
<td>.15</td>
<td>.27*</td>
<td>.00</td>
<td>-.04</td>
<td>.29**</td>
<td>.71***</td>
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<td>10 Career ambition</td>
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<td>1.03</td>
<td>-.14</td>
<td>.12</td>
<td>-.10</td>
<td>.19</td>
<td>.12</td>
<td>.04</td>
<td>.03</td>
<td>.28*</td>
<td>.30**</td>
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<tr>
<td>11 Gender composition of career-related professional support network inside department (ranging from 1 = solely male to 0 = solely female)</td>
<td>–</td>
<td>–</td>
<td>.37**</td>
<td>.12</td>
<td>.01</td>
<td>.41**</td>
<td>.27*</td>
<td>-.11</td>
<td>-.22*</td>
<td>.11</td>
<td>.08</td>
<td>.04</td>
<td>–</td>
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<tr>
<td>12 Gender composition of career-related professional support network outside department (ranging from 1 = solely male to 0 = solely female)</td>
<td>–</td>
<td>–</td>
<td>.31**</td>
<td>.06</td>
<td>-.02</td>
<td>.26*</td>
<td>.12</td>
<td>-.05</td>
<td>-.01</td>
<td>.15</td>
<td>.15</td>
<td>.00</td>
<td>.26*</td>
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<td>13 SCS: Perceived career success</td>
<td>4.63</td>
<td>.74</td>
<td>.03</td>
<td>-.34**</td>
<td>-.37**</td>
<td>.15</td>
<td>.14</td>
<td>.03</td>
<td>.10</td>
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<td>.07</td>
<td>.22*</td>
<td>.16</td>
<td>.31**</td>
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<td>14 SCS: Perceived external marketability</td>
<td>4.19</td>
<td>1.09</td>
<td>.19*</td>
<td>.01</td>
<td>-.20*</td>
<td>.23*</td>
<td>.16</td>
<td>.10</td>
<td>-.04</td>
<td>.40***</td>
<td>.26*</td>
<td>.11</td>
<td>.38***</td>
<td>.42**</td>
<td>.24*</td>
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</tr>
</tbody>
</table>

Note. *p < .10; **p < .05; ***p < .01; ****p < .001; SCS = subjective career success.
Table 2

*Standardized Indirect Effects of Gender on Subjective Career Success via Gender Composition of Different Professional Support Networks (N = 82)*

<table>
<thead>
<tr>
<th></th>
<th>Specific indirect effect on perceived career success</th>
<th>Specific indirect effect on perceived external marketability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
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<tr>
<td>→ Gender composition of career-</td>
<td>.035(^1)</td>
<td>.075(^*)</td>
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<tr>
<td>related professional support network inside department</td>
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<tr>
<td>Gender</td>
<td></td>
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<tr>
<td>→ Gender composition of career-</td>
<td>.083(^*)</td>
<td>.094(^*)</td>
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<tr>
<td>related professional support network outside department</td>
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</tbody>
</table>

Note. \(^*\)p < .05; \(^1\) for better comparability we display three decimal places for specific indirect effects
Figure 1. Theoretical model: Gender, gender composition of career-related professional support networks, and subjective career success.

Note. a = model part a (Hypothesis 1a & 1b); b = model part b (Hypotheses 2a & 2b)
Figure 2. Empirical model: Gender, gender composition of career-related professional support networks, and subjective career success.

Note. N = 82; women = 0, men = 1; standardized regression coefficients and estimated correlations between the two support networks and subjective career success; * p < .05, ** p < .01, *** p < .001; the effects of several variables (age, final university grade, contract type, research field, network size inside and outside of the department, career ambition, and internal and external networking behavior) on both measures of subjective career success were controlled for; furthermore, the effect of research field on the gender composition of the support networks was also controlled for.