



Doctoral Support Networks: characteristics and associations with research conditions and identity development

Redes de apoyo doctoral: características y relaciones con las condiciones de investigación e identidad

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Abstract

Doctoral candidates rely on diverse individuals to cope with the challenges of their doctoral trajectory. In this article we define *Doctoral Support Networks* (DSNs) as the group of individuals with whom the doctoral candidate intentionally collaborates in order to deal with the problems and difficulties of the doctorate. We aim to explore the characteristics of this type of networks and their relationships with doctoral program conditions and researcher identity development. Results from a cluster analysis identified two groups of doctoral candidates based on the characteristics of their network: those with *Distributed and Active DSNs* (56.8%) and those with *Reduced and Passive DSNs* (43.2%). The first group reported more frequent interactions with a wider range of individuals from both academic and extra-academic contexts, higher levels of emotional support and direct advice to cope with doctoral challenges and difficulties, and a higher level of identification with the researcher position.

Keywords: Graduate education; Social support; Doctoral candidates; Dialogical self theory

Resumen

Los estudiantes de doctorado colaboran con múltiples personas para afrontar los retos de la trayectoria. En este artículo definimos las Redes de Apoyo Doctoral (RAD) como el grupo de individuos que colabora con el doctorando para superar los problemas y dificultades del doctorado. Nuestro objetivo es explorar las características de este tipo de redes y sus relaciones con las condiciones del programa de doctorado y el desarrollo de la identidad como investigador. Los resultados de nuestro estudio identifican dos tipos de RAD (“distribuidas y activas” versus “reducidas y pasivas”) que manifiestan relaciones significativas con las demás variables de análisis.

Palabras clave: Educación de Postgrado; Apoyo Social; Estudiantes de doctorado; Teoría del Self Dialógico

INTRODUCTION

Challenges and difficulties in doctoral trajectories

The doctoral trajectory is not a linear process but a journey with emotional highs and lows in which progress mainly depends on the management of unexpected challenges and difficulties. Previous studies associated these challenges to problems with socialization and integration into the scientific community, supervisory relationship, balance between work and personal life, motivation and attribution of meaning, and access to resources (Castelló, Pardo, Sala-Bubaré & Suñé-Soler, 2017; McAlpine, 2013; McAlpine, Paulson, Gonsalves & Jazvac-Martek, 2012; Pyhältö, Toom, Stubb & Lonka, 2012; Turner, 2015). The effects of these challenges are well documented. When the right conditions are met, they can become important sources of motivation, learning and development (Pyhältö, Stubb & Lonka, 2009; Stubb, Pyhältö & Lonka, 2011). However, if the doctoral student feels unable to cope with them, they grow into tensions that hinder progress, generate negative emotions, and reduce engagement and wellbeing (McAlpine, 2013; Pyhältö et al., 2012).

The chronification of unresolved difficulties is also known to cause stress, exhaustion and attrition in doctoral candidates (Pyhältö et al., 2012; Jairam and Kahl, 2012), a situation further aggravated by a work environment with progressively higher levels of job insecurity (Biron, Brun & Ivers, 2008; Walsh & Lee, 2015). Indeed, a recent study shows that a third of doctoral candidates experience psychological distress and are at risk of having or developing common psychiatric disorders such as anxiety and depression during the doctorate (Levecque et al., 2017). The severity of this ratio is coherent with the high dropout rates that characterize doctoral studies: 50% at the international level (Ali & Kohun 2006; Gardner, 2009) rising to 70-90% in countries like Catalonia, Spain (Castelló et al., 2017; de Miguel Díaz, 2010).

To better understand how these challenges and difficulties are experienced and managed by doctoral candidates, research has traditionally focused on the supervisor-student relationship. Yet, recently, some authors have pointed out that an exclusive focus on this dyad, although relevant, is of limited scope (Baker & Pifer, 2011; Hopwood, 2010b; McAlpine & McKinnon, 2013; Sweitzer, 2008, 2009). Supervisors are sometimes unaware of candidates' struggles, either because candidates might feel uncomfortable about sharing certain issues with them or because the student-supervisor relationship is precisely the main focus of tension (Ali & Kohun, 2007; Hopwood, 2010b; McAlpine, 2013). Relatedly, Marian Jazvac-Martek, Shuhua Chen and Lynn McAlpine (2011) found that only 32% of doctoral candidates identified the supervisor as the most important

external position for their progress while the rest rely on a diverse range of other individuals to advance in their doctorate (e. g. peers, family, friends or themselves).

In this line, several studies have explored the characteristics of doctoral candidates' networks and their influence in several dimensions of the doctorate. Doctoral networks are usually composed of members from diverse communities, both academic—e.g. supervisor, peers, faculty and team colleagues—and extra-academic—e.g. family, friends and other professionals—(Baker & Lattuca, 2010; Baker & Pifer, 2011; Coromina, Capó, Guia & Coenders, 2011; Hopwood, 2010a, 2010b; Jairan and Kahl, 2012; Jazvac-Martek, Chen & McAlpine, 2011; Pilbeam & Denyer, 2009; Sweitzer, 2008, 2009). There are different types of support (e. g. emotional, psychosocial, informational, professional and instrumental) that PhD candidates can expect from alters with specific social position (Agneessens, Waeye & Lievens, 2006; Jairam & Kahl, 2012).

Doctoral networks play a critical role as mediators of learning (Hopwood, 2010a, 2010b) and are highly related to persistence, motivation, production and professional success (Coromina et al., 2011; de Janasz & Sullivan, 2004; Goller & Harteis, 2014; Hopwood, 2010b). PhD candidates with more supportive relationships experience fewer difficulties with their academic progress and show faster completion-times (Jairam & Kahl, 2012; Pyhältö and Keskinen, 2012). Moreover, those who receive more social and emotional support report lower levels of stress and psychological problems and higher levels of wellbeing and social integration (Agneessens, Waeye & Lievens, 2006). Doctoral networks also socialize aspiring members, regulate inclusion, construct expectations about roles and provide meaning and professional identity development (Baker & Pifer, 2011). These studies indicate that *networking* (i.e. the ability to develop and manage relationships with others who have the potential to support our careers; Forret & Dougherty, 2004) and *relational agency* (i.e. the ability to engage and collaborate with others in order to interpret and act on the object of our interactions in enhanced ways; Edwards and D'Arcy, 2004; Edwards, 2005; Pyhältö and Keskinen, 2012) become critical to achieving success and wellbeing during the doctorate and may also be decisive competences for identity development.

DOCTORAL SUPPORT NETWORKS AND RESEARCHER IDENTITY DEVELOPMENT

During the doctorate is expected that doctoral candidates further develop their identity through the consolidation of a *researcher I-position*. From Dialogical Self Theory (Hermans, 2001a; Hermans & Hermans-Konopka, 2010; Meijers & Hermans, 2018) doctoral candidates' identity might be re-conceptualized as an

interconnected multiplicity of autonomous I-positions reflecting the participation of the individual in broader social communities while doing the doctorate. As spatial-relational acts, *I-positions* are specific situation-dependent versions of the doctoral candidate's identity—i.e. ways of addressing one-self toward other positions which emerge from specific context demands—in a continuous dialogical interchange with each other (Hermans, 2018; Hermans & Hermans-Konopka, 2010). Different tasks generate different I-positions, but also different others may do so. In this sense, I-positions may be *internal* (e. g. I as a researcher, I as a doctoral candidate, I as a student, I as a mother), associated to specific activity spheres, functions and responsibilities; and *external* (e. g. my supervisor, my team, my friends, my daughter), so that significant others' perspectives, views and voices are also integrated into doctoral candidate's *extended self* (Hermans, 2001b; James, 1890). Doctoral candidates' identity—as dialogical, distributed and context-dependent—is recursively involved in processes of positioning and counter-positioning with some positions becoming temporary more dominant or powerful depending on the contingencies of the situation at hand (Hermans, 2018).

Several factors may facilitate the development of a specific I-position as a researcher. First, a special kind of I-positions, *promoters* (Hermans, 2018; Raggatt, 2015) have the potential to organize and give direction to groups of I-positions and stimulate the development of the self. They push the self into particular innovative directions, facilitating the emergence of more specialized (new) I-positions and integrating them within the previous self repertoire in order to cope with the demands of a specific domain (in this case, e.g. the research and academic communities). Promoters have context-dependent nature and can exist in the internal and external domain of the self. Some significant people may enter the extended domain of the self (e.g. My supervisor) because they are seen as adding value to the community or as having a powerful position and become relevant promoters for self-development. These external promoters in the self may evolve into similar promoters in the internal domain (e.g. I as a dedicated researcher identifying with my supervisor) or become promoters that develop in the opposite direction (e.g. I as a democratic leader to overcome the limitations of my boss) (Hermans, 2016). Over the doctoral trajectory, promoters may change and show up as significantly different. In order to develop and consolidate a researcher I-position, PhD candidates' must have access to well-aligned promoter positions, whether internal or external, with the capacity of produce a diverse range of more specialized and competent positions at the same time that they contribute to the democratic organization of the self (Hermans, 2018).

Second, the *challenges and difficulties* of the doctoral path may produce enough levels of uncertainty and tension in PhD candidates' self to open the door to change and innovation in their position repertoires (Hermans, 2018; Monereo, 2019). These innovative impulses of the environment together with a self with flexible boundaries may generate a diverse range of new specialized I-positions to solve the tension produced by the doctoral event. Coping with a stressful situation is expected to be successful if the PhD student has access to alternative I-positions with the ability and power to solve the emotional, social or technical challenges that the specific situation evokes. These challenges and difficulties may, in the end, reinforce the position repertoire of PhD candidates and become the arena to enrich, test and validate the fit of their researcher I-position.

Finally, precisely, *significant others* with whom the PhD student's collaborating to cope with doctoral challenges and difficulties may develop into external I-positions of the self with specific meanings and perceptions about *what it means to be a researcher*. During the interactions about these doctoral events, PhD candidates not only position themselves toward the event but are also positioned by others (Hermans, 2001a). They experience themselves through the positioning eyes of these significant others (e.g. supervisor, peers, friends) and react to this external positioning with a counter-positioning that may also become established in their identity repertoire (Hermans, 2018). On the other hand, as an external I-positions, they become sources of identity even when they are not physically present. Dependent on their expertise, power, and demands of the situation, significant others from doctoral networks may finally become *external promoter positions* with a leadership status to encourage and modulate the development of PhD student' researcher I-position. Given the complexity, diversity and cross-domain of the challenges and difficulties of the doctoral path, it may be decisive to have access to the wide range of potential promoters that doctoral networks provide.

For this study, we define *Doctoral Support Networks* (DSNs) as the group of individuals (i.e. external positions) with whom the doctoral candidate intentionally collaborates in order to deal with the difficulties of the doctoral trajectory. Although the effects of academic networks on the progress, socialization and wellbeing of doctoral candidates are well documented, relatively little is known about the impact of broader networks in the development of a researcher I-position. Moreover, there is also a need to explore further how specific research conditions may hinder or facilitate the development of adaptive and positive DSNs.

We aim to fill these gaps answering the following research questions:

1. What are the main characteristics of DSNs?
2. What are the relationships between DSNs characteristics and Doctoral Program's conditions?
3. What are the relationships between DSNs characteristics and the development of a researcher I-position?

METHOD

Our methodology was based on an interpretative, quantitative dominant mixed-method design (Gibson, 2016; Johnson, Onwuegbuzie & Turner, 2007; Riazi & Candlin, 2014). The argumentation behind was to broaden the scope of data collection and analyses, to increase the validity of measures through triangulation, and to enhance the capacity for the interpretation and elaboration of the results (Edmonson & McManus, 2007; Greene, Caracelli & Graham, 1989; Molina-Azorin, 2016; Tashakkori & Teddlie, 2010).

Context and participants

Doctoral education in Catalonia is mainly regulated by the Royal Decree 99/2011, which introduced some changes based on Bologna (1999) and Salzburg (2005) principles in order to harmonize research training in Spanish universities to the European Higher Education Area (EHEA) and European Research Area (ERA). The main innovations regarding doctoral education were (a) a limitation of the duration of doctoral studies to three years (with two possible consecutive annual extensions); (b) a new conception of doctoral candidates not just as “students” but also as “early career researchers”; (c) a specific focus on the supervisory relationship as a key element for the formation, progress and well-being of doctoral candidate; (d) the creation of Doctoral Schools, Academic Commissions and Doctoral tutors as new educational agents to improve the quality of doctoral training; and (e) the creation of a new assessment tool, the Doctoral Portfolio, in which doctoral candidates and supervisors must validate and proof the consecution of different milestones of doctoral candidates' trajectory at the end of each year (i.e. publications, training courses, participation in international conferences).

Participants were 149 doctoral candidates (60.4% female; mean age = 33.9) from *Universitat Autònoma de Barcelona* (Catalonia). At the time of the study (2016), 33.5% of the participants were enrolled in the Social Sciences; 28.9%, in Health and Social Care; 21.5%, in STEM; and 16.1%, in the Arts and Humanities. Most participants (68%) were in the initial stage of the doctorate; 21.1%, in the middle stage; and 10.9%, in the final stage. In relation to thesis format, 43.9%

of participants were writing a monograph; 34.5%, a compilation of articles; and 21.6%, have not decided it yet. Regarding the frequency of supervisory meetings, 41.5% of participants declared having meetings once every 2 weeks; 33.3%, once a month; 21.1%, less than once a month; and 4.1%, depending on availability or thesis progress. The average level of satisfaction with supervision was 3.79 (minimum= 1, maximum= 5; SD= 1.174). Additionally, most participants (60.8%) declared to participate in a research team.

Data collection and analyses

Data were collected through an on-line questionnaire with 13 questions about demographics, research conditions and identity, and DSNs characteristics (see Table 1 for further details regarding the full set of variables and response format). Web questionnaires have proved to be a valid and reliable instrument for collecting network data, especially for a population of PhD candidates who use the computer daily for work. For the questionnaire design, we followed the recommendations in regards to validity in Lluís Coromina and Germà Coenders (2006) who propose that ordering the items by question instead of by alters and labelling each response categories help to improve validity. The content of the items was selected from previous studies on DSN, reviewed in the first two sections.

For data analyses, firstly, we applied the principles of content analysis (Flick, von Kardoff & Steinke, 2004; Mayring, 2004; Neuendorf, 2002) to code the open-ended questions and re-code participants' specifications for the response category "Other". We then carried out descriptive analyses and conducted k-means cluster analysis (SPSS, v.21) to identify groups of participants based on the characteristics of their Doctoral Support Network (diversity of alters, frequency of interaction and quality of support). Finally, we performed Chi-square, Crammer's V, and independent samples *t*-tests to explore the associations and differences between clusters in the remaining variables.

RESULTS

What are the main characteristics of Doctoral Support Networks (DSNs)?

Data analyses showed that participants interact with a wide range of people to deal with the difficulties of their doctoral journey. The majority of doctoral candidates reported conversations with family member(s) (94.6%), supervisor(s) (81.2%), friend(s) (76.5%), and peer(s) (67.1%) about problems related to their doctorate. Fewer doctoral candidates reported interactions with team colleague(s) (46.3%), extra-academic professionals (32.9%), or faculty (24.8%). Regarding the frequency of interaction, the external positions with whom doctor-

Category	Variables	Response format (<i>codes</i>)
Demographic	Age	Open-ended question - number format
	Gender	Categorized question (<i>Female, Male, Other*</i>)
Research conditions	Discipline	Open-ended question
	Year	Categorized question (<i>First, Second, Third, Other</i>)
	Thesis format	Categorized question (<i>Monograph, Summary of articles, I don't know</i>)
	Frequency of supervision	Categorized question (<i>Once a week, Twice a month, Once a month, Other</i>)
	Level of satisfaction with supervision	Likert scale 1-5
	Participation in the research team	Categorized question (<i>Yes, No</i>)
	Identification with Researcher Identity (RI)	Likert scale 1-5
Doctoral Support Network	Conceptions related to RI development	Open-ended question
	Frequency of interaction with each alter	Combined categorized question (<i>Family, Friends, Supervisor/s, Peers in the same department, Peers from other departments, Members of the research team, Faculty from the same university, Faculty from different university, Extra-academic professionals. Other</i>) with Likert scale (1: <i>Never</i> , 2: <i>Rarely</i> ; 3: <i>Sometimes</i> ; 4: <i>Usually</i> ; 5: <i>Always</i>).
	Type of support from each alter	Combined categorized question (type of alter) and type of support (<i>Information, knowledge and strategies to solve the problem (Direct Advice); and Emotional support</i>) with Likert scale (1: <i>Never</i> , 2: <i>Rarely</i> ; 3: <i>Sometimes</i> ; 4: <i>Frequently</i> ; 5: <i>Always</i>).
	Relevance	Open-ended question

* Every "Other" option could be specified by participants

Table 1. Questionnaire variables and answer type

al candidates talked more about their difficulties and problems were a supervisor(s) (mean= 3.36; SD=1.056); followed by peers (mean=3.22; SD=1.324) and friends (mean=3.14; SD=0.923). The external positions with a lower frequency of interaction were faculty members (mean=1.99; SD=0.997) (see Table 2 for further details).

These external positions provided at least two types of support: (a) direct advice about how to cope with or solve the difficulty or problem—being the main sources supervisor(s) (mean= 3.77; SD=1.131) and peers (mean=3.14; SD=1.249)—; and (b) emotional assistance, mostly from friends (mean=4.15; SD=1.039), family (mean=4.11; SD=1.275), supervisor(s) (mean=3.70; SD=1.281)

and peers (mean=3.47; SD=1.407). On average, DSNs provided a higher frequency of emotional support than direct advice. Regarding the relevance of their DSNs, most participants (89.4%; n=101) explicitly declared that it played a significant role in their doctoral progress and wellbeing during the journey.

Results from K-means cluster analyses (see Table 2) identified two groups of PhD candidates who showed significant differences regarding the main charac-

	Frequency of interaction about doctoral difficulties ^a		Type of support			
			Frequency of emotional support		Frequency of direct advice	
	Mean	SD	Mean	SD	Mean	SD
Family	2,91	1,036	4,11	1,275	2,62	1,242
Friends	3,14	,923	4,15	1,039	2,87	1,139
Supervisor	3,36	1,056	3,70	1,281	3,77	1,131
Peers	3,22	1,324	3,47	1,407	3,14	1,240
Team colleagues	2,49	1,280	2,64	1,443	2,61	1,307
Faculty	1,99	,997	2,25	1,266	2,24	1,236
Professionals (EA)	2,09	1,081	2,04	1,256	1,89	1,064

^aLikert Scale (1: never, 2: rarely, 3: sometimes, 4: frequently, 5: always)

Table 2. Mean and SD of the frequency of interaction and type of support (n=148)

teristics of their DSNs: diversity of external positions, frequency of interaction and type of support provided. Cluster 1, named as *Distributed and Active DSNs*, included 84 participants (56.8%) who had more expansive and frequent interactions and received higher levels of both kinds of support. Cluster 2, named as *Reduced and Passive DSNs*, included 64 participants (43.2%) who had fragmented networks with fewer interactions with the academic community and received lower levels of both kinds of support. As we can see in Table 3, these two groups did not show significant differences regarding the frequency of interactions with *friends* and *other professionals of non-academic contexts*.

As Figures 1 and 2 show, PhD candidates with *Distributed and Active DSNs* not only interact with a broader range of external positions from both the academic and non-academic contexts but also receive higher levels of direct advice and emotional support from all of them. While those candidates with *Distributed and Active DSNs* reported more frequent emotional assistance from both their personal (i.e. family and friends) and academic community (i.e. supervisor and peers), those with *Reduced and Passive DSNs* declared general lower levels of emotional guidance, especially from their academic community. Moreover, whereas candidates with *Reduced and Passive DSNs* only had one

primary source of direct advice (i.e. supervisors), those with *Distributed and Active DSNs* receive orientations and strategies to cope with doctoral difficulties or problems from a variety of counsellors or experts, such as supervisor, peers, and team colleagues and, to a lesser extent, also friends.

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Interaction about doctoral difficulties						
Family	4,218	1	1,052	146	4,008	,047*
Friends	2,563	1	,841	146	3,049	,083
Supervisor	9,854	1	1,056	146	9,332	,003*
Peers	81,082	1	1,209	146	67,048	,000**
Team colleagues	61,163	1	1,232	146	49,663	,000**
Faculty	16,036	1	,890	146	18,019	,000**
Other professionals (NA) ¹	,588	1	1,173	146	,501	,480
Emotional support						
Family	27,059	1	1,452	146	18,636	,000***
Friends	19,352	1	,955	146	20,272	,000***
Supervisor	24,024	1	1,488	146	16,142	,000***
Peers	155,973	1	,924	146	168,783	,000***
Team colleagues	151,084	1	1,061	146	142,369	,000***
Faculty	71,605	1	1,124	146	63,689	,000***
Other professionals (NA)	25,769	1	1,411	146	18,264	,000**
Direct advice						
Family	9,713	1	1,487	146	6,532	,012*
Friends	21,251	1	1,160	146	18,326	,000***
Supervisor	10,252	1	1,219	146	8,412	,004**
Peers	99,375	1	,867	146	114,562	,000***
Team colleagues	117,574	1	,914	146	128,609	,000***
Faculty	51,223	1	1,188	146	43,104	,000***
Other professionals (NA)	14,666	1	1,038	146	14,124	,000***

¹ Note: Non-academic context

Table 3. ANOVA values for K-means cluster analysis

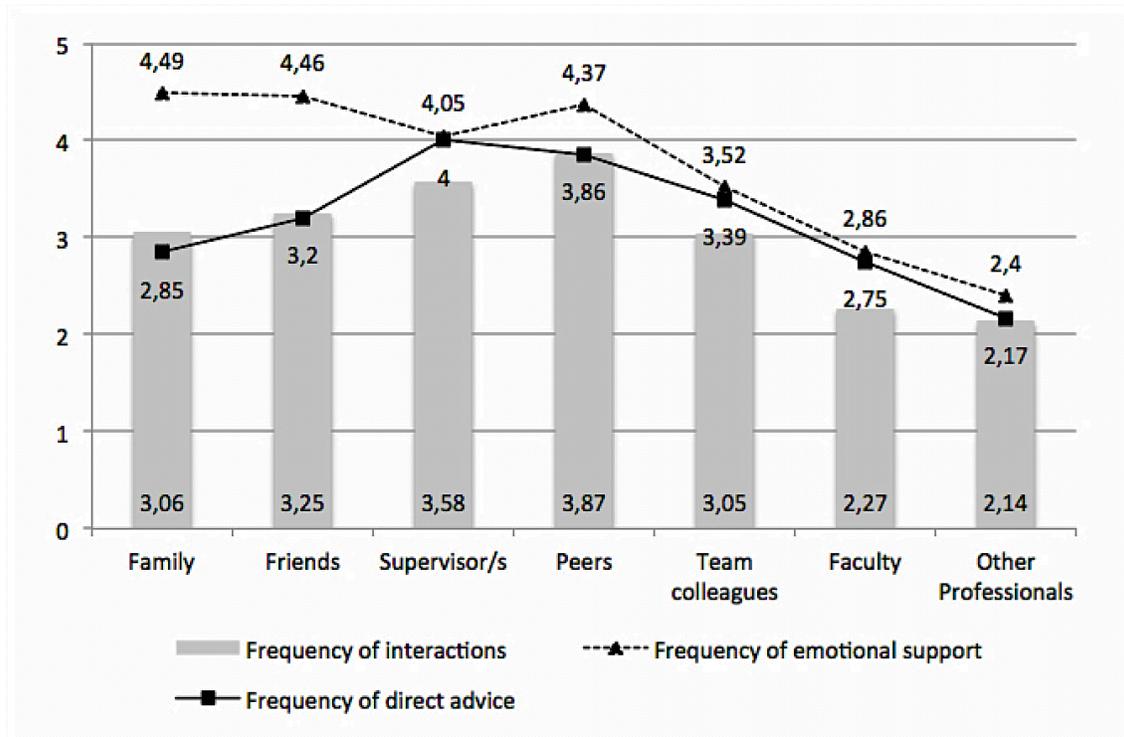


Figure 1. Mean values related to the frequency of interaction, emotional support and direct advice of those candidates with *Distributed and Active DSNs* (Cluster 1).

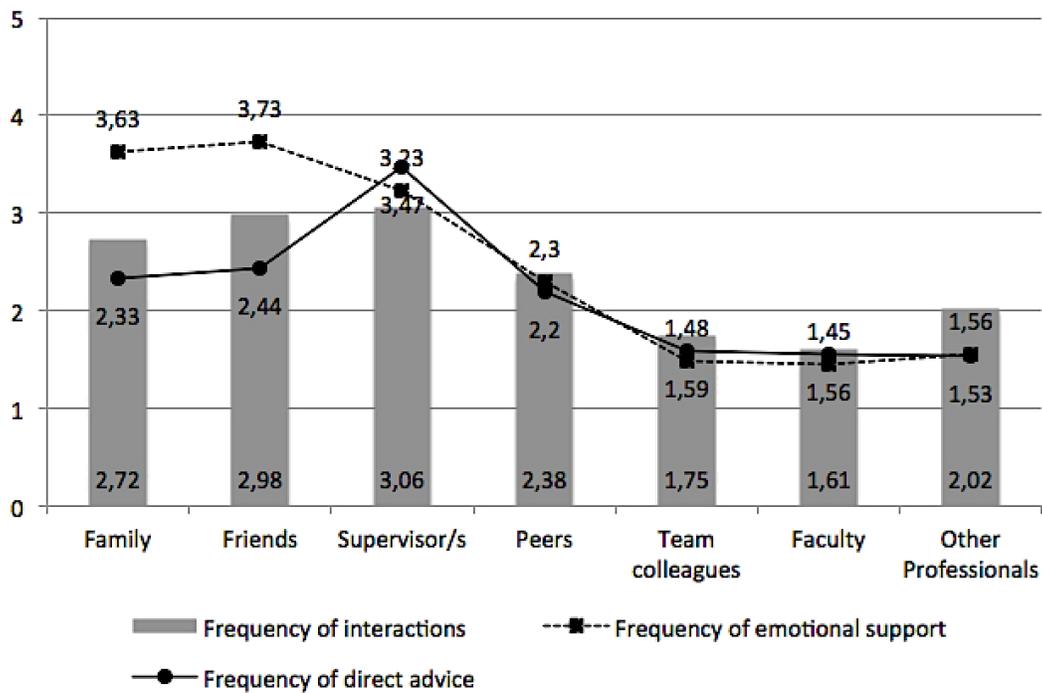


Figure 2. Mean values related to the frequency of interaction, emotional support and direct advice of those PhD candidates with *Reduced and Passive DSNs* (Cluster 2).

What are the relationships between DSNs characteristics and Doctoral Program's conditions?

Chi-squared and *t*-tests (see Table 4) revealed that participants with *Distributed and Active DSNs* were significantly more likely to participate in a research team ($\chi^2(1)= 16.687$, $p < .000$, Cramer's $V= .336$). Moreover, they had more frequent supervision meetings ($\chi^2(3)= 8.886$, $p < 0.05$, Cramer's $V= .246$) and reported higher levels of satisfaction with supervision ($t(101.942)= 2.878$, $p < .01$). No differences were found related to gender, discipline, age, year, and thesis format.

		Distributed and Active DSNs	Reduced and Passive DSNs	
Participation in a research team (n=148)	No	23, z= -4.1	35, z= 4.1	$\chi^2(1) = 16.687$; Cramer's $V= .336$ $p < .000$
	Yes	66, z= 4.1	24, z= -4.1	
Frequency of supervision (n=147)	At least twice a month	45, z= 2.9	16, z= -2.9	$\chi^2(3)= 8.886$; Cramer's $V= .246$ $p = .031$
	Once a month	26, z= -1.2	23, z= 1.2	
	Less than once a month	14, z= -1.9	17, z= 1.9	
	Variable	3, z=-0.5	3, z=0.5	
Level of satisfaction with supervision (n=147)		Mean= 4.02 SD= 1.011	Mean= 3.44 SD= 1.317	$t(101.942)= 2.878$ $p = .005$

Table 4. Chi-Square tests, symmetric measures and independent samples t-test of the relationships between DSNs and research conditions (SPSS, v.21)

What are the relationships between DSNs characteristics and the development of a researcher I-position?

The mean level of identification with the researcher I-position reported by the participants was 3.45 (min.= 1, max.=5, $SD=1.145$). 21% of them declared a *very low* or *low* level of identification; 25%, a *medium* level; and 54%, a *high* or *very high* level. Independent samples t-test revealed that those PhD candidates with *Distributed and Active DSNs* reported a significantly higher level of identification with the researcher position than those with *Reduced and Passive DSNs* ($t(100.988)= 3.519$, $p < .005$).

Content and descriptive analyses revealed that participants associate their level of identification with the researcher I-position to the different *promoter* or *anti-promoter* I-positions (see table 5). Particularly, doctoral candidates highlighted the I-positions “I-as-full-time-student”, “I-as-a-competent-researcher”,

	Frequency (%)		Frequency (%)
Promoter positions (drivers)	63 (55.8%)	Dedication time: I as a full time student	16 (14.2%)
		Research variables: My thesis as an interesting, useful or adequate research	15 (13.3%)
		Personal variables: I as a competent, experienced or motivated researcher	31 (27.4%)
		Community: My supportive community or supervisor	1 (0.9%)
Anti-promoter positions (barriers)	50 (44.2%)	Dedication time: I as a part time student	7 (6.2%)
		Research variables: My thesis as poor, not interesting or not useful research	7 (6.2%)
		Personal variables: I as an apprentice, with lack of research competences, knowledge or experience	27 (23.8%)
		Community: My uncooperative or unsupportive community or supervisor	9 (8%)
Total	113 (100%)	Total	113 (100%)

Table 5. Chi-Square tests, symmetric measures and independent samples t-test of the relationships between DSNs and research conditions (SPSS, v.21)

“My-interesting-thesis”, “My-useful-thesis”, “My-adequate-thesis”, “My-supportive-community” and “My-supportive-supervisor” as the main drivers for the development of the I-position as researchers. On the contrary, they also identified the I-positions “I-as-part-time-student”, “I-as-apprentice”, “I-as-not-competent-researcher”; “I-as-inexperienced-researcher”, “My-poor-thesis”, “My-not-interesting-thesis”, “My-not-useful-thesis”, “My-unsupportive-community” and “My-unsupportive-supervisor” as the main barriers for the development of an internal I-position as researchers. Moreover, those with *Reduced and Passive DSNs* were significantly more likely to report the external I-positions “My-unsupportive-community” and “My-unsupportive-supervisor” as the main anti-promoter I-positions ($\chi^2(1) = 8.253, p < 0.005, \text{Cramer's } V = .27$).

DISCUSSION

Our study has confirmed that doctoral candidates interact with a wide range of people to deal with challenges and difficulties of their doctoral journey. Moreover, we have identified two profiles of doctoral candidates based on the characteristics of their Doctoral Support Networks (DSNs) that showed significant differences in their level of identification with the researcher I-position. Underlying each profile, we may deduce different paradigms or models of doctor-

al training. As our results showed, doctoral candidates with *Distributed and Active DSNs* interact with a broader range of external positions, receive frequent emotional assistance from both their personal and academic communities, and obtain direct advice to cope with doctoral challenges and difficulties from a wide array of experts from the academic community. We infer that these doctoral candidates benefit from a *distributed supervision model* (McAlpine, 2013), in which doctoral training is not individually improvised by the supervisor, but a collective responsibility in which other educational agents (i.e. peers, team colleagues and faculty members) also collaborate in training and socialization of doctoral candidates.

On the contrary, those with *Reduced and Passive DSNs*, reported overall fewer interactions and reduced levels of emotional assistance and direct advice, which mostly felt on the supervisor. Consistently with the findings of Krisi Pyhäntö and Jenni Keskinen (2012) this significant lack of both types of support was especially significant from key figures of the academic community (i.e. peers, faculty and team colleagues). In these cases, the *impossibility to participate in a research team* and the *unsatisfactory and infrequent supervision meetings* have been proved to hinder the development of doctoral candidates' relational agency and, consequently, the emergence of more positive DSNs. Another interesting result of our study is the evidence that perceiving the relevance of networking appears to be necessary but not enough to develop *Distributed and Active DSNs*. Although the vast majority of participants (89%) recognized the positive impact of networking on their doctoral progress, almost half of the doctoral candidates were not able to develop adequate DSNs. The nonexistence of a significant association between doctoral stage and the quality of the DSNs corroborates that doctoral training is not helping PhD candidates and other community members to progressively develop networking abilities and more adaptive DSNs throughout the doctorate (AQU, 2017). Furthermore, we surmise that those barriers to interact with academic figures about the emotional dimension of the doctoral journey may indicate that a *prevailing culture of silence* regarding the affective component of research (Cotterall, 2013) still dominates the research department of almost half of participants of our study.

Regarding the differences between the two profiles on the level of identification with the researcher I-position, our results indicate that *Distributed and Active DSNs* may act as a driver for the development of this specific I-positions. A possible explanation for this finding comes from the Dialogical Self Theory (Hermans, 2001a; Meijers & Hermans, 2018). Candidates with Distributed and Active DSNs have a greater number of opportunities to interact with diverse ex-

ternal I-positions about the significant events of their doctoral journey and, thus, to position and been positioned themselves as a (future) researchers (Hermans, 2018). These dialogical encounters may become rich spaces for the negotiation and the integration of a (developing) researcher I-position into her identity repertoire. Moreover, those doctoral candidates with *Distributed and Active DSNs* may also benefit of several promoter I-positions (i.e. *I as a full-time student; my thesis as an interesting, useful or adequate research; I as a competent, experienced or motivated researcher; and My supportive community or supervisor*) that boost the negotiation, integration and consolidation of the researcher I-position within their self repertoire. As our results showed, even when participants highlight both internal and external I-positions, it seems that are those external I-positions linked to the university (i.e. my community and my supervisor) the ones who have more power to facilitate the development of the researcher I-position.

CONCLUSIONS

During the doctorate is expected that every doctoral candidate develops an I-position as a researcher. In our study, we were able to demonstrate that Doctoral Support Networks (DSNs) play a significant role in the development of this specific I-position, although not all DSNs have been proved to be equally effective. Doctoral candidates with *Distributed and Active DSNs* manifested higher levels of identification with the researcher I-position and greater satisfaction with their doctoral training and supervision than those with *Reduced and Passive DSNs*. Going into more detail, the results of our research also highlighted the fundamental role of promoter and anti-promoter I-positions on identity construction. External alters who conform DSNs may be internalized as external I-positions within the dialogical self of doctoral candidates and become potent drivers or barriers for their identity development as researchers.

Unfortunately, we know that the majority of doctoral programs in Catalonia still not have among their objectives the formal training and promotion of *Distributed and Active DSNs* among their doctoral candidates. A prevailing dominant narrative which still conceives the doctoral path as an individual endeavour is transferring the responsibility of learning how to develop and manage DSNs almost exclusively on the intuition of doctoral candidates (McAlpine et al., 2012; Pyhältö & Keskinen, 2012). As McAlpine (2013) argued, doctoral supervision should not be individually improvised but a collective institutional responsibility. Coordinators of Research Education (CREs) should inquire about the existence and characteristics of DSNs and, when necessary, provide to faculty members, research colleagues, supervisors and peers with the fundamental

resources and opportunities to collaboratively support the trajectories of doctoral candidates, create and/or strengthen these networks, and become external promoter I-positions for their dialogical self-development. Moreover, doctoral programs should implement mechanisms, activities and workplaces more oriented towards optimizing the relational agency and networking possibilities of doctoral candidates, especially in those cases that individuals face specific barriers or anti-promoter I-positions (e. g. “I-as-a-part-time-student”). Promoting more *Distributed and Active DSNs* within the academic community not only will benefit the progress of doctoral candidates but also enhance the dialogical power and scientific advancement of the whole community.

This study was an initial exploration of DSNs and, as such, there are several limitations that need to be taken into account. In relation to the characteristics of the sample, all participants were enrolled in the same university and, although they were relatively well distributed in terms of most variables, none of them was in the first year. On the other hand, most of the network data collected were quantitative, narrowing the possibilities for analysis. Future research should conceive DSNs from a more dynamic and situated perspective (Hopwood, 2010a) and include measures about how these networks change and evolve during the doctoral journey. Also, it would be interesting to explore further how the dialogic interactions within DSNs impact on the development of diverse doctoral candidates’ core I-positions (e.g. I as a researcher, teacher, practitioner, author) (Hermans & Gieser, 2012). Furthermore, future studies should analyse in more detail the characteristics and dynamics of doctoral candidates’ promoters and anti-promoters I-positions in relation to the construction and integration of their researcher identity, as well as the dialogical strategies that the individual uses in the negotiation of new I-positions within a self embedded in power dynamics and populated with other voices, meanings and previous I-positions which may be divergent (Hermans, 2016). Another interesting line of research would be the validation of training resources specially oriented to help doctoral candidates to improve their relational agency, networking abilities and identity development during the doctoral trajectory. To this aim, future studies should consider expanding the research design with more qualitative measures and collect longitudinal data of the functioning and dynamics of DSNs and the dialogical self of doctoral candidates.

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