




Returning home and becoming alumni faculty: dual academic networks and their impact on Chinese returnee faculty's professional development satisfaction

Han Wu¹ · Jiani Zhu² 

Accepted: 19 September 2023 / Published online: 9 November 2023
© The Author(s), under exclusive licence to Springer Nature B.V. 2023

Abstract

Returnee faculty experiencing cross-border academic mobility have obtained ample transnational experience in an international academic environment, which may potentially influence their professional development satisfaction after returning to their home countries. Most research has compared returnee faculty's research productivity with their home-trained colleagues. However, the joint impact of local and overseas networks on professional development satisfaction needs to be further explored, particularly how they take advantage of overseas and domestic academic networks in professional development. This study used a mixed-methods approach to explore these issues. In the quantitative research section, a survey of 1307 returnees from 41 top Chinese universities was conducted. Ordinary Least Squares (OLS) and Propensity Score Matching (PSM) models were adopted to probe the influence of the dual academic networks on returnee scholars' professional development and to reveal the causal effect of the alum faculty status, respectively. In the qualitative research section, thirteen returnee faculty from nine Chinese universities participated in interviews. Key findings show that dual academic networks impact returnees' satisfaction with professional development, and network members with different tie strengths played diverse roles. The frequency of contact with former domestic and overseas supervisors and domestic colleagues is positively related to the returnee faculty's professional development satisfaction. Furthermore, the alum faculty status has a negative effect on returnees' professional development satisfaction. Returnees are advised to effectively and intentionally manage the strength of their ties to various roles within the dual academic networks to enhance their professional development satisfaction.

Keywords Academic networks · Returnee faculty · Professional development

Han Wu is the first author.

✉ Jiani Zhu
zhujiani@sjtu.edu.cn

¹ Beijing Academy of Educational Sciences, Beijing, China

² School of Education, Shanghai Jiao Tong University, Shanghai, China

Introduction

Scientific and technological talents participating in transnational academic mobility are essential for knowledge innovation and technology transfer (Chen, 2017). For developing countries, returnee faculty serve as bridges for academic exchanges and scientific research collaboration with developed countries, while also providing home countries with economic, human, and social capital that cannot be obtained solely through local scientific and technological innovation and resource integration (Melin, 2004). Consequently, developing countries like China introduced various talent programs to encourage the return of talented faculty. Simultaneously, Chinese universities are actively recruiting returnees in science and technology to build world-class universities and enhance global competitiveness by creating talent clusters.

Transnational academic mobility enables individuals to expand their social capital and academic networks (Rosen & Zweig, 2003). When scholars return, their previous academic ties with the international community can be relocated to domestic academia (Li & Tang, 2019). As China is a relationship-oriented society, returnees' previous domestic networks might also affect their professional development. From this context, this study explores the following research question: how do the overseas and domestic academic networks impact returnee scholars' professional development satisfaction?

This paper is organized as follows: first, we review the literature on strong and weak ties and propose the research hypotheses. The second part introduces the methodology. In the third part, we present the findings of returnee faculty's dual academic networks and their impact on professional development satisfaction, based on quantitative and qualitative data. Our analysis suggests that maintaining different strengths of ties with members in dual academic networks exerts various impacts on returnees' professional development satisfaction.

Literature, conceptual framework, and hypotheses

Conceptual framework: strong and weak ties

Ties, or *guanxi* used in Chinese culture, refer to a connection between two individuals that is subjectively close and potentially resourceful (Bian, 2019). It has been widely demonstrated that the trust, resources, information, and support embedded within these ties have a significant impact on employment, mobility, and career advancement in the labor market. Strong and weak ties are essential branches of tie theory. When synthesizing strong and weak ties, two core aspects can be extracted: the criteria for defining tie strength and the utility of strong and weak ties.

First, regarding the criteria of tie strength, Granovetter (1973) considers it a combination of four dimensions: frequency of interaction, degree of intimacy, degree of emotional attachment, and extensity of resource exchanges. Since the four dimensions are empirically interrelated, they can be characterized using one of the single dimensions (Bian, 2019). Bian (2019) agrees with Granovetter's criterion, while his definition of tie strength focuses more on the role type: kin ties (parents, spouses, etc.), pseudo-kin ties (teachers-students, masters-apprentices, etc.), and other non-kin ties are the types with decreasing intimacy and tie strength. His view implies a critical idea: an inherent affinity gap between roles leads to differences in mutual responsibilities and obligations. Although this view

is empirical in most cases, it fails to cover particular situations (e.g., father-son conflict). Integrating Granovetter and Bian's views, this study argues that the dynamic frequency of interactions should characterize the operationalized definition of ties strength. Meanwhile, since the intensity and closeness of ties between roles differ, it is necessary to distinguish role types in the ties network when discussing the criteria for classifying tie strength.

The second core dimension involves the utility of strong and weak ties. Granovetter (1973) believes that weak ties have an advantage over strong ties in the labor market. In a network of strong ties, actors and information have a high degree of similarity. Accordingly, information disseminated through strong ties is more likely to be confined to a smaller range, fostering local cohesion while tending to lead to overall isolation and fragmentation (Li, 2003). Weak ties mainly serve as a bridge between two different groups, thus allowing actors to obtain novel information. In contrast, Bian (1997) argues that strong ties are often more effective than weak ties. Favor exchange is usually informal, to some extent, as a violation of formal organizational principles; it must be based on mutual trust, familiarity, and intimacy (Sun & Bian, 2012), while weak ties indicate less trust and a lack of obligation (Bian, 1997).

In general, both strong and weak ties have their strengths. Weak ties have advantages in transmitting heterogeneous information, but they fail to build bridges due to alienation. Strong ties excel at accessing informal opportunities because they imply commitment, trust, and obligation; however, since strong ties are confined to the in-group, the scope of resources involved is narrow, and there is often a high degree of homogeneity.

The strong and weak ties, roles types, and returnee scholars' professional development

Ties have become an integral part of formal organizations and bureaucratic systems. The use of informal ties to access resources or information is not unique to China (Ji, 2012), and academic fields are no exception. In conjunction with the theme of professional development satisfaction among returnees' faculty, it is necessary to distinguish different roles within academic networks and investigate the influence of strong and weak ties on professional development satisfaction.

Supervisors, fellow students with the same supervisors, and classmates/colleagues are the most common role types in academic networks, and the intimacy of these roles varies. Supervisors and fellow students with the same supervisors are often classified as *shimen* at Chinese universities (Liu, 2021), which translates to the same "research family" (Zheng et al., 2018).

Within the *shimen*, the functions of supervisors and fellow students are different regarding qualifications, knowledge, and resources (Wen, 2022, May 31). In the traditional Chinese culture, supervisor-subordinate forms father-son or mother-daughter relations (Gu et al., 2018), a typical pseudo-kin ties (Bian, 2019). Similarly, the German term *Doktorvater* (doctoral father) or *Doktormutter* (doctoral mother) shows an intellectual bond of family intimacy between supervisors and Ph.D. candidates (Holmes et al., 2019). Accordingly, supervisors are not only willing but also capable of offering students enlightening, critical, and future-oriented suggestions and valuable resources. Therefore, we hypothesize (Table 1):

H1: More frequent contact with domestic supervisors increases the returnee faculty's professional development satisfaction.

Table 1 A summary of hypothesis 1–6

Roles \ Ties	Dual academic networks	
	Overseas	Domestic
	Strong ↔ Weak	Strong ↔ Weak
Supervisor	+	+
Students with the same supervisor	+	-
Classmates/colleagues	+	+

“+” stands for a positive impact; “-” indicates a negative impact

H2: More frequent contact with overseas supervisors increases the returnee faculty’s professional development satisfaction.

Frequently, fellow students with the same supervisors do not differ significantly in knowledge, abilities, and the extent and level of their academic networks. During the professional socialization process of graduate training, the concept of *shimen* is utilized to create a group of individuals with similar research habits, preferences, and ways of thinking (Lin & Chao, 2019; Yao & Yu, 2019). Moreover, they form a well-defined circle; homogeneity is a prerequisite for the group’s existence, and closeness, conservatism, and exclusivity are essential characteristics (Wen, 2022, May 31). However, excessive intra-group consistency and cohesion can lead to groupthink dilemmas, which in turn may result in rigid thinking, limited information flow, unquestioning obedience, stereotypes toward outsiders, and an increased risk of having a narrow vision (Janis, 1991). Based on this, the study posits the following hypothesis:

H3: More frequent contact with domestic fellow students with the same supervisors (*shimen*) decreases the returnee faculty’s professional development satisfaction.

Unlike in China, academic culture overseas seldom has an equivalent concept of *shimen* (Wen, 2022, May 31). Although there are inevitably similarities in research ideas and directions from the same supervisors, transnational networks are more open and more heterogeneous (Lu, 2014), which can “dilute” and neutralize the negative effects of the closed and redundant nature of the strong *shimen* ties. Accordingly, heterogeneous transnational networks provide more effective diversified resources to promote academic development. Therefore, we hypothesize:

H4: More frequent contact with overseas fellow students with the same supervisors increases the returnee faculty’s professional development satisfaction.

The ties that develop with roles such as classmates/colleagues are often looser than those of members in *shimen* (Huang, 2021). These ties tend to cross group boundaries, thus facilitating access to heterogeneous resources and information. However, as Qiu and Qiao (2018) argue, the “capability” to help and “willingness” to help are entirely different. When returnees fail to establish stable academic ties with classmates/colleagues at home and abroad, there is no reciprocal channel for exchanging resources and information, and these individuals may not take the initiative to share the resources

and information. Maintaining close ties with domestic classmates/colleagues may reactivate local academic networks weakened by lack of communication in overseas study and gain recognition and acceptance (Levin et al., 2011). Based on this, we hypothesize:

H5: More frequent contact with domestic classmates/colleagues increases the returnee faculty's professional development satisfaction.

H6: More frequent contact with overseas classmates/colleagues increases the returnee faculty's professional development satisfaction.

Academic inbreeding and returnee scholars' professional development

Another concept closely related to the strength of ties is academic inbreeding. It describes the phenomenon of returnees returning to their *alma mater*, becoming the most significant indicator of domestic academic networks (Li & Tang, 2019). Larger network sizes often translate into greater diversity, providing access to a wide range of resources, opportunities, and non-redundant information (Ynalvez & Shrum, 2011). In contrast, academic inbreeding refers to reproduction within the same category, implying strong ties and homogeneity. Additionally, the exchange of favors, facilitated by trust and support, often requires alum faculty to assume corresponding responsibilities and obligations as compensation, a concept referred to as “rob Peter to pay Paul” (McGee, 1960). Waggoner (1966) bluntly states that “inbreeding is not always bad, but it is dangerous” (p.211). Therefore, we hypothesize:

H7: The alumni-faculty status has a negative impact on returnee faculty's professional development satisfaction.

Methodology

Sample

In this paper, we define “returnee faculty” as those full-time faculty at Chinese universities who either achieved their doctoral degree abroad or have at least two consecutive years of postdoctoral research or work experience at universities or institutions abroad.

This study employs a convergent parallel mixed-method design (Creswell, 2002) to probe the research question. In the quantitative research, we first browsed the homepages of China's 42 “Double First-Class” universities and sent survey invitations to returnee faculty whose e-mail addresses were available. After three rounds of distribution, 1369 questionnaires were collected, with a response rate of 12.6%. After cleaning the data, a sample of 1307 returnee faculty was obtained. In the qualitative research, we adopted a purposive sampling strategy to identify participants according to their alumni faculty identities and frequency of contact with members in their previous academic networks. Eventually, 13 returnees from nine universities participated in the study, with four participants being alumni faculty (Table 2). Participants' anonymity and confidentiality were guaranteed to protect the interviewees' privacy.

Table 2 Demographic information of interviewees

Interviewees	Gender	Disciplines	Academic ranks	Host countries/regions	Overseas experience	Period abroad (year)	Period returned (year)	Alum status
Thomas	Male	Science	Professor	Brazil	Postdoc	3	17	Yes
Jessica	Female	Science	Associate professor	France	Postdoc	2.5	6	Yes
Betty	Female	Science	Associate professor	UK	Ph.D	9	10	No
Edward	Male	Engineering	Professor	USA	Ph.D. and postdoc	11	7	Yes
Jeffrey	Male	Engineering	Associate professor	Hong Kong, China/Germany	Ph.D. and postdoc	5	6	No
Emma	Female	Engineering	Associate professor	USA	Ph.D. and postdoc	6	4	No
Scott	Male	Engineering	Professor	USA	MA and Ph.D. and postdoc and associate professor	6	4	No
Julie	Female	Humanities	Lecturer	Spain	MA and Ph.D	5	6	No
Victoria	Female	Economics	Lecturer	USA	MA and Ph.D. and postdoc	11	13	No
Alice	Female	Economics	Associate professor	USA	Ph.D	5	7	No
Sara	Female	Social science	Associate professor	Hong Kong, China	MA and Ph.D. and Postdoc and lecturer	8	6	No
Rose	Female	Social science	Associate professor	Canada/Macao, China	MA and Ph.D. and postdoc	14	5	No
Richard	Male	Humanities	Professor	Netherlands	Ph.D	5	14	Yes

Data collection

The quantitative data was based on a self-compiled questionnaire with 61 items, exploring overseas learning and research experience abroad, working experience at Chinese universities, and demographic information. The current study focuses on those question items concerning professional development satisfaction and domestic and overseas academic networks. According to the definition of job satisfaction (Locke, 1969; Spector, 1997), we understand professional development satisfaction as employees feel about their overall and systematic development, regarding the fulfillment, and overall positive experience an individual derives from their professional growth (Singh & Singh, 2021). Most research has adopted surveys or bibliometric methods to explore returnees' research productivity, while few have studied it from an individual perspective. As the self-evaluation approach provides information that other standardized measures cannot obtain (Ross, 2006), we use the self-report method to understand how satisfied returnee faculty are with their professional development. The qualitative data was obtained through semi-structured interviews. The interview questions covered three topics: how returnees received their academic positions, their professional development experience, and their opinions regarding their academic networks.

Data analysis

Quantitative research

Regarding the dependent variable, based on the literature review and pre-interviews, we divide the self-evaluation of professional development into five dimensions: competitive research funding, publications, research collaboration, the extension of original research areas, and the exploration of new research interests. The dependent variables are the above five subscale items and the results of their factor analysis. The five items are chosen for the following reasons: first, tenure track evaluation is mainly based on the quality and quantity of competitive projects and publications. Research collaboration is crucial in promoting projects and publications, and this is particularly true for those faculty with international mobility experience (Wang et al., 2019). We further investigated how returnee scholars explored new research directions and expanded existing research fields to better understand how they perceive their research performance in terms of both breadth and depth (Li et al., 2018). Regarding the independent variable "contact," participants are required to indicate how frequently they communicate with members of their academic networks.

This study adopts Ordinary Least Squares (OLS) and Propensity Score Matching (PSM) models. The first group of OLS models aims to explore the influence of overseas and domestic academic networks on returnee scholars' professional development satisfaction. Contact frequency is selected as an operational index to measure the strength of ties (Granovetter, 1973).

The second model explores alumni status's influence on returnee faculty's professional development satisfaction. Since the choice of returnee faculty to return to their *alma mater* is not randomly distributed, it may be influenced by individual and university-level factors, resulting in a self-selection bias. The PSM in a quasi-experimental method is a common approach to tackling the above problems. The core independent variable of this model is whether the returnee is an alum faculty or not. Regarding selecting covariates, "it is important to include

in the matching procedure all variables known to be related to both treatment assignment and the outcome” (Stuart, 2010, p.5). Therefore, the covariates selected as matching variables of this study are the variables that affect whether returnee faculty return to their *alma mater* and their professional development satisfaction. These variables and their detailed descriptions are listed in the *control/covariate variable* in Table 3. We use the “psestimate” command to filter out the matching variables to achieve the best matching effect. The matching variables finally screened out are shown in Table 7 in the “Appendix” section.

Qualitative research

The interview data was probed by thematic analysis, one of the most widely used methods to identify and analyze qualitative data (Braun & Clarke, 2006). The original material was coded word for word, and the passages of text that were identified by the same code were clustered together; we then formed an initial list of codes (e.g., provision of job-position information, research collaboration, willingness to return and work at *alma mater*); then, we focused on the broader level of themes (e.g., access to academic positions and domestic academic networks) and sorted the different codes into potential themes (e.g., “provision of job-position information” was a subcategory under “access to academic positions”). After that, all codes were refined under more general headings related to the research questions, and a coding frame was formed.

Findings

Dual academic networks and professional development satisfaction

Findings indicate that both overseas and domestic networks are essential for the satisfaction of returnee faculty professional development. The results of inferential statistics suggest that maintaining the appropriate strength of ties with different members of the academic network is critical for returnees (Table 4).

Frequent contact with domestic and overseas supervisors improves returnee faculty’s professional development satisfaction, supporting hypotheses 1 and 2. Among them, the positive role of the overseas supervisor is omnidirectional. For each unit where returnees are more closely connected with their overseas supervisors, their self-evaluation of professional development in five dimensions, including competitive research funding, publications, research collaboration, the extension of original research areas, the exploration of new research interests, and overall professional development satisfaction, increases by 0.133, 0.141, 0.212, 0.160, 0.141, and 0.187 units, respectively. Besides insufficient promotion role in exploring new research interests, contact with domestic supervisors also shows significant positive effects in other dimensions. The interviewees confirmed the role of supervisors from different perspectives. First, overseas supervisors continue to provide advice for research. For example, Sara mentioned the career advice offered by her former supervisor in the UK:

I rely on my former supervisor’s suggestions in planning my future research focus. He is more familiar with my research and can offer more helpful advice. (Sara)

Similarly, Betty and Alice believed that their overseas supervisors’ guidance facilitated their professional development regarding publication in international journals.

Table 3 Descriptions of variables and descriptive statistics

Variable	Description	Obs	Mean	SD	Min	Max
Dependent variables						
Competitive research funding	The higher the score, the higher the satisfaction in this dimension	1292	3.392	1.084	1	5
Publications	<i>Ibid</i>	1288	3.498	0.973	1	5
Research collaboration	<i>Ibid</i>	1268	3.492	0.954	1	5
Extension of original research areas	<i>Ibid</i>	1271	3.642	0.970	1	5
Exploration of new research interests	<i>Ibid</i>	1269	3.765	0.933	1	5
Independent variables						
Contact with domestic supervisor	The higher the score, the more frequent contact with the member	969	2.475	0.585	1	3
Contact with overseas supervisor	<i>Ibid</i>	1287	2.452	0.544	1	3
Contact with students with the same domestic supervisor	<i>Ibid</i>	1061	2.460	0.576	1	3
Contact with students with the same overseas supervisor	<i>Ibid</i>	1220	2.357	0.561	1	3
Contact with domestic classmates/colleagues	<i>Ibid</i>	1136	2.479	0.542	1	3
Contact with overseas classmates/colleagues	<i>Ibid</i>	1214	2.365	0.535	1	3
Alum faculty	If any degree (bachelor, master, and/or doctorate) is obtained in the current university, the value will be 1; otherwise, it will be 0	1307	0.355	0.479	0	1
Control/covariate variables						
Gender	Male = 1; female = 0	1307	0.760	0.427	0	1
Age_X	Age_1 = 1 if age ≤ 35; 0 if otherwise	1307	0.305	0.460	0	1
	Age_2 = 1 if 36 ≤ age ≤ 45; 0 if otherwise	1307	0.406	0.491	0	1
	Age_3 = 1 if age ≥ 46; 0 if otherwise	1307	0.290	0.454	0	1
Discipline (DC_X)	Discipline_1 = 1 if science; 0 if otherwise	1262	0.381	0.486	0	1
	Discipline_2 = 1 if engineering; 0 if otherwise	1262	0.372	0.483	0	1
	Discipline_3 = 1 if social science; 0 if otherwise	1262	0.187	0.390	0	1
	Discipline_4 = 1 if humanities; 0 if otherwise	1262	0.059	0.237	0	1
Academic rank (AR_X)	AR_1 = 1 if lecturer; 0 if otherwise	1297	0.184	0.387	0	1
	AR_2 = 1 if associate professor; 0 if otherwise	1297	0.338	0.473	0	1
	AR_3 = 1 if professor; 0 if otherwise	1297	0.478	0.500	0	1
University level (UL)	UL = 1 if C9 League; 0 if otherwise	1307	0.407	0.492	0	1

Table 3 (continued)

Variable	Description	Obs	Mean	SD	Min	Max
The geographical location of the current university (GL_X)	GL_1 = 1 if eastern, 0 if otherwise	1306	0.695	0.460	0	1
	GL_2 = 1 if central, 0 if otherwise	1306	0.203	0.402	0	1
	GL_3 = 1 if western, 0 if otherwise	1306	0.102	0.303	0	1
The geographic location of overseas university where faculty studied (HC_X)	HC_1 = 1 if North America, 0 if otherwise	1289	0.387	0.487	0	1
	HC_2 = 1 if Europe, 0 if otherwise	1289	0.261	0.440	0	1
	HC_3 = 1 if Asia-Pacific, 0 if otherwise	1289	0.332	0.471	0	1
	HC_4 = 1 if others, 0 if otherwise	1289	0.019	0.138	0	1
	YR_1 = 1 if before 2000, 0 if otherwise	1307	0.088	0.283	0	1
The year of entry to Chinese university (YR_X)	YR_2 = 1 if between 2000 and 2010, 0 if otherwise	1307	0.355	0.479	0	1
	YR_3 = 1 if after 2010, 0 if otherwise	1307	0.557	0.497	0	1
	Acquaintance = 1 if the university has acquaintance, 0 if otherwise	1307	0.425	0.495	0	1
Overseas study experience (OSE_X)	OSE_1 if doctoral-level, 0 if otherwise	1276	0.437	0.496	0	1
	OSE_2 if postdoctoral-level, 0 if otherwise	1276	0.213	0.410	0	1
	OSE_3 if master- and doctoral-level, 0 if otherwise	1276	0.062	0.241	0	1
	OSE_4 if doctoral- and postdoctoral-level, 0 if otherwise	1276	0.216	0.412	0	1
	OSE_5 if master, doctoral-, and postdoctoral-level, 0 if otherwise	1276	0.042	0.201	0	1

Table 4 Regression results of the influence of academic networks on the professional development satisfaction of returnee faculty

	(1)	(2)	(3)	(4)	(5)	(6)
	Competitive research funding	Publications	Research col-laboration	Extension of original research areas	Exploration of new research interests	Overall professional development satisfaction
Independent variables						
Domestic supervisor	0.237 ^{***} (0.077)	0.248 ^{***} (0.066)	0.234 ^{***} (0.065)	0.194 ^{***} (0.065)	0.104 (0.066)	0.210 ^{***} (0.067)
Overseas supervisor	0.133 [*] (0.074)	0.141 ^{**} (0.063)	0.212 ^{***} (0.063)	0.160 ^{**} (0.063)	0.141 ^{**} (0.064)	0.187 ^{***} (0.065)
Students with the same domestic supervisor	-0.059 (0.093)	-0.030 (0.080)	-0.086 (0.080)	-0.237 ^{***} (0.079)	-0.118 (0.081)	-0.149 [*] (0.082)
Students with the same overseas supervisor	0.100 (0.092)	0.059 (0.079)	0.120 (0.078)	0.204 ^{***} (0.078)	0.066 (0.081)	0.154 [*] (0.081)
Domestic classmates/colleagues	0.203 ^{**} (0.098)	0.016 (0.084)	0.162 [*] (0.084)	0.205 ^{**} (0.083)	0.204 ^{**} (0.085)	0.202 ^{**} (0.086)
Overseas classmates/colleagues	-0.095 (0.098)	0.084 (0.084)	0.080 (0.084)	-0.007 (0.083)	0.016 (0.084)	0.030 (0.086)
Control variables						
C9 League (C9 = 1)	0.125 [*] (0.073)	0.156 ^{**} (0.062)	0.241 ^{***} (0.062)	0.312 ^{***} (0.062)	0.234 ^{***} (0.063)	0.255 ^{***} (0.064)
Discipline (with the science as reference)						
Engineering	0.002 (0.081)	0.049 (0.069)	0.043 (0.069)	-0.054 (0.069)	0.028 (0.069)	0.014 (0.071)
Social science	-0.064 (0.110)	0.134 (0.094)	0.131 (0.094)	0.083 (0.094)	0.180 [*] (0.096)	0.116 (0.098)
Humanities	-0.304 [*] (0.174)	0.007 (0.146)	-0.087 (0.147)	-0.062 (0.146)	0.041 (0.148)	-0.030 (0.151)
Academic title (with the lecturer as reference)						
Associate professor	0.231 ^{**} (0.114)	0.227 ^{**} (0.097)	0.079 (0.097)	0.233 ^{**} (0.097)	0.115 (0.098)	0.176 [*] (0.100)
Professor	0.424 ^{***} (0.128)	0.606 ^{***} (0.109)	0.264 ^{**} (0.109)	0.475 ^{***} (0.109)	0.339 ^{***} (0.110)	0.494 ^{***} (0.113)

Table 4 (continued)

	Competitive research funding	Publications	Research col-laboration	Extension of original research areas	Exploration of new research interests	Overall professional development satisfaction
Period returned (year) (with under 5 years as reference)						
7–12 years	0.040 (0.096)	0.155* (0.082)	0.101 (0.081)	-0.029 (0.082)	0.121 (0.083)	0.058 (0.085)
Over 12 years	0.329** (0.145)	0.222* (0.123)	0.211* (0.122)	0.262** (0.123)	0.336*** (0.125)	0.292** (0.127)
Gender (male = 1)	0.137 (0.089)	0.216*** (0.076)	0.245*** (0.076)	0.218*** (0.076)	0.258*** (0.076)	0.308*** (0.079)
Age (with under 35-year-old as reference)						
36–45 year old	-0.235** (0.101)	-0.052 (0.087)	0.007 (0.086)	0.082 (0.086)	0.090 (0.087)	0.003 (0.089)
Over 45 year old	-0.307** (0.153)	0.076 (0.131)	0.003 (0.129)	-0.035 (0.129)	-0.036 (0.131)	-0.049 (0.134)
The geographic location of the host country where returnee faculty studied (with North America as a reference)						
Europe	-0.064 (0.092)	-0.059 (0.079)	0.081 (0.078)	0.025 (0.078)	0.018 (0.079)	-0.015 (0.081)
Asia-Pacific	-0.077 (0.087)	-0.069 (0.075)	-0.065 (0.074)	-0.001 (0.074)	-0.033 (0.075)	-0.030 (0.077)
Others	-0.471* (0.256)	-0.437** (0.218)	-0.224 (0.222)	-0.214 (0.216)	-0.149 (0.218)	-0.470** (0.230)
Adjusted R ²	0.080	0.176	0.152	0.153	0.115	0.175
N	842	840	828	831	828	827

(1) Significance level: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. (2) The numbers in brackets are standard errors

Second, because of the exclusiveness of closed-structured *guanxi* networks, scarce resources are often only available to the group members. Therefore, maintaining frequent contact with domestic supervisors allows access to scarce academic resources. Jessica mentioned:

Since my supervisor has continuously researched immunization, some specific methods to make good animal models are only available to the members under his supervision. (Jessica)

Findings show that more frequent contact with fellow students in the *shimen* has a negative effect on all aspects of the returnees' satisfaction with research advancement; at the same time, contacting students with the same supervisors overseas has a positive impact on the extension of original research areas and overall professional development satisfaction, which confirms hypotheses 3 and 4.

Table 4 also shows that a higher frequency of contact with domestic classmates/colleagues positively impacts returnee faculty's professional development in all dimensions, and hypothesis 5 is supported. In contrast, a higher frequency of contact with classmates/colleagues overseas does not promise a significant increase in professional development, which rejects hypothesis 6. Interviewees provided some evidence that supports the results. They believed that ties with classmates/colleagues overseas were not close enough to support them to ask the latter for advice when they returned home; moreover, research collaboration across countries was not permissible in terms of time and energy (*Emma*). At the same time, with the shift in the research field, teaming up with domestic colleagues under the guidance of Chinese government policy is more efficient in researching China-specific issues (*Alice*).

The alumni faculty status and professional development satisfaction

Before using PSM to estimate the treatment effect, it is advisable to perform balance and standard support checks to test the matching effect. Table 7 in the "Appendix" section shows that the mean difference of each covariate between the treatment group and the control group is no longer significant after matching, and the standard deviation is controlled within 9%. This indicates that the differences in covariates between the two groups are eliminated after matching, and the conditional independent assumption was satisfied. Figure 1 is the test of the standard support hypothesis. It shows significant proximity and coverage between the two groups after matching. The above results show that the matching effect of this study is good, and reliable estimation results can be obtained.

Since the treatment effect of returnee faculty returning to their *alma mater* on professional development satisfaction may be affected by the matching method adopted, this study uses radius and kernel matching methods to test the consistency while conducting one-to-one neighbor matching. Table 5 presents the alumni faculty status's treatment effect on returnees' professional development satisfaction under various matching methods. Table 5 indicates that after controlling self-selection, alumni faculty status significantly negatively impacts the professional development satisfaction of returnee faculty, and hypothesis 7 is supported. Taking the nearest neighbor matching (NNM) method ($k=1$) as an example, in the overall professional development satisfaction, the regression coefficient of average treatment effect (ATT) is -0.139 , indicating that alumni faculty's overall professional development satisfaction is 0.139 units lower than that of non-alumni faculty. The result remains robust under different matching methods. The same is true for the other five sub-dimensions of professional development satisfaction. It should be noted that regarding research collaboration and exploration of new research interests, the coefficient of ATT under the NNM is not significant; however, it is significant in radius matching and nuclear matching.

The qualitative data also supports the above research findings. First, having alum status is not always conducive for individuals to expand their academic networks. Scott did not choose to return to his *alma mater*, and he held that academic mobility facilitated developing a “circle” and occupying a position of structural hole:

(Now) I know my alma mater and the new institution well. I can act as a “glue,” and through me, scholars on both sides can get to know each other. (Scott)

Scott further noted another critical fact that returning to a familiar team leads to narrow-minded thinking, while the non-alumni faculty status provides returnees with more non-redundant information. Similarly, Jessica reiterated that it was often challenging to conduct academic exchanges and discussions equally with former supervisors as alum faculty. Under the “umbrella” of her former domestic supervisor, she usually handles research work with a “Ph.D. candidate” identity and mentality. It was difficult for her to design a research project or establish new academic networks as an independent scholar.

Edward, an alum faculty, also shared his experience. He enjoys the benefits of his alumni status, allowing him to access research resources unavailable to others easily. However, in return for this trust and favor, Edward is required to fulfill his additional obligations. For example, when other colleagues refuse the dean’s request to teach classes in English, Edward is expected to take on the job. In other words, returnees with alumni-faculty status often undertake extra obligations at the cost of the time and energy faculty members have planned to invest in research. In addition, Thomas mentioned that classmates/colleagues often underestimate alum faculties’ academic achievement, as they attribute any academic achievement attained by the returnees to their alum faculty status.

Discussion

This study highlights that maintaining strong and weak ties with role types in dual academic networks impacts returnees’ professional development satisfaction. Findings show that the key to promoting returnees’ professional development satisfaction lies in how returnees adjust the ties’ strength to various roles in the dual academic networks to give full play to the advantages of the strong–weak relations to jointly meet the diverse nature of the individual’s needs (Li, 2007).

First, findings show that keeping strong ties with overseas (I) and domestic supervisors (II) impacts returnees’ higher professional development satisfaction positively (Table 6). Supervisors possess professional knowledge, relatively high social status, and show concern for the personal well-being of the student (Stephens, 2014). The higher the social status of an intermediary, the more beneficial it is for promoting the exchange of social resources and the functioning of resource credit (Sun & Bian, 2017). The trust and reciprocity built through strong ties with supervisors enable returnees to mobilize resources within academic networks and enhance the level of their academic networks and human capital (Baruffaldi et al., 2016).

Maintaining strong ties with domestic fellow students doesn’t promote returnees’ satisfaction with professional development (IV), while strong ties with overseas fellow students do (III). One possible explanation is that domestic fellow students and returnees belonging to a relatively closed academic network and members share similarities in research ideas, paradigms, etc. (Lin & Chao, 2019). According to Bourdieu’s theory of habitus, the likelihood “for someone to ‘undo’ their early education” (Swartz, 1997, p.16) is rare. Accordingly, scholars’ deeply-rooted thinking and mindset formed by the former research training will not be easily changed when they are replaced with new research institutions. Such strong ties might lead to similar research ideas and overlapping resources and fall into the dilemma of groupthink (Janis,

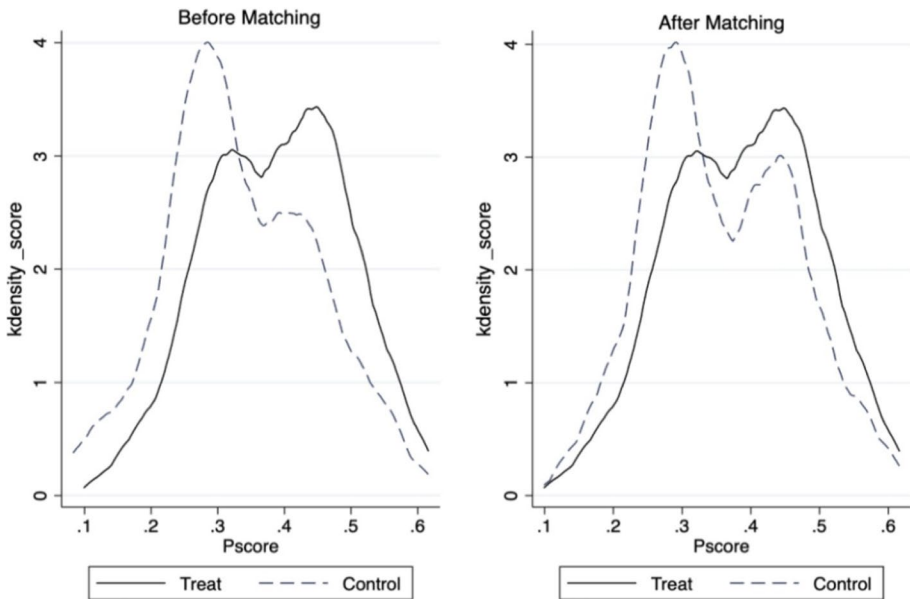


Fig. 1 Nuclear density map before and after matching (taking overall professional development satisfaction as an example)

1991). The closure of the strong ties decreases the possibilities of extending communication with members in heterogeneous networks, which hinders the formation of interdisciplinary and cross-team communication, highlighting the shortcomings of strong ties. In contrast, though returnees and fellow students in the overseas academic networks also received supervision from the same supervisors, the different research platforms (domestic vs. overseas) neutralized the adverse effects of closure and homogeneity of the strong ties. When scholars return, frequent contact with overseas fellow students will build bridges for information and resource exchange, heterogeneous resources from the international academic community, which may become a meaningful way to achieve high-quality publications (Lu & McInerney, 2016).

One might wonder why the supervisors and fellow students in the *shimen* are categorized into the strong ties type (Huang, 2021) but have contradictory impacts on returnees' professional development. Supervisors amass extensive knowledge and academic network connections, and keeping strong ties with them usually results in top-down guidance and one-dimensional resource allocation (Sun & Bian, 2017). However, fellow students in the domestic *shimen* do not possess the same advantages as supervisors mentioned above. On the contrary, the overlapping resources and redundant information among fellow students have been found to have a negative effect.

Domestic classmates/colleagues (VI) belong to the academic network beyond the *shimen* boundaries. Fostering closer ties with members in such heterogeneous networks empowers returnees to break marginal status, expand the network scale, and expedite integration into the domestic academic community. The results partially confirm Lu's (2014) view that the more collaborators and stronger ties established with colleagues, the more beneficial to professional development satisfaction. In contrast, ties with overseas classmates/colleagues (V) are inherently loose. Considering the relatively high cost of cross-national communication and the previous status of the weak relations with classmates/colleagues overseas, the time and effort spent contacting them might outweigh their impact on promoting returnees' professional development satisfaction.

Table 5 Estimation results of average treatment effect in the treatment group and the control group

Dependent variable	Matching method	<i>T</i>	<i>C</i>	ATT	SE	<i>t</i> -value
Competitive research funding	Unmatched	3.251	3.458	-0.207 ^{***}	0.065	-3.16
	NNM (<i>k</i> = 1)	3.251	3.451	-0.200 ^{***}	0.077	-2.61
	RM	3.25	3.483	-0.233 ^{***}	0.071	-3.29
	KM	3.252	3.481	-0.229 ^{***}	0.070	-3.28
Publications	Unmatched	3.398	3.541	-0.143 ^{***}	0.059	-2.44
	NNM (<i>k</i> = 1)	3.398	3.512	-0.115 [*]	0.068	-1.68
	RM	3.397	3.520	-0.124 ^{**}	0.063	-1.97
	KM	3.398	3.516	-0.118 [*]	0.062	-1.91
Research collaboration	Unmatched	3.395	3.535	-0.140 ^{**}	0.058	-2.43
	NNM (<i>k</i> = 1)	3.395	3.490	-0.095	0.067	-1.41
	RM	3.396	3.511	-0.115 [*]	0.063	-1.84
	KM	3.396	3.507	-0.112 [*]	0.061	-1.82
Extension of original research areas	Unmatched	3.550	3.696	-0.146 ^{**}	0.059	-2.50
	NNM (<i>k</i> = 1)	3.550	3.678	-0.128 [*]	0.067	-1.91
	RM	3.551	3.693	-0.142 ^{**}	0.064	-2.23
	KM	3.553	3.694	-0.141 ^{**}	0.062	-2.26
Exploration of new research interests	Unmatched	3.678	3.817	-0.139 ^{**}	0.057	-2.45
	NNM (<i>k</i> = 1)	3.678	3.776	-0.098	0.065	-1.50
	RM	3.677	3.792	-0.115 [*]	0.062	-1.86
	KM	3.681	3.800	-0.120 ^{**}	0.061	-1.97
Overall professional development satisfaction	Unmatched	-0.109	0.055	-0.164 ^{***}	0.061	-2.67
	NNM (<i>k</i> = 1)	-0.109	-0.031	-0.139 [*]	0.072	-1.95
	RM	-0.109	0.051	-0.160 ^{**}	0.066	-2.41
	KM	-0.109	0.047	-0.156 ^{**}	0.065	-2.39

Significance level: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Second, this study explores the impact of alumni-faculty identities, a unique tie within the domestic networks, and results indicate that such status won't guarantee returnees' professional development satisfaction. To show loyalty and reciprocity to the home institution, alumni faculty often feel obligated to shoulder more tasks than non-alumni faculty. This finding aligns with Bian's (1997) concept that trust and obligation are crucial to guanxi networks. In addition, alumni returnees joining research teams led by their former supervisors or senior colleagues might confine their research vision due to the lack of novel information or cross-team interactions, making it challenging to conduct research activities as independent scholars. In contrast, non-alumni returnees can freely explore new research fields. Thus, individuals at the nodes of a structural hole obtain more information, opportunities, and resources and have greater control over the flow of social capital than other individuals (Burt, 1992).

Conclusion

This study examines how dual academic networks influence returnees' professional development satisfaction. The results show the frequency of contacting various members of the dual academic networks has different impacts on returnee scholars' professional development satisfaction.

Table 6 The suggested effective strength of ties with various roles in dual academic networks

Roles	Ties	Dual academic networks	
		Overseas	Domestic
		Strong ↔ Weak	Strong ↔ Weak
Supervisor	● I	● II	
Students with the same supervisor	● III		● IV
Classmates/colleagues	/ V	● VI	

The point “●” indicates the effective strength of ties with various role types in dual academic networks, and the “/” suggests a proper strength of ties that returnees should maintain

Our findings provide some practical implications. First, previous research explores the effect of ties on individuals’ occupational attainment; this study further applies the impact of the strength of ties and role types on individuals’ professional development satisfaction, both with the overseas and domestic academic networks. The previous study shows returnees’ scientific productivity and research performance are increased when they are embedded in transnational professional networks in their home country or when they are enabled to retain professional linkages with their co-workers and supervisors in the former host country (Jonkers & Tijssen, 2008). This study illustrates that maintaining strong ties with members of the academic network is not always beneficial. Although *guanxi* is “dyadic in its basic form” (Barbalet, 2021, p.14), it is a continuum system; thus, there are no purely strong or purely weak ties (see Table 6). The relationship between two individuals is not static (Bian, 2019); *guanxi* building is dynamic (Chen et al., 2013). When time and energy are limited, returnees need to develop a strategy to maximize the strength of both strong and weak ties, while minimizing their weakness, to achieve career development. Second, to increase the overall satisfaction of professional development, returnee scholars need to consider applying for job positions offered by universities that fit their research interests and orientation rather than merely returning to their *alma mater* for an academic job position.

This research may have the following contributions. First, it is the first time that such a large-scale survey questionnaire has been conducted to cover returnee faculty members from all “Double First-Class” universities in China. Second, we differentiate between the impacts of various roles in returnees’ dual academic networks. This distinction provides valuable insights for guiding returnees in adjusting their strategies when interacting with different members of the academic networks.

This study does have certain limitations. Due to word limits, there has been limited discussion on the in-depth influence of strong and weak ties established with different roles in the academic network on the five dimensions of professional development satisfaction among returnees. Additionally, since this study regarded the frequency of interactions with different groups as a sign of the strength of ties of the academic networks, formal interactions were not clearly distinguished from informal ones, though they are slight differences in concept (Woolley et al., 2008). Finally, this paper only analyzes the overseas and domestic networks jointly by using separate independent variables. A more complex design of independent variables, such as the interaction variables between dual academic networks, will explain more details of the study.

Appendix

Table 7 Balance test of control variables before and after matching

Alumni faculty	Logit		Unmatched		Matched		% reduct bias		Logit		Unmatched		Matched		% reduct bias	
			% bias	t-value	% bias	t-value	% bias	t-value	% bias	t-value	% bias	t-value	% bias	t-value	% bias	t-value
Competitive research funding																
AQT	-0.167	0.70	4.2	0.70	-2.9	-0.42	31.2	-0.156	4.5	0.72	4.5	0.72	0.5	0.07	89.3	89.3
DC_2	0.224	2.98***	18	2.98***	2.0	0.28	88.9	0.237	18.2	3.01***	18.2	3.01***	-3.0	-0.42	83.6	83.6
OSE_4	0.435**	1.23	7.4	1.23	4.0	0.57	45.8	0.417**	6.8	1.12	6.8	1.12	8.6	1.25	-27.4	-27.4
HC_1	-0.044	1.6	0.26	1.6	3.5	0.50	-119.9	-0.014	1.2	0.20	1.2	0.20	1.5	0.21	-19.2	-19.2
GL_1	-0.709***	-4.24***	-25.5	-4.24***	0.5	0.07	98.0	-0.695***	-25.1	-4.17***	-25.1	-4.17***	-2.6	-0.36	89.7	89.7
AR_1	-0.845***	-0.91	-5.6	-0.91	-3.9	-0.56	30.5	-0.801***	-5.0	-0.82	-5.0	-0.82	4.3	0.63	13.6	13.6
YR_1	-1.294***	-2.41**	-15.2	-2.41**	-2.7	-0.43	82.5	-1.015***	-14.0	-2.23**	-14.0	-2.23**	7.0	1.24	49.8	49.8
YR_3	-0.030	2.20**	13.4	2.20**	1.5	0.21	89.1	-0.044	12.6	2.06**	12.6	2.06**	1.5	0.21	88.4	88.4
DC_3	-0.171	-2.11**	-13.1	-2.11**	0.6	0.09	95.3	-0.156	-12.8	-2.07**	-12.8	-2.07**	5.6	0.87	56.5	56.5
c.YR_1#c.AR_1	1.640***	0.3	0.05	0.3	-6.1	-0.82	-1937.2	1.269**	-1.1	-0.18	-1.1	-0.18	7.4	1.20	-579.3	-579.3
c.AR_1#c.OSE_4	-0.536*	-1.03	-6.4	-1.03	1.6	0.24	74.8	-0.509*	-6.2	-1.00	-6.2	-1.00	8.0	1.28	-29.1	-29.1
c.AR_1#c.HC_1	0.616**	1.08	6.6	1.08	1.8	0.25	72.8	0.552**	5.9	0.98	5.9	0.98	4.2	0.60	29.6	29.6
c.HC_1#c.DC_2	-0.534**	1.0	0.17	1.0	3.0	0.43	-194.6	-0.548**	0.7	0.12	0.7	0.12	-1.5	-0.21	-103.2	-103.2
c.AR_1#c.AQT	0.438*	1.07	6.5	1.07	-6.8	-0.93	-4.8	0.439*	7.0	1.16	7.0	1.16	2.5	0.35	65.1	65.1
c.YR_3#c.AR_1	0.488*	0.94	5.7	0.94	0.0	0.00	100.0	0.501*	6.4	1.05	6.4	1.05	1.6	0.23	74.2	74.2
c.AR_1#c.DC_2	0.495*	1.48	9.0	1.48	0.0	0.00	100.0	0.480*	9.1	1.50	9.1	1.50	-2.2	-0.31	75.6	75.6
N	1,180							1,177								
Pseudo R ²	0.045		0.045		0.003			0.041		0.041		0.041	0.005			
LR CHI2	68.67***		69.04***		2.95		62.16***		62.28***		62.28***		5.34			
Alumni faculty																
Research collaboration																
AQT	-0.143	5.0	0.82	5.0	-2.5	-0.35	51.4	-0.177	4.1	0.67	4.1	0.67	-2.9	-0.42	28.5	28.5
DC_2	0.245	18.0	2.94***	18.0	3.5	0.50	80.3	0.222	17.4	2.85***	17.4	2.85***	2.5	0.35	85.5	85.5
Extension of original research areas																

Table 7 (continued)

Alumni faculty	Logit	Unmatched		Matched		% reduct bias	Logit	Unmatched		Matched		% reduct bias
		% bias	t-value	% bias	t-value			% bias	t-value	% bias	t-value	
OSE_4	0.457**	8.1	1.33	3.5	0.49	57.0	0.432**	7.1	1.16	4.6	0.66	34.6
HC_1	-0.041	0.7	0.12	2.5	0.36	-246.1	-0.073	0.5	0.08	4.5	0.65	-875.0
GL_1	-0.690***	-25.1	-4.14***	-1.0	-0.14	95.9	-0.688***	-25.0	-4.14***	-4.7	-0.65	81.3
AR_1	-0.814***	-4.4	-0.72	2.0	0.28	55.9	-0.792***	-5.1	-0.83	1.5	0.21	71.4
YR_1	-1.109***	-14.0	-2.21**	6.3	1.10	54.9	-1.154***	-15.3	-2.41**	1.8	0.30	88.2
YR_3	-0.048	13.1	2.12**	1.5	0.21	88.7	-0.024	13.1	2.14**	1.5	0.21	88.8
DC_3	-0.142	-12.5	-2.01**	-2.5	-0.37	80.1	-0.174	-12.9	-2.08**	-1.2	-0.19	90.4
c.YR_1#c.AR_1	1.449***	0.2	0.03	5.0	0.77	-3087.2	1.360**	-1.8	-0.29	1.2	0.18	30.7
c.AR_1#c.OSE_4	-0.542*	-5.6	-0.90	5.7	0.88	-1.6	-0.548*	-6.7	-1.08	4.8	0.75	28.0
c.AR_1#c.HC_1	0.599**	6.8	1.12	4.2	0.60	37.9	0.603**	6.3	1.03	1.2	0.17	80.8
c.HC_1#c.DC_2	-0.577**	-0.2	-0.03	2.3	0.33	-1029.1	-0.520*	0.3	0.05	5.2	0.77	-1665.2
c.AR_1#c.AQT	0.422*	7.3	1.20	-1.2	-0.17	83.0	0.450*	6.8	1.11	-3.7	-0.51	45.2
c.YR_3#c.AR_1	0.534**	7.1	1.15	1.7	0.23	76.4	0.447	5.8	0.95	1.1	0.16	81.0
c.AR_1#c.DC_2	0.475*	9.0	1.48	-1.1	-0.16	87.6	0.457*	8.3	1.36	-0.6	-0.08	93.3
N	1159						1165					
Pseudo R ²	0.043	0.043		0.003			0.042	0.042		0.003		
LR CHI2	64.46***	64.77***		3.73			62.71***	62.86***		3.19		
Exploration of new research interests												
AQT	-0.159	4.9	0.79	1.5	0.21	69.7	-0.164	3.9	0.62	0.0	-0.00	100.0
DC_2	0.179	17.1	2.80	-3.0	-0.42	82.3	0.211	17.3	2.78***	-2.1	-0.29	87.9
OSE_4	0.404**	6.0	0.99	1.7	0.25	71.1	0.392*	7.0	1.13	0.0	0.00	100.0
HC_1	-0.068	0.9	0.15	5.5	0.79	-494.1	-0.044	2.4	0.39	4.1	0.58	-69.0
GL_1	-0.698***	-25.0	-4.13***	-7.8	-1.08	68.7	-0.704***	-25.1	-4.07***	-1.6	-0.22	93.6
AR_1	-0.861***	-6.6	-1.08	2.9	0.42	55.8	-0.852***	-4.9	-0.78	-0.5	-0.07	89.6
Overall professional development satisfaction												
AQT												
DC_2												
OSE_4												
HC_1												
GL_1												
AR_1												

Table 7 (continued)

Alumni faculty	Logit	Unmatched		Matched		% reduct bias	Logit	Unmatched		Matched		% reduct bias
		% bias	t-value	% bias	t-value			% bias	t-value	% bias	t-value	
YR_1	-1.241 ^{***}	-16.1	-2.53	6.3	1.12	60.8	-1.255 ^{***}	-14.5	-2.25 ^{**}	0.9	0.15	93.5
YR_3	-0.062	12.7	2.07 ^{**}	1.5	0.21	88.4	-0.047	12.2	1.94 [*]	0.5	0.07	95.8
DC_3	-0.183	-12.5	-2.01	2.5	0.38	80.0	-0.153	-12.8	-2.02 ^{**}	3.2	0.48	75.0
c.YR_1#c.AR_1	1.474 ^{***}	-1.7	-0.28	6.2	0.98	-257.0	1.581 ^{***}	0.1	0.02	1.3	0.18	-760.7
c.AR_1#c.OSF_4	-0.547 [*]	-7.9	-1.26	3.2	0.50	59.0	-0.476	-5.7	-0.90	1.7	0.25	70.7
c.AR_1#c.HC_1	0.603 ^{***}	5.7	0.94	3.6	0.51	37.0	0.671 ^{**}	8.7	1.40	1.9	0.26	78.5
c.HC_1#c.DC_2	-0.487 [*]	0.8	0.13	1.5	0.22	-88.5	-0.561 ^{***}	0.6	0.10	-1.5	-0.21	-149.7
c.AR_1#c.AQT	0.456 [*]	6.6	1.09	2.5	0.35	62.5	0.421	6.4	1.03	-0.6	-0.09	89.9
c.YR_3#c.AR_1	0.489 [*]	4.9	0.80	2.2	0.32	54.4	0.475 [*]	5.4	0.87	0.6	0.08	89.4
c.AR_1#c.DC_2	0.481 [*]	8.4	1.38	-7.3	-1.00	14.0	0.502 [*]	8.7	1.41	-4.1	-0.55	53.3
N	1164						1-119					
Pseudo R ²	0.043	0.043		0.003			0.043	0.043		0.001		
LR CHI2	64.13 ^{***}	64.26 ^{***}		3.92			62.64 ^{***}	62.90 ^{***}		1.35		

Significance level: ***p < 0.001, **p < 0.01, *p < 0.05

Acknowledgements We want to express our sincere gratitude to the anonymous reviewers for their insightful input and to Professor Juergen Henze for his helpful comments on the manuscript.

Funding This study is funded by the National Social Science Fund in China–Education, “Research on the Chinese highly-cited scholars and their international research networking” (BIA210190).

Data Availability The data underlying this article will be shared on reasonable request to the corresponding author.

Declarations

Conflict of interest The authors declare no competing interests.

References

- Barbalet, J. (2021). *The theory of guanxi and Chinese society*. Oxford University Press.
- Baruffaldi, S., Visentin, F., & Conti, A. (2016). The productivity of science & engineering PhD students hired from supervisors’ networks. *Research Policy*, 45, 785–796.
- Bian, Y. J. (1997). Bringing strong ties back in: Indirect ties, network bridges, and job searches in China. *American Sociological Review*, 62(3), 366–385.
- Bian, Y. (2019). *Guanxi, how China works*. Polity Press.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Burt, R. S. (1992). *Structural holes: The social structure of competition*. Harvard University Press.
- Chen, Q. Q. (2017). *Globalization and transnational academic mobility: The experience of Chinese academic returnees*. Springer.
- Chen, C. C., Chen, X. P., & Huang, S. (2013). Chinese guanxi: An integrative review and new directions for future research. *Management and Organization Review*, 9(1), 167–207.
- Creswell, J. W. (2002). *Educational research: Planning, conducting, and evaluating quantitative*. Prentice Hall.
- Granovetter, M. (1973). The Strength of Weak Ties. *American Journal of Sociology*, 78, 1360–1380.
- Gu, J., Levin, J. S., & Luo, Y. (2018). Reproducing “academic successors” or cultivating “versatile experts”: Influences of doctoral training on career expectations of Chinese PhD students. *Higher Education*, 76, 427–447.
- Holmes, P., Costa, N., & Lopes, B. (2019). The role of supervision in doctoral education—a transversal perspective. *The Doctorate as experience in Europe and beyond: Supervision, languages, identities* (pp. 213–228). Routledge.
- Huang, S. (2021). *Power anomie in university field of China from the perspective of relational sociology*. Dalian University of Technology.
- Janis, I. (1991). Groupthink. In E. Griffin (Ed.), *A first look at communication theory* (pp. 235–246). McGraw Hill.
- Ji, Y. (2012). Culture, institution and structure: Reflections on the studies of Chinese social relations. *Sociological Studies*, 2, 60–85.
- Jonkers, K., & Tijssen, R. (2008). Chinese researchers returning home: Impacts of international mobility on research collaboration and scientific productivity. *Scientometrics*, 77(2), 309–333.
- Levin, D. Z., Walter, J., & Murnighan, J. K. (2011). Dormant ties: The value of reconnecting. *Organization Science*, 22(4), 923–939.
- Li, J. (2003). Beyond strong and weak ties: Reconsidering the concept of ties. *Sociological Studies*, 03, 42–50.
- Li, L. Y. (2007). The weak valence in weak ties and its transformation: A cultural interpretation of Chinese guanxi. *Chinese Journal of Sociology*, 27(4), 175–194.
- Li, F., & Tang, L. (2019). When international mobility meets local connections: Evidence from China. *Science and Public Policy*, 46(4), 518–529.
- Li, M., Yang, R., & Wu, J. (2018). Translating transnational capital into professional development: A study of China’s Thousand Youth Talents Scheme scholars. *Asia Pacific Education Review*, 19, 229–239.
- Lin, J., & Chao, Y. (2019). A mixed study of the organizational culture types and features in advisor postgraduate fellowship. *Journal of Higher Education Management*, 13(6), 35–44.
- Liu, D. (2021). Discussion on the significance, issues and optimization of academic activities within a faculty. *Higher Education Forum*, 11, 87–90.

- Locke, E. A. (1969). What is job satisfaction? *Organizational behavior and human performance*, 4(4), 309–336.
- Lu, X. (2014). Social network and career advancement: An empirical study on Chinese academic labor market. *Science and Society*, 4(2), 49–62.
- Lu, X., & McInerney, P. B. (2016). Is it better to “Stand on Two Boats” or “Sit on the Chinese Lap”? Examining the cultural contingency of network structures in the contemporary Chinese academic labor market. *Research Policy*, 2016(10), 2125–2137.
- McGee, R. (1960). The function of institutional inbreeding. *American Journal of Sociology*, 65(5), 483–488.
- Melin, G. (2004). Post-doc abroad: Inherited scientific contacts or establishment of new networks? *Research Evaluation*, 13(2), 95–102.
- Qiu, Z., & Qiao, T. (2018). Weak ties, strong ties, or the homophily based on social attributes? *The Sociological Review*, 6(1), 3–20.
- Rosen, S., & Zweig, D. (2003). Transnational capital: valuing academic returnees in a globalizing China. In L. Cheng (Ed.), *Bridging minds across the Pacific: US-China educational exchanges* (pp. 111–132). Lexington Books.
- Ross, J. A. (2006). The reliability, validity, and utility of self-assessment. *Practical Assessment, Research, and Evaluation*, 11(1), 10.
- Singh, L., & Singh, A. P. (2021). The role of professional development on job satisfaction of the LIS professionals. *Library Philosophy and Practice* (ejournal). <https://digitalcommons.unl.edu/libphilprac/6221/>
- Spector, P. E. (1997). *Job satisfaction: Application, assessment, causes, and consequences* (Vol. 3). Sage.
- Stephens, S. (2014). The supervised as the supervisor. *Education+ Training*, 56(6), 537–550.
- Stuart, E. A. (2010). Matching methods for causal inference: A review and a look forward. *Statistical Science: A Review Journal of the Institute of Mathematical Statistics*, 25(1), 1–21.
- Sun, X. E., & Bian, Y. (2012). Ethnic networking in the transnational engagement of Chinese American scientists. *Asian Perspective*, 36(3), 435–461.
- Sun, Y., & Bian, Y. (2017). The mechanism of human relationship in occupational status acquisition. *Social Science Front*, 5, 189–199.
- Swartz, D. (1997). *Culture and power: The sociology of Pierre Bourdieu*. University of Chicago Press.
- Waggoner, G. R. (1966). Problems in the professionalization of the university teaching career in Central America. *Journal of Inter-American Studies*, 8(2), 193–211.
- Wang, J., Hooi, R., Li, A. X., & Chou, M. H. (2019). Collaboration patterns of mobile academics: The impact of international mobility. *Science and Public Policy*, 46(3), 450–462.
- Wen, C. F. (2022, May 31). *Shimen culture: The invisible force that determines students' future development*. *China Science Daily*. 004
- Woolley, R., Turpin, T., Marceau, J., & Hill, S. (2008). Mobility matters: Research training and network building in science. *Comparative Technology Transfer and Society*, 6(3), 159–184.
- Yao, T. H., & Yu, C. P. (2019). The relationship between supervisor-fellow students supports research self-efficacy and graduates' scientific Creativity. *Higher Education Exploration*, 4, 46–53.
- Ynalvez, M. A., & Shrum, W. M. (2011). Professional networks, scientific collaboration, and publication productivity in resource-constrained research institutions in a developing country. *Research Policy*, 40(2), 204–216.
- Zheng, G., Shen, W., & Cai, Y. (2018). Institutional logics of Chinese doctoral education system. *Higher Education*, 76, 753–770.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.