The role of mentoring in the career outcomes of female early-career academics in Africa: a secondary analysis of multi-country data

By

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Declaration

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Abstract

Even though previous research has documented the powerful potential of mentoring through the vast array of benefits that it offers, little is known about the relationship between mentoring and academic career outcomes. This study aimed at establishing the role of mentoring in the career outcomes of female early-career academics in Africa. Using a mixed-methods research approach, the study entailed a secondary analysis of survey data and interview data to determine whether female ECAs in Africa receive mentoring and its relationship with their career outcomes. Other study objectives were to describe female ECAs in Africa and determine the extent of the negative impact of various challenges on their careers.

The study revealed that African female ECAs were on average 40 years old (but ranging from 27 to 68 years) and had two children or dependents aged from six to eighteen. They undertook the majority of care work and general housework in their family, relationship or household. The female ECAs were nationals of 25 African countries, and they also worked or resided in countries similar to those of their nationality, except for Lesotho. A large majority of female ECAs had never studied or worked outside their home country and they tended to collaborate with researchers at their own institution. The female ECAs were predominantly employed permanently, and a majority held the rank of senior lecturer, and only half of them had received research funding. In a typical year, they reported spending the highest percentage of working time on consultancy and the lowest percentage on raising research grants. On average, they produced 5,8 articles in peer-reviewed academic journals, 0,3 books, 1,1 book chapters, 3,3 conference-proceedings papers and 5,0 conference presentations. The highest percentage of female ECAs were social scientists, followed by natural and agricultural scientists, health scientists, and engineering and applied technologists. Finally, female ECAs perceived that balancing work and family demands, a lack of research funding, and a lack of mentoring were the challenges that had negatively impacted their careers the most.

The study found that most female ECAs had received mentoring on attaining a position/job, research methodology, scientific writing, presentation of research results and in the form of introduction to research networks, while only a minority of them had received mentoring on career decisions and fundraising. It was further established that there is a statistically significant relationship between (1) receipt of mentoring in the form of introduction to research networks, on the one hand, and the production of articles in peer-reviewed journals, and frequency of some forms of collaboration, on the other; and between (2) receipt of mentoring in fundraising and

receipt of research funding. However, not all forms of mentoring were found to be related to their expected career outcomes.

The contribution of this study is mainly empirical, as it offers novel insights into the link between, on the one hand, mentoring in research methodology, scientific writing, fundraising and in the form of introduction to research networks, and, on the other hand, career outcomes that ultimately influence career development.

Opsomming

Alhoewel vorige navorsing gedokumenteer het hoe kragtig mentorskap kan wees weens die groot verskeidenheid voordele wat dit bied, is daar min bekend oor die verband tussen mentorskap en akademiese loopbaanuitkomste. Hierdie ondersoek het ten doel gehad om die rol van mentorskap in die loopbaanuitkomste van vroulike vroeëloopbaanakademici (VLA's) in Afrika vas te stel. Met behulp van 'n gemengdemetodes-navorsingsbenadering het die ondersoek 'n sekondêre ontleding van opnamegegewens en onderhouddata behels, om vas te stel of vroulike VLA's in Afrika mentorskap ontvang en hoe dit met hulle loopbaanuitkomste verband hou. Ander ondersoekdoelstellings was om vroulike VLA's in Afrika te beskryf en die omvang van die negatiewe impak van verskillende uitdagings op hulle loopbane te bepaal.

Die ondersoek het getoon dat vroulike VLA's in Afrika gemiddeld 40 jaar oud was (tussen 27 en 68 jaar) en twee kinders of afhanklikes van ses tot agtien jaar gehad het. Hulle het die meeste versorgingswerk en algemene huiswerk in hulle gesin, verhouding of huishouding onderneem. Die vroulike VLA's was burgers van 25 Afrikalande, en hulle het ook gewerk of gewoon in hulle geboortelande, behalwe vir Lesotho. Baie vroulike VLA's het nog nooit buite hul geboorteland gestudeer of gewerk nie en was geneig om met navorsers by hul eie instelling saam te werk. Die vroulike VLA's was oorwegend permanent in diens gestel, en die meeste van hulle het die rang van senior lektor beklee. Slegs die helfte van hulle het navorsingsbefondsing ontvang. Hulle het gerapporteer dat hulle in 'n tipiese jaar die hoogste persentasie werkstyd aan konsultasie bestee en die laagste persentasie aan die insameling van navorsingstoelaes. Gemiddeld het hulle 5,8 artikels in portuurbeoordeelde akademiese vaktydskrifte, 0,3 boeke, 1,1 hoofstukke, 3,3 konferensie-prosedures en 5,0 konferensie-aanbiedings gelewer. Die hoogste persentasie vroulike VLA's was sosiale wetenskaplikes, gevolg deur natuur- en landbouwetenskaplikes, gesondheidswetenskaplikes en ingenieurs- en toegepaste tegnoloë. Ten slotte het vroulike VLA's geglo dat die balans tussen werk en gesin, 'n gebrek aan navorsingsbefondsing en 'n gebrek aan mentorskap die uitdagings was wat hul loopbane die negatiefste beïnvloed het.

Die ondersoek het bevind dat die meeste vroulike VLA's mentorskap ontvang het vir die verwerwing van 'n pos/werk, navorsingsmetodologie, wetenskaplike skryfwerk, aanbieding van navorsingsresultate en in die vorm van bekendstelling aan navorsingsnetwerke, terwyl slegs 'n minderheid van hulle mentorskap ontvang het oor loopbaanbesluite en fondsinsameling. Daar is verder vasgestel dat 'n statisties-beduidende verband bestaan tussen (1) die ontvangs van mentorskap deur bekendstelling aan navorsingsnetwerke, enersyds, en die lewering van artikels in

portuurbeoordeelde vaktydskrifte en die voorkoms van sommige vorms van samewerking, andersyds; en tussen (2) mentorskap ontvang in fondsinsameling en die ontvangs van navorsingsbefondsing. Nie all vorms van mentorskap het egter verband gehou met hul verwagte loopbaanuitkomste nie.

Die bydrae van hierdie ondersoek is hoofsaaklik empiries, aangesien dit nuwe insigte bied in die verband tussen, enersyds, mentorskap in navorsingsmetodologie, wetenskaplike skryfwerk, fondsinsameling en bekendstelling aan navorsingsnetwerke, en andersyds, loopbaanuitkomste wat uiteindelik loopbaanontwikkeling beïnvloed.

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Chapter 1: Introduction

1.1   Introduction and background

This chapter provides background information that contextualises this study and then progresses to elucidate the research's significance. Thereafter, the general aim, specific objectives and research methodology of the study are outlined. The chapter then concludes with a synopsis of the other chapters that comprise the remainder of this dissertation.

1.1.1   Situating females in higher education institutions

The core functions of higher education institutions (HEIs) are to generate knowledge and produce skilled personnel and academics through research and teaching (Mama, 2003; Teferra & Altbach, 2004; Houston, Meyer & Paewai, 2006; Porter, 2014; Opesade, Famurewa & Igwe, 2017). Recognising these key dual roles, HEIs in different parts of the world have exhibited two trends (UNESCO, 2012; Silander, Haake, & Lindberg, 2013; OECD, 2014; Aiston & Jung, 2015; Eddy & Ward, 2015). The first trend in HEIs is that there has been an increase in the number of women seeking to pursue a career in academia (M. Baker, 2009; Carvalho & Santiago, 2010; May, Moorhouse & Bossard, 2010; Opesade *et al*., 2017; Crabtree & Shiel, 2019). The second trend is that there has also been an increase in the number of females pursuing undergraduate and graduate studies at HEIs (Penney, Young, Badenhorst, Goodnough, Hesson, Joy, McLeod, Pickett, Stordy, Vaandering & Pelech, 2015; H. Johnson, 2016; Cidlinská, 2019; Wotipka, Nakagawa & Svec, 2018; Mengel, Sauermann, & Zolitz, 2019) to the extent that female undergraduate students outnumber male undergraduate students (UNESCO, 2015). This second trend was confirmed in a recent report published by UNESCO (2020a), which indicated that over a period of 25 years, significant progress has been made globally in gender equality in education. One of the findings was that the enrolment of female students in tertiary education had tripled from a low of 38 million to a high of 116 million (UNESCO, 2020a).

Specifically in sub-Saharan Africa, a steady increase in the enrolment of females in tertiary education over the last twenty years has been observed. In 2000, the gross enrollment ratio[1] of females was 3.7%, which increased sharply to 6.5% in 2010 and to 8.3% in 2019 (UNESCO

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[1] This is defined as "the ratio of total enrollment, regardless of age… Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level."

Institute for Statistics, 2020). Moreover, females have attained equality with males among bachelor's (53%) and master's (55%) degree graduates (Bello, Blowers, Schneegans & Tiffany, 2021) but still lag behind as doctorate graduates (44%) (Huyer, 2015 cited in Bello *et al*., 2021). In South African public universities, the graduation rates of female students have been consistently greater than those of male students, over the 10-year period from 2010 to 2019 (Khuluvhe, Netshifhefhe, Ganyaupfu &Negogogo, 2021). In terms of field, the available figures (for only ten African countries for 2018) are depicted in Table 1 below, which reveals that female tertiary graduates are still a minority in STEM fields, but constitute a majority in the humanities, arts, social sciences and health sciences (Bello *et al*., 2021).

The rise in the number of females in HEIs, both as students and academic staff, has been ascribed to various factors. These factors include females' consideration of higher education as a medium for the acquisition of skills and knowledge (Baker, 2016). These skills and knowledge act as drivers for females' socio-economic development through securing gainful employment or becoming entrepreneurs (UNESCO, 2012). Furthermore, this knowledge, coupled with new or improved skills, offers females opportunities for career advancement in HEIs (Mama, 2003).

Many countries' adoption of and alignment with various global declarations and initiatives have also led to an increment in females' enrollment in HEIs (Wotipka *et al.*, 2018), thereby creating an opportunity for these females to later pursue academic careers. The Fourth World Conference on Women that was hosted by the United Nations (UN) in 1995 is a memorable illustration of a global initiative that committed to the advancement of women's rights, such as improving their access to continuing education which in turn stimulated the enrolment of females and their pursuit of careers, in HEIs. The conference report (United Nations, 1996:28) noted that one of the strategic actions to meet the objective of ensuring equal access to education was to "[e]liminate gender disparities in access to all areas of tertiary education by ensuring that women have equal access to career development, training, scholarships and fellowships". Another illustration of a global initiative is the 2009 World Conference on Higher Education that culminated in the adoption of a communiqué by member states of UNESCO. The communiqué (UNESCO, 2010:2) highlighted the issue of access to higher education by females and encouraged an increase in the number of both female students and female academics in UNESCO member states by stating that,

[e]xpanding access has become a priority in the majority of Member States and increasing participation rates in higher education are a major global trend. Nevertheless, great disparities persist, constituting a major source of inequality. Governments and institutions must encourage women's access, participation and success at all levels of education.

More recently, in 2015, member states of the UN adopted 17 Sustainable Development Goals (SDGs), which called for them to work towards the achievement of those goals. Two of those goals are relevant to this dissertation: SDG 4 (quality education) and SDG 5 (gender equality), which call for action for the empowerment of females and an increase in their access to education at all levels, including at the tertiary level (UNESCO, n.d). It is against this background afore whereby I generally situate females in HEIs. In the next four subsections, I map the representation and positioning of female academics in HEIs because they are the subject of this dissertation.

Table 1: Percentage of female tertiary graduates in 2018 in ten African countries, by field

Country	Field							
	Agriculture	Engineering	Health and Welfare	Natural sciences	ICT	Social sciences and journalism	Business administration and law	Arts and humanities
Algeria	77	49	71	83	49	68	58	80
Burkina Faso	34	22	43	19	-	45	49	28
Cape Verde	100	33	77	67	44	69	67	61
Ghana	27	16	61	27	20	40	45	44
Lesotho	49	18	73	45	31	78	62	67
Madagascar	41	19	68	37	34	46	54	52
Mozambique	34	29	75	45	21	57	55	42
Niger	19	8	31	21	23	46	27	46
Rwanda	38	27	58	41	39	48	55	43
Tunisia	74	44	75	77	56	77	71	74

Source: adapted from Bello *et al*. (2021)

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1.1.1.1   *Representation of female academics in higher education institutions*

Despite the enrollment of females in HEIs and the implementation of various initiatives to boost females' access and participation at all education levels, HEIs worldwide are still dominated by male academics (Wotipka *et al.*, 2018). Several studies have established that this male domination is widespread in Australia (Marchant & Wallace, 2013); Europe (Benschop & Brouns, 2003; O'Connor, 2015); the United Kingdom (UK) (Knights & Richards, 2003; Morley, 2005; Cooper, 2018); North America (Blickenstaff, 2005; Ecklund, Lincoln & Tansey, 2012; Jones, Weinrib, Metcalfe, Fisher, Rubenson & Snee, 2012); and Africa (Teffera & Altbach, 2003; Zewotir & Maqutu, 2006; Odhiambo, 2011; Breetzke & Hedding, 2017; Mukhwana, Abuya, Matanda, Omumbo, Mabuka & AAS, 2020).

Data from UNESCO (2020b) indicates that at June 2020, females comprised less than a third of researchers[2] globally (30%) and in sub-Saharan Africa (31%), even though they accounted for 44% of doctorate graduates (Bello *et al*., 2021). Only "four out of ten academics worldwide" are females (Bello *et al*., 2021:21). A closer look at Africa, the focus of this dissertation, reveals that the underrepresentation of female academics in Africa has been reported in various countries. These include the Democratic Republic of Congo (Teferra & Altbach, 2004), Ethiopia (Semela, Bekele & Abraham, 2017), Ghana (Tsikata, 2007; Arthur & Arthur, 2016), Kenya (Raburu, 2015), Nigeria (Teferra & Altbach, 2004; Olaogun, Adebayo & Oluyemo, 2015), Zambia (Teferra & Altbach, 2004), and Zimbabwe (Gaidzanwa, 2007). For example, in Ethiopia, female academics comprised a mere 10,5% of academics in the 2014/2015 academic year (Semela *et al.*, 2017). The outcomes of the underrepresentation of female academics in HEIs are that female academics in such environments lack mentors (Henley, 2015), they have fewer opportunities to network (Hunt, 2010 cited in Henley, 2015) and they are unable to obtain tacit institutional information (Bettinger & Long, 2005). Tacit information is defined by Zuckerman (1977 cited in Ma, Mukherjee & Uzzi, 2020:14081) as "the kind of knowledge that is difficult to codify in writing and, therefore, tends to be transferred between people informally, through face-to-face interaction, and learned outside regimented instruction".

This underrepresentation of female academics indicates that increasing access to higher education for females does not necessarily translate into an increase in their participation as academics (Mazibuko, 2006; David, 2016). In other words, females dominate as consumers of

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[2] "professionals engaged in the conception or creation of new knowledge" (UNESCO, 2020b:1)

higher education knowledge, but are a minority among producers of new knowledge (Wotipka *et al.*, 2018). In such a scenario, Chan and Torgler (202) underscore that when there are more female scholars in a country, the production or increment of top scholars is greater. However, Yallew and Maruza (2020) caution that "transforming and creating equitable systems and institutions goes beyond ensuring quantitative representation and demographic parity. Representation is only one dimension of equity and does not, in and of itself, mean much if the underlying norms and rules of engagement remain untransformed". In instances where female academics are present in HEIs, their participation is predominantly limited to specific ranks, as the next subsection expounds.

1.1.1.2   *Vertical gender segregation among female academics*

Recent research conducted in different countries, including Australia (White & Özkanli, 2011; Toffoletti & Starr, 2016), Germany (Bührer, Schmidt, Palmen & Reidl, 2020), Ireland (Coate & Howson, 2016), the UK (Doherty & Manfredi, 2010; Barrett & Barrett, 2010; Equality Challenge Unit, 2017; Crabtree & Shiel, 2019), and the United States of America (USA) (H. Johnson, 2016) has further established that the majority of female academics occupy the lower academic ranks. These lower ranks, such as assistant lecturer, junior lecturer or lecturer, tend to be teaching positions. In contrast, few female academics occupy senior ranks, such as full or associate professor. According to different studies, the percentage of female full professors ranged from 32% in the USA in 2016 (US Department of Education, 2016, cited in H. Johnson, 2016) to 23% in the UK during the 2014/2015 academic year (Grove, 2015), and to a low 18% in Ireland during the 2011/2012 academic year (Coate & Howson, 2016).

The pattern also applies to various African countries. For example, in 2017, female academics comprised only 29% of professors at South African universities, while 55% of lecturers and 60% of junior lecturers were female (source: HEMIS[3] data produced by CREST[4]). Similar figures have been reported for universities in other African countries. However, there is a paucity of recent statistics, as has been demonstrated in the study by Mukhwana *et al.* (2020), which lacked a breakdown according to countries. According to the most recently available information, in 2020 female full and associate professors at the University of Ghana were in the minority (3% and 9% respectively), while female senior lecturers were just over a quarter (27%), lecturers were 46%, assistant lecturers were 16% in comparison to male academics who were 8% full professors, 12%

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[3] Higher Education Management Information System
[4] Dr. Milandre van Lill, Centre for Research on Evaluation, Science and Technology (CREST) at Stellenbosch University, provided these statistics

associate professors, 34% senior lecturers, 35% lecturers and 11% assistant lecturers (University of Ghana, 2020).

The concentration of female academics at the lower ranks has been termed "vertical stratification" by Sonnert (1999:39). This term is also used when female academics are located in departments or institutions of low prestige (Dobele, Rundle-Thiele & Kopanidis, 2014) that have limited access to those material resources and networks typically found in high-prestige departments or institutions (Weisshaar, 2017). Eveline (2004:4) uses the metaphor "ivory basement" to describe the concentration of female academics in lower ranks. A related term is the "leaky pipeline" in academia (Berryman, 1983), which describes the phenomenon whereby the proportion of females in HEIs diminishes as they advance through academic ranks and academic degree levels (Barrett & Barrett, 2010; Goulden, Mason & Frasch, 2011; Shaw & Stanton, 2012; Silander *et al.*, 2013; H. Johnson, 2016).

The vertical stratification of female academics has been ascribed to different reasons. One reason is the greater likelihood of female academics lacking a doctorate, thus constraining their progression to higher ranks (Campion & Shrum, 2004; Winslow, 2010; Zulu, 2013). Another reason is that most female academics follow career pathways that are different or "non-standard" when compared to those of male academics (Xie & Shauman, 1998). The low research output of female academics has additionally been highlighted as a factor (Bello *et al.*, 2021). Gender stereotypes, for example, that female academics are "more emotional" and "less intelligent" than their male counterparts and are therefore, unable to hold senior ranks in HEIs have also been reported as a reason (Handelsman, Cantor, Carnes, Denton, Fine, Grosz, Hinshaw, Marrett, Rosser, Shalala & Sheridan, 2005; Prozesky, 2006; Martinez, Botos, Dohoney, Geiman, Kolla, Olivera, Qiu, Rayasam, Stavreva & Cohen-Fix, 2007; Aiston & Jung, 2015; Van den Besselaar & Sandström, 2016).

As to the implications of vertical gender stratification for female academics, it is relevant to note that those (mostly female) academics occupying the lower ranks within the academic hierarchy wield relatively little influence and power and tend not to be allocated leadership responsibilities (Morley, 2005; Acker & Dillabough, 2007; Carvalho & Santiago, 2010). Thus, Maphalala and Mpofu (2017:9246) refer to female academics in these lower ranks as the "voiceless minority", while Coate and Howson (2016:579) label them "worker bees" whose labour facilitates male academics to advance their research careers (Angervall, Beach & Gustafsson, 2015). Eveline (2004:2) fittingly explains that these female academics provide "ivory basement leadership" because the type of activities that they undertake are critical to the functioning of HEIs and shaping

of society in general, yet these activities are rarely seen by people outside of the academy or appreciated by those occupying the ivory tower.

Among the lower ranks, one usually finds temporary, contract appointments, which are disadvantageous to female academics, as such contracts preclude making long-term career plans, and limit access to resources, such as research funds, and privileges such as maternity leave (Maddrell, Thomas & Wyse, 2019). Hence, female academics in the lower ranks are vulnerable to exploitation (Penney *et al*., 2015) because they lack power and "have little of value to exchange" (Coate & Howson, 2016:579). This, in turn, means that they tend to be allocated substantial teaching, administrative and service tasks (Maddrell *et al*., 2019) that academics in senior ranks tend to eschew (Crabtree & Shiel, 2019), which further accumulates their disadvantage (Valian, 1999, cited in Miegroet, Glass, Callister & Sullivan, 2019).

1.1.1.3   Clustering of female academics in teaching posts

As mentioned in the previous subsection, female academics are concentrated in the lower ranks, which tend to be teaching positions (Cubillo & Brown, 2003; Zembylas, Bozalek & Shefer, 2014; Angervall & Beach, 2017; Crabtree & Shiel, 2018; Shreffler, Shreffler & Murfree, 2019). Additionally, female academics tend to work at teaching-intensive rather than in research-intensive HEIs (Long & Fox, 1995; Xie & Shauman, 1998; Nakhaie, 2002; Winslow, 2010; Baker, 2016).

The tendency of female academics being offered teaching posts (Subotzky, 2001; Zulu, 2013) is attributable to the stereotyping and socialisation of females as teachers and nurturers, more so than as researchers (Maürtin-Cairncross, 2003; Mariskind, 2014; Angervall & Beach; 2017; Kelly & McCann, 2019; UNESCO, 2020a). The focus on teaching is disadvantageous to female academics as it limits their opportunities for career advancement (Drennan, 2001; Kain, 2006; Fletcher, Boden, Kent & Tinson, 2007; Priola, 2007). Career progression is limited because teaching is not valued as highly as research when academics are considered for promotion (Cretchley, 2009; Chalmers, 2011; Misra, Lundquist & Templer, 2012; Obers, 2014; Mengel *et al*., 2019). The ramification of the vertical segregation and clustering of female academics in teaching posts is that very few of them ascend to leadership positions, as is expounded in the following subsection.

1.1.1.4   The dearth of female academics in leadership positions

The over-representation of female academics in lower ranks logically means that they are underrepresented among the senior ranks. Consequently, numerous researchers in diverse regions of the world have found that only a few female academics advance to leadership positions, such as dean or vice-chancellor (also known as vice-rector). The dearth of female academics in leadership positions at HEIs has been described as a global systemic occurrence (Blackmore, 2014). Some statistics for the African continent are as follows: in 2018, only four of the 26 vice-chancellors in South Africa were females (Naidu, 2018); in Ethiopia in 2016, only two of the 12 vice-president positions at three public universities were occupied by female academics (Semela *et al*., 2017) and the renowned Addis Ababa university only appointed its first female professor as recently as 2009 (Girmaw, 2013). In other parts of the wrorld, it has been observed in Asia (Macfarlane, 2012; Aiston, 2014), Australia (Gardiner, Tiggemann, Kearns & Marshall, 2007; Marchant & Wallace, 2013; Winchester & Browning, 2015), Europe (Sanders, Willemsen & Millar, 2009; Mischau, 2001; van den Brink, Benschop & Jansen 2010; Fritsch, 2015), and the UK (Barrett & Barrett, 2010; Fotaki, 2013; Grove, 2013; Dobele *et al*., 2014; Howe-Walsh & Turnbull, 2016). This scarcity is also present in North America (Buch, Huet, Rorrer & Roberson, 2011; Misra, Lundquist, Holmes & Agiomavritis, 2011; Longman & Lafreniere, 2012; Terosky, O'Meara & Campbell, 2014) and Africa (Mama, 2003; Odhiambo, 2011; Riordan & Louw-Potgieter, 2011; Wolhuter, Peckham, van der Walt & Potgieter, 2013). This underrepresentation of female academics in leadership positions suggests that female academics' careers either peak, halt or are disrupted at lower academic levels (Parker, Hewitt, Witheriff, & Cooper, 2018).

A glass ceiling (meaning obstacles that are invisible and artificial) that hinders the progression of many female academics to leadership positions seems to exist in HEIs (Williams, 2005; Maddrell *et al*., 2019). The glass ceiling is not easily noticeable, and female academics may be within reach of those leadership positions, but are still unable to reach them (Boyd, 2008), even though they may be as experienced and as skilled as male academics (Brown, Crampton, Finn & Morgan, 2020). The use of the phrase "glass ceiling" can arguably be traced back to three events in history in the USA. The first was in 1977, when it was used in a speech addressed to the Women's Action Alliance by Marylin Loden (Loden, n.d.); the second was in 1984, when Gay Bryant used it in a magazine article (Boyd, 2008); and the third was in 1986, when it was used by Hymowitz and Schellhardt in a Wall Street Journal article (Carnes, Morrissey & Geller, 2008; Jackson & O'Callaghan, 2009). Loden, Bryant, Hymowitz and Schellhardt used the term glass ceiling to refer to the status of working women, who seemed "trapped" at the middle-management

level, because they rarely rose to senior leadership posts (Boyd, 2008; Jackson & O'Callaghan, 2009). A "clogged pipeline" is another term that has been used to describe the limited mobility of female academics into leadership positions at HEIs (Miegroet *et al*., 2019:247).

The gender imbalance among those occupying leadership positions at HEIs can be attributed to a myriad of reasons. The fact that female academics are positioned predominantly in the lower academic ranks means that there is only a small pool of female academics that are available in senior ranks to take up leadership positions (Gardiner *et al*., 2007; Morley, 2014; Dobele *et al*., 2014; Whittaker, Montgomery & Acosta, 2015; Shreffler *et al*., 2019). Moreover, and as already mentioned previously, leadership opportunities at the lower ranks are inadequate, if they exist at all (Muthumbi & Sommerfield, 2015).

The "impostor phenomenon" (Clance & Imes, 1978: 241) is another factor that may limit the ascension of female academics to leadership positions (Howe-Walsh & Turnbull, 2016). This phenomenon refers to a belief among female academics that they are intellectually inadequate, regardless of their high academic achievements. Consequently, they do not apply for or accept appointments to these leadership positions (Clance & Imes, 1978; Jöstl, Bergsmann, Lüftenegger, Schober & Speil, 2012; Howe-Walsh & Turnbull, 2016).

On the other hand, males tend to consider themselves and are also perceived by society as more competent and suitable as leaders than females are (Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2012; Bismark, Morris, Thomas, Loh, Phelps & Dickinson, 2015; Coate & Howson, 2016; Semela *et al*., 2017). This perception is due to stereotypes about females, further emboldened by the continued underrepresentation of female academics in leadership positions (Bagilhole, 2002; Coate & Howson, 2016). In other instances, there may be bias against female academics (Bingham & Nix, 2010) in that their achievements and capabilities, the roles that they play, and the work that they undertake, are undervalued (Henley, 2015; O'Connor & O'Hagan, 2016; Managa, 2013; Semela *et al*., 2017; Mukhwana *et al*., 2020). Bias may also be found in using different standards to evaluate male and female academics' competencies and performance (White, 2001; Williams, 2004; Van den Brink & Benschop, 2012; Henley, 2015; Mukhwana *et al*., 2020).

Thus, on an institutional level, the policies and practices of HEIs directly influence the career progression of academics (Bingham & Nix, 2010), and may be a hindrance to the progression of female academics to leadership positions (Winchester, Lorenzo, Browning & Chesterman, 2006; Odhiambo, 2011; Eddy & Ward, 2015). Sometimes, policies intended to aid the career progression of female academics are developed and enacted without consulting the beneficiaries (Maphalala

& Mpofu, 2017). Such policies illustrate a typical response by HEIs, which is their attempt to change female academics instead of changing the institutional culture and policies (Odhiambo, 2011; Eddy & Ward, 2015; Coate & Howson, 2016). The legitimisation, implementation, and sustainability of suitable interventions to support female academics' career advancement also require commitment from the leadership of the HEIs, where it is lacking (Sturm, 2006; Correll, 2017).

An entirely different factor that has been found to contribute to the dearth of female academics in leadership positions is that some of the few females in these leadership positions tend to reproduce and embolden the patriarchal higher education system (Maphalala & Mpofu, 2017). These female academics replicate patriarchy by not supporting other female academics to achieve and progress to these positions – a phenomenon referred to as the "queen bee syndrome" (Staines, Tavris & Jayaratne, 1974, cited in Ellemers, Van den Heuvel, De Gilder, Maass & Bonvini, 2004:325).

The scarcity of female academics in leadership positions has been described as a waste of public funding used to educate and upskill female academics (Huston, Norman, and Ambrose, 2007; Stout, Staiger & Jennings, 2007; Xu, 2008; Ponjuan, Conley & Trower, 2011; Caffrey, Wyatt, Fudge, Mattingley, Williamson & McKevitt, 2016). Additionally, this scarcity deprives female academics in lower ranks from receiving exposure to "diverse gender status and role-related perspectives" (Seo, Hedayati & Huang, 2016:745). Of particular relevance to this study is that the underrepresentation of females among senior academics or leadership posts limits the access of other female academics to mentors and role models that they can identify with and emulate (Goulden *et al.*, 2011; Obers, 2014; Terosky *et al.*, 2014; O'Connor, 2015; Wotipka *et al.*, 2018) if they aspire to progress their academic careers (Fox, 2005; Howe-Walsh & Turnbull, 2016). The shortage of females in academic leadership posts also reinforces the perception that male academics are the experts (Beaulieu, Boydstun, Brown, Dionne, Gillespie, Klar, Krupnikov, Michelson, Searles & Wolbrecht, 2017).

Lastly, this scarcity skews the processes of decision-making in HEIs and amplifies prejudice and neglect in agendas by not considering different views that may be raised by female academics (Bird, 2011). It has therefore been argued that addressing the gender imbalance in senior academic or leadership posts will result in expanded thinking, innovation, diversified style of management, and the sustainable development of the higher education sector as a whole (Ovseiko, Edmunds, Pololi, Greenhalgh, Kiparoglou, Henderson, Williamson, Grant, Lord, Channon, Lechler & Buchan, 2016; Miegroet *et al.*, 2019).

A reflection on all the preceding discussions reveals that female academics in African HEIs are a minority that is concentrated in the lower ranks, especially in teaching positions, and are rarely in leadership positions. Consequently, considering the challenges that female academics experience during their career development is necessary, as these challenges may be responsible for this status quo of female academics.

1.1.2   Challenges in the career development of female academics

Generally, career development tends to be complicated for female academics (Baldwin, 1990). They are more likely than their male counterparts to be appointed in temporary positions (Williams, 2005), and various researchers (Dickey, 2011; Akinsanya, 2012; González Ramos & Vergés Bosch, 2013; Shen, 2013; Macoun & Miller, 2014) have found that they tend to progress more slowly in their careers than male academics do. The career progression of female academics is influenced by "complex issues" (Eddy & Ward, 2015:7) and "is related to a variety of psychological, social and cultural influences" (Gasser & Shaffer, 2014:343). According to Lipton (2017), the advancement of female academics' careers is inhibited by cultural, meritocratic and power-related factors. Other researchers explicitly describe the career development of female academics in pessimistic terms, including Barrett and Barrett (2010:152), who state that it is "a stubborn, complex, equality issue" and that "the underlying reasons are complicated and have proved rather intractable". Crabtree and Shiel (2019:11) further indicate that "the path of academic women is strewn with obstacles to progression". Scholars have highlighted numerous factors as obstacles to female academics' career progression, and these are discussed in the subsequent subsections.

1.1.2.1   Lack of mentors and role models

A lack of mentors and role models to provide guidance on navigating and developing an academic career (Bettinger & Long, 2005; Managa, 2013; Henley, 2015) has also been flagged by researchers in Africa (Tsikata, 2007; Akinsanya, 2012; Obers, 2015; Udegbe, 2016) and other world regions (Roach & El-Khawas, 2010; Ballenger, 2010; Goulden *et al*., 2011; Blackburn, 2017; Brown *et al*., 2020) as a deterrent to the career development of female academics. Parker *et al*. (2018:13) succinctly summarise the implication of a lack of mentors and roles models for female academics by stating that female academics "cannot be what they cannot see".

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1.1.2.2 Substantial teaching, administrative and service duties

One of the most widely mentioned factors in numerous studies[5] conducted as far back as over 20 years ago as a barrier to female academics' career advancement is substantial teaching and course preparation workload and overcommitment to administrative and service roles. Examples of service responsibilities include advising, counselling and recruiting students, serving on committees and task forces, volunteering for events organised by HEIs, mentoring students and fellow academics, and representing the HEI in media engagements. It is worth noting that, teaching is one of the mandates of an HEI, and it generates much-needed funding from student fees (Subramaniam, 2003). The fulfilment of service responsibilities by academics is also essential for the overall functioning of an HEI (Eddy & Ward, 2015).

However, the workload generated by these academic responsibilities leaves female academics with little spare time to undertake research (Teodorescu, 2000; Williams, 2005; Kelly & McCann, 2019). These substantial teaching, administration and service responsibilities that female academics undertake have been described using phrases such as "[t]eaching is the new housework" (O'Connor, 2015:311) and "emotional labour [which is] work regarded as vital to corporate functioning, while ensuring that casualty rates among students and staff are kept as low as possible" (Crabtree & Shiel, 2018: 903).

1.1.2.3 Balancing work and family responsibilities

Balancing work and family responsibilities is another often-cited obstacle to the career advancement of female academics. A vast number of studies in various countries have established that female academics experience pressure in balancing their academic roles as teachers, researchers and counsellors with their family roles as spouses, partners, caregivers, parents, and homemakers. This challenge has been reported in studies conducted in Australia (Probert, 2005; Wolf-Wendel & Ward, 2006; Toffoletti & Starr, 2016), Canada (Acker & Armenti, 2004; Acker & Dillabough, 2007; Penney *et al.*, 2015), the Czech Republic (Cidlinská, 2019), Germany

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[5] Xie & Shauman, 1998; Doyle & Hind, 1998; Rosser, 2003; August & Waltman, 2004; Fox, 2005; Houston *et al.*, 2006; Ebner, 2007; Myers, 2008; Link, Swann & Bozeman, 2008; Prozesky, 2008; Wilson, Gadbois & Nichol, 2008; Grummell, Devine & Lynch, 2009; Gardner, 2013: Dehdarirad, Villarroya & Barrios, 2015; O'Connor, 2015; Coate & Howson, 2016; Crabtree & Shiel, 2018; Maddrell *et al.*, 2019

(Sagiebel, 2016), Iran (Nazemi, Mortazavi & Borjalilou, 2012), the UK (Raddon, 2002), and a large number of studies in the USA[6].

In Africa in general, studies undertaken by Tamale and Oloka-Onyango (1997) and Mukhwana *et al*. (2020) found that balancing work and family responsibilities is a major challenge for the career development of female academics. Other studies in specific African countries such as Ghana (Tsikata, 2007), Kenya (Odhiambo, 2011; Raburu, 2015), Mauritius (Thanacoody, Bartram, Barker & Jacobs, 2006), Nigeria (Ukpokolo, 2010; Ogbogu, 2011; Akinsanya, 2012), Zimbabwe (Gaidzanwa, 2007) and South Africa (Van Staden, Boon & Dennill, 2001; Moultrie & De la Rey, 2003; Mabokela & Mawila, 2004; Zulu, 2013; Callaghan, 2016) arrived at the same conclusion.

The incompatibility of family and work responsibilities leads to role conflict due to the significant pressure emanating from the two responsibilities (Williams, 2005; Shreffler *et al*., 2019). As a result, Coser (1974 cited in Wright *et al*., 2004: 150) describes the family and the HEI as "greedy institutions". Female academics experience work-family role conflict to a far greater extent than male academics (Ruppanner & Huffman, 2013; Fox *et al*., 2011; Seo *et al*., 2016; Torp, Lysford & Mydje, 2018; Angervall, Erlandson & Gustafsson, 2018). This work-family role conflict is because studies such as those conducted by Ukpokolo (2010), Ecklund and Lincoln (2011), Sallee (2012), LaPan, Hodge, Peroff and Henderson (2013), and Cidlinská (2019) have demonstrated that, in addition to their substantial academic responsibilities, female academics undertake more household work and care for children, elderly or sick family members in their homes than male academics do. Females in general unfairly bear a large proportion of family responsibilities because of patriarchal societal beliefs and perceptions that traditionally assign these roles to them (Dobele *et al*., 2014; Semela *et al*., 2017; Seo *et al*., 2016; Toader & Dahinden, 2018; Prozesky & Mouton, 2019).

1.1.2.4   *Weak and limited access to networks*

A lack of networking is also a commonly recognised barrier to the career progression of female academics. Female academics experience a seeming inability to build strong networks (Pell, 1996; Cheng, 2010; Semela *et al*., 2017), and they are excluded from the broader social and informal networks at HEIs (Ibarra, Kilduff & Tsai, 2005; M. Baker, 2009; Maranto & Griffin, 2011; Van

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[6] Etzkowitz, Kemelgor, Neuschatz, Uzzi & Alonzo, 1994; Riger, Stokes, Raja, & Sullivan, 1997; Trower, 2000; Grant, Kenney & Ward, 2000; Sax, Hagedorn, Arredondo & Dicrisi, 2002; Wright *et al.*, 2004; Schoening, 2009; Fox, 2010; Monk-Turner & Fogerty, 2010; Fox, Fonseca & Bao, 2011; Terosky *et al.*, 2014; Eddy & Ward, 2015

den Brink & Benschop, 2012; Baker, 2016). Additionally, female academics have smaller networks compared to those of male academics (Quinlan, 1999; Eliasson, Berggren & Bondestam, 2000; Ortiz-Walters, 2009), and/or their access to, and participation in, male academics' networks is limited (Sagebiel, 2016), Even if the male academics' networks are accessible, female academics feel they do not belong the "homo-social culture" (Sagebiel, 2016:56). These networking-related issues are coupled with the fact that female academics are often not privy to the subtle biases and unwritten rules of HEIs (Levine, Lin, Kern, Wright & Carrese, 2011; Baker, 2016; Meschitti & Smith, 2017). Consequently, female academics are vulnerable to marginalisation and at risk of exclusion from career-development opportunities (Meschitti & Smith, 2017).

Due to the exclusion of female academics from, or their limited access to, networks, they feel unwelcome, isolated and lonely, especially in departments where they are the minority (Blau, Currie, Croson & Ginther, 2010; H. Johnson, 2016; Howe-Walsh & Turnbull 2016; Maddrell *et al.*, 2019; Ooms, Werker & Hopp, 2019). These negative feelings lead to a decline in work productivity, self-esteem and career satisfaction, as the female academics have only a few, if any, female colleagues to interact and relate with, and psychosocial support is rarely available (Handelsman *et al.*, 2005; Thanacoody *et al.*, 2006; Monk-Turner & Fogerty, 2010; Muthumbi & Sommerfield, 2015). Associated with the challenge of limited or non-existent access to networks is a lack of information, awareness of, or clarity on promotion requirements and processes (Fox & Colatrella, 2006; Trower & Gallagher, 2010). Networks are powerful platforms from which female academics can obtain this type of information, and they also serve as avenues through which female academics can obtain a job-application reference or someone to "put in a good word" during a job interview. Sagebiel (2016) succinctly summarises the significance of networks in academic career advancement when she states, "[n]etworks' influence is largely hidden but it is enormous, virtually replacing objective criteria such as qualifications and performance". The significance of networks in developing a career in academia is discussed in detail in chapter two.

1.1.2.5   *Skewed or lack of recognition of accomplishments and skills*

An added hindrance to the career development of female academics is the fact that their accomplishments or proficiencies tend to be more thoroughly scrutinised, more harshly judged, and less celebrated, when compared to male academics who are commended, recognised more and given the benefit of doubt for their achievements (Mabokela, 2002; Williams, 2005; Winchester *et al.*, 2006; Larivière, Vignola-Gagné, Villeneuve, Gélinas, P. & Gingras, 2011; Howe-Walsh & Turnbull 2016). A case in point is that, historically, scientific discoveries made by female scientists

have not been acknowledged and appreciated, but have been erased from historical records, dismissed, unrecognised, or at least have received low levels of publicity (Rossiter, 1993). Instead, male scientists who worked collaboratively with female scientists on research projects have received sole recognition, even going as far as winning a Nobel Prize (Rossiter, 1993).

The phenomenon of female academics' contributions to various disciplines being denied, undervalued, unrecorded or unrecognised was named the "Matilda Effect" by Rossiter (1993:337), after the American sociologist and feminist Matilda Joslyn Gage. Gage observed and articulated a tendency in society of men prohibiting women "from reaping the fruits of their own toil" (Rossiter, 1993:336). The Matilda Effect has been observed in cases where female academics are part of research teams that include male academics (Grant & Ward, 1991; Rossiter, 1993; Mama, 2003; Cheng, 2010; Polkowska, 2013) and where both male and female academics have equal achievements (Rossiter, 1993; Pell, 1996; Mervis, 2012; Coate & Howson, 2016; Miegroet *et al*., 2019). The Matilda Effect has also been noted in cases where female academics outperform male academics in scholarly achievements (Rossiter, 1993; Dobele *et al*., 2014) and even when female scientists undertake groundbreaking research (Frize, Frize & Faulkner, 2009 cited in Henley, 2015).

A further, related aspect that complicates the career progression of female academics is that performance-appraisal standards (North-Samardzic & Gregson, 2011; MacNell, Driscoll & Hunt, 2015; Nielsen, 2016; O'Connor & O'Hagan, 2016; Mukhwana *et al*., 2020) and evaluation standards for grant applications (Kaatz, Lee, Potvien, Magua, Filut, Bhattacharya, Leatherberry, Zhu & Carnes, 2016; Witteman, Hendricks, Straus & Tannenbaum, 2019) that are applied to female academics are different from those applied to male academics. The net outcome of the Matilda Effect and unequal performance evaluation standards is that female academics have to work harder than male academics to prove their competency (Williams, 2005).

1.1.2.6   *Presence of gendered cultures and practices*

At an institutional level, the sluggish career advancement of female academics has been attributed to the gendered culture and practice of HEIs, which tend to be biased towards male academics (Maranto & Griffin, 2011; Fotaki, 2013; Ceci, Ginther, Kahn & Williams, 2014), even when those HEIs identify themselves as gender-neutral (Van den Brink & Benschop, 2011; Winchester & Browning, 2015). HEIs increasingly operate in a neoliberal, globalised and corporatised context (Olssen & Peters, 2005; Radice, 2013; Saunders, 2010; McKay & Monk, 2017). A corporate context brings about, at HEIs, an emphasis on measurable outputs and revenue generation, together

with the normalisation of a culture of overworking, self-promotion, individualism, deficient collegiality, and competitiveness (Odhiambo, 2011; Petersen, 2011; McKay & Monk, 2017; Sutherland, 2017; Maddrell *et al*., 2019).

These cultures and practices of HEIs pose a challenge to female academics with family responsibilities, as they are less able than their male colleagues to work outside of office hours (Ely & Meyerson, 2000; Mason & Goulden, 2004; Baxter, Hewitt & Haynes, 2008; Mayer & Tikka, 2008; Emslie & Hunt 2009). Moreover, the presence of such cultures and practices means that female academics are less able to attend to family responsibilities in the course of their working day, or take career breaks when they need to, without being penalised (Mukhwana *et al*., 2020; Brown *et al*., 2020). In instances where HEIs have policies that allow for flexible working arrangements to enable academics to attend to family responsibilities when needed, female academics who utilise them do so to the detriment of their career. This is because those academics experience "flexibility stigma", as they are perceived by colleagues as not contributing their fair share of work, and as reluctant to work overtime in a culture that praises overworking (Padavic, Ely & Reid, 2020:64). Consequently, these female academics are penalised in ways that derail their careers, such as being overlooked for promotion (Cohen & Single, 2001).

Also, female academics may have been socialised to view engagement in self-promotion as contrary to prescribed norms for their gender (Reuben, Sapienza & Zingales, 2014). Even if they do engage in such behaviour, they are likely to be viewed by others as contravening those norms, in other words, as arrogant and boastful (Williams, 2005). The shortage of female academics in the leadership of HEIs, which has already been discussed, further propagates the gendered cultures and practices that favour male academics in HEIs (Bailyn, 2003; Fox, 2005; Priola, 2007; Rhoton, 2009; Barnard, Powell, Bagilhole & Dainty, 2009).

Closely linked to this gendered system operating in HEIs is patriarchy: a societal system that views males as superior to females in terms of physical and intellectual ability, which aggravates gender stereotypes. Patriarchy has been reported as especially prevalent in HEIs in Africa (Tamale & Oloka-Onyango, 1997; Guramatunhu-Mudiwa, 2010; Managa, 2013; Maphalala & Mpofu, 2017). As a result, one finds that at these HEIs, access to resources is unequal and favoured towards male academics and is controlled by a leadership structure composed of largely male academics who act as gatekeepers (Subotzky, 2001; Cheng, 2010; Mukhwana *et al*., 2020). Peer reviewers of academic journals (Grant & Ward, 1991; Pell, 1996; Cheng, 2010) and editorial boards of journals (Laver, Prichard, Cations, Osenk, Govin & Coveney, 2018) are also predominantly male. These individuals who are meant to act as gatekeepers to "uphold the quality and novelty of research

publications" (Royal Society of Chemistry, 2019:18) have instead been found to be biased against scholarly articles submitted for publication by female academics (Fox & Paine, 2019; Royal Society of Chemistry, 2019). Lastly, female academics have been reported to experience patronisation (Baker, 2016; H. Johnson, 2016) and sexual harassment by male colleagues in many HEIs (Odhiambo, 2011; H. Johnson, 2016; Mukhwana *et al.*, 2020).

1.1.2.7 Low research output

Another aspect that has been documented in the literature as curtailing the career advancement of female academics is their lower research output compared to that of male academics (Ogbogu, 2011; Padilla-González, Metcalfe, Galaz-Fontes, Fisher, & Snee, 2011; Obers, 2014; Maphalala & Mpofu, 2017; Cardel, Dhurandhar, Yarar-Fisher, Foster, Hidalgo, McClure, Pagoto, Brown, Pekmezi, Sharafeldin, Willig, & Angelini, 2020). However, Miegroet *et al.* (2019) opine that the factors that lead to this gender difference in research output still need more in-depth interrogation. In contrast, a study by Huang, Gates, Sinatra and Barabási (2020) revealed that the research output of female researchers is equal to that of male researchers.

Research output is important because it has a significant impact on the career progression of academics and in raising the profile of the HEIs in which they operate (Sax, Hagedorn & Dicrisi III, 2002; Kaya & Weber, 2003; Tower, Plummer & Ridgewell, 2007; Hesli & Lee, 2011; Henley, 2015). The significance of academics' research output arises from the fact that, in HEIs, it is influential in its use as a benchmark in performance evaluations that inform decisions about promotion around the world (Kaufman & Chevan, 2011; Bergeron, Ostroff, Schroeder & Block, 2014; Huber, 2016; Leišytė, 2016). Research output also raises the visibility (profile and reputation) of an academic within his/her discipline and increases the academic's chances of securing research funding (Sutherland, 2017; Royal Society of Chemistry, 2019). Female academics who have low research output are less visible than academics who have high research output (Leahey, 2007; Bello *et al.*, 2021).

1.1.2.8 Tokenism

Finally, there is tokenism, whereby female academics are appointed in HEIs simply to increase their representation (Semela *et al.*, 2017; Miegroet *et al.*, 2019). Due to tokenism, female academics are expected – based on their gender and perceived character as nurturers – to advise students (Fritsch, 2015; H. Johnson, 2016) and act as mentors to fellow female academics (Wasburn, 2007).

It is paramount for HEIs to ensure the equitable participation of female academics so that they can tap into their full human resource potential. Female academics already contribute considerably to higher education through scholarship (David, 2004), production of inventions (Blickenstaff, 2005) and inspiration of the next generation of female academics, particularly female undergraduate and graduate students (Carrell, West & Scott, 2010; Diekman, Brown & Johnston, 2010). Finally, the participation of female academics ensures that research is enriched by having balanced (Ovseiko *et al.*, 2016) and diverse (Sonnert, 1999) perspectives, such as highlighting gender dimensions in research projects and determination of priorities in research agendas (Thanacoody *et al*., 2006; Anagbogu & Ezeliora, 2008; Muthumbi & Sommerfield, 2015).

To ensure that female academics actively and fairly participate in the higher education system, and that the entire complement of their talents is utilised (Sonnert, 1999; Eddy & Ward, 2015; Purcell, Beer & Southern, 2016), the challenges that hinder their career progression, as discussed in this section, would need to be addressed. The result will be the creation of a sustainable academic environment and the enhancement of global competitiveness in HEIs (Levinson, Kaufman, Clark & Tolle, 1991; Mama, 2003; Etzkowitz & Ranga, 2011; Muthumbi & Sommerfield, 2015). The discussion in the following section focuses on situating early-career academics (ECAs) in HEIs, since they are also the subject of this dissertation.

1.1.3   Early-career academics in the academic enterprise

As HEIs generate knowledge through research, they contribute to the social and economic development of a country through the value derived from knowledge creation (Arthur & Arthur, 2016; Aytekin, Erdil, Erdoğmuş, & Akgün 2016). It is therefore concerning that HEIs in Africa (Tettey, 2006; Teferra, 2016; Lesenyeho, Barkhuizen & Schutte, 2018) are characterised by an ageing academic workforce that is approaching retirement (Hugo, 2005; Trower & Gallagher, 2010; Jones *et al*., 2012; Price, Coffey & Nethery, 2015). Addressing this situation in Africa necessitates support for the career development of ECAs (Sawyerr, 2004; Tettey, 2006; Whitworth, Kokwaro, Kinyanjui, Snewin, Tanner, Walport, & Sewankambo, 2008). This support would then enable ECAs to competently assume the responsibilities of senior academics when the latter leave the higher education system (Harle, 2013; Teferra, 2016; Osman & Hornsby, 2016). HEIs acknowledge that the future fate of academia and its sustenance depend on ECAs (Kerey & Naef, 2005; Smith, Hollerbach, Donato, Edlund, Atz, & Kelechi, 2016; Crome, Meyer, Bosanquet, & Hughes, 2019). The acknowledgement is also because ECAs enrich HEIs through unconventional and distinctive viewpoints and values that they bring along (Trower & Gallagher,

2010; Smith *et al.*, 2016). Likewise, ECAs are the generation that will ensure the rejuvenation of healthy competition and sustainability of creativity in scholarly work (Prpić, 2000; Ter Meulen & Stock, 2010).

Having recently graduated, ECAs tend to enter academia as highly motivated individuals with high expectations (Waxman, 1992) and their identity straddles between student and staff member (Vilakazi, 2020). However, Waxman (1992) notes that ECAs are a delicate grouping of academics, whereas Laudel and Gläser (2008) describes them as a vulnerable category of academics. This is because ECAs are in a precarious career phase – a "rite of passage" (Foote, 2010:10) that can "make, break or at least shape an academic career" (Waxman, 1992:124). And according to Sutherland (2017:745), "[e]arly career academics belong to, move between, juggle, construct, and are challenged and influenced by various communities simultaneously, from their immediate departments to the university as a whole, to their international disciplines and the wider academic community".

A number of other scholars (Pienaar & Bester, 2006; Laudel & Gläser, 2008; Pifer & Baker, 2013; Müller, 2014; Brown, Bharwani, Patel & Lemaire, 2016) have established that the early-career phase is a challenging one, although this is not a universal phenomenon, as Jones *et al*. (2012) found it not to be the case for ECAs in Canada. ECAs commence a new career with new responsibilities. In general, they do so along a solitary, transformational journey (Wyllie, Levett-Jones, DiGiacomo & Davidson, 2019) that may span more than a third of their career in academia (Foote, 2010). During that journey in HEIs, ECAs often have to reconcile their assumptions and ideals with a different reality (Foote, 2010; Adcroft & Taylor, 2013; Pithouse-Morgan, Naicker, Masinga, Pillay & Hlao, 2016). ECAs are situated in "an existing and complex system" (Adi Badiozaman, 2020:4) that is unlikely to offer adequate collegial and organisational support (Gravett & Petersen, 2007; Price *et al*., 2015; Subbaye & Dhunpath, 2016), such as induction programmes (Ssempebwa, Teferra, & Bakkabulindi, 2016). An ECA has to "sink or swim" (Foote, 2010:10), meaning that an ECA has to either chart his/her own path that will lead to a successful academic career, or failing this, exit academia (Foote, 2010; Perry & Parikh, 2017; Conn *et al.*, 2018).

An ECA has to grow from a neophyte to a colleague (Adcroft & Taylor, 2013) and build an independent researcher's academic identity by making contributions to knowledge (Waxman, 1992; Hollywood, McCarthy, Spencely & Winstone, 2019). Moreover, an ECA has to familiarise herself or himself with – and adapt to – an institution's culture (McKay & Monk, 2017; Conn *et al.*, 2018) while operating in an environment of largely unwritten rules (Jones & Osborne-

Lampkin, 2013; Maddrell *et al*., 2019). The work expectations that ECAs have to meet are high, as expressed by Caretta, Drozdzewski, Jokinen and Falconer (2018:262):

> [t]hey include, but are not limited to, providing: a multitude of measurable outputs and skills, publications, income generation through the acquisition of external grants, international collaboration, and teaching excellence, as well as proving that one can do all these things in combination and at pace.

Keeping in mind the roles that ECAs play in academia, their expectations, and the reality that they have to confront in HEIs, it is imperative to understand the context of their work environment by examining the challenges that they experience.

1.1.4 Challenges in the career development of early-career academics

ECAs experience a range of challenges, including lack of mentoring, a heavy teaching, administration and service workload, lack of teaching experience, lack of research funding, limited job opportunities, job insecurity, balancing work and family responsibilities, lack of mobility opportunities, and lack of key skills. I examine each of these challenges in more detail in the next subsections.

1.1.4.1 *Lack of mentoring*

Lack of mentoring is a prevalent challenge that ECAs in Africa (Whitworth *et al*., 2008; Pithouse-Morgan *et al*., 2016; Subbaye & Dhunpath, 2016; Mukhwana *et al*., 2020) and other regions of the world (Hardwick 2005; Trower & Gallagher, 2010; Foran-Tuller, Robiner, Breland-Noble, Otey-Scott, Wryobeck, King & Sanders, 2012; Cochran, Elder, Crandall, Brasel, Hauschild & Neumayer, 2013; Adi Badiozaman, 2020) are confronted with. Consequently, ECAs experience difficulties in adapting to academic life because they feel unrecognised, disengaged and marginalised (Kjeldal, Rindfleish & Sheridan, 2005; Aiston & Jung, 2015) and have no guidance for undertaking their responsibilities effectively to build their academic careers (Jackson, Palepu, Szalacha, Caswell, Carr & Inui, 2003; Prozesky, 2008; Kelchtermans & Veugelers, 2013). ECAs' negative experiences that arise from lack of mentoring are further intensified by feelings of isolation and disillusionment (Fink, 1988, cited in Foote, 2010; Trower & Gallagher, 2010; Hollywood *et al*., 2019), which stem from lack of collegiality or absence of peers in departments, and lack of knowledge on how to steer through departmental politics (Moss, Teshima & Leszcz, 2008; Smith, 2010; Hemmings, 2012; Price *et al.*, 2015).

1.1.4.2 Substantial teaching, administrative and service duties

A persistent barrier to the career development of ECAs is a heavy workload, which comprises extensive undergraduate teaching, course material preparation, as well as service and administrative tasks. The occurrence of this challenge among ECAs has been observed in studies conducted across the world for example, in Australia (Hemmings, 2012; Price *et al*., 2015; Bosanquet, Mailey, Matthews & Lodge, 2017; Wyllie *et al*., 2019), Canada (Acker & Webber, 2017), Europe (Caretta *et al*., 2018; Sawarkar, Scherz-Shouval, Denzel & Saarikangas, 2018; Susi, Shalvi & Shrivinas, 2019), Malaysia (Adi Badiozaman, 2020), the UK (Adcroft & Taylor, 2013), and the USA (Trower & Gallagher, 2010; Powell, 2016). In Africa, this challenge has been observed in studies conducted predominantly in South Africa (Petersen & Gravett, 2000; Van Staden *et al*., 2001; Christiansen & Slammert, 2006; Prozesky, 2008; Zulu, 2013; Subbaye & Dhunpath, 2016; Pithouse-Morgan *et al*., 2016) and a few others in Ghana (Tsikata, 2007) and Uganda (Ssempebwa *et al*., 2016).

ECAs are well aware that in addition to their substantial teaching, administrative and service responsibilities, they are expected to undertake research and publish in prestigious journals (Fitzmaurice, 2013; Müller, 2014; Smart & Loads, 2016; Hollywood *et al*., 2019; Osbaldiston, Cannizzo & Mauri, 2019). The dilemma that ECAs face as they strive to accomplish all the academic responsibilities assigned to them is suitably expressed by McKay and Monk (2017:1260): "ECAs are expected to teach courses where new knowledge is required, complete administrative tasks in systems that are not easy to navigate and apply for grants in processes they do not yet fully understand or qualify". The expectation to simultaneously serve many masters exerts significant pressure on ECAs in terms of time management and task prioritisation (Greene, O'Connor, Good, Ledford, Peel & Zhang, 2008; Geber, 2009; Trower & Gallagher, 2010). As a result, ECAs tend to work long hours, including after-office hours and weekends (Price *et al*., 2015). Also, the relentless pressure arising from competing demands and responsibilities leads to anxiety (Petersen, 2011; Osman & Hornsby, 2016), stress (Barkhuizen & Rothamann, 2008; Vajoczki, Biegas, Crenshaw, Healey, Osayomi, Bradford & Monk, 2011; Mark & Smith, 2012), burnout (Foote, 2010; Watts & Robertson, 2011; Susi *et al*., 2019), job dissatisfaction (Archer, 2008; Matthews, Lodge & Bosanquet, 2014; Hollywood *et al*., 2019) and reduced productivity (Adcroft & Taylor, 2013; Pithouse-Morgan *et al*., 2016) among ECAs. Hence, Toffoletti and Starr (2016) contend that the achievement of a sustainable work-life balance by an ECA is not plausible, considering that Crabtree and Shiel (2019) liken a career in academia to a treadmill.

If an ECA's time is consumed by substantial teaching and course-preparation loads, service and administrative responsibilities, and these take precedence over research, his/her career progression will be curtailed (Bazeley, 2003; Laudel & Gläser, 2008; McAlpine, Amundsen & Turner 2014; Acker & Webber, 2017; Osbaldiston *et al*., 2019). The limitation in the career development of ECAs would occur because they would not have, built a track record of scholarly publications (Kaya & Weber, 2003; Callaghan, 2016; Castelló, McAlpine & Pyhältö, 2017), secured research grants (Hesli & Lee, 2011; Horodnic & Zaiţ, 2015; Sutherland, 2017; Adi Badiozaman, 2020), or supervised the research of postgraduate students' (Dobele *et al*., 2014; McKay & Monk, 2017; Hollywood *et al*., 2019). Besides, a heavy workload may mean that ECAs cannot find the time to attend professional development training sessions or engage in networking, which are both critical components for career development (Price *et al*., 2015; Wyllie *et al*., 2019).

1.1.4.3   *Lack of teaching experience*

Despite the fact that ECAs are very often responsible for teaching large classes (Osman & Hornsby, 2016; Subbaye & Dhunpath, 2016; Ssempebwa *et al*., 2016), lack of experience in teaching is a common challenge that ECAs have been found to face (Waxman, 1992; Trower & Gallagher, 2010; Petersen, 2011; Remmik, Karm, Haamer & Lepp, 2011). In addition, ECAs have limited access to teaching materials and equipment, coupled with a lack of information on how to access these resources (McAlpine *et al*., 2014).

1.1.4.4   *Lack of research funding*

Although ECAs are expected to conduct research as part of their academic responsibilities, they are globally confronted by a dwindling pool of research funding. The availability of research funding has become even more precarious due to the coronavirus pandemic that has disrupted the global economy (Vilakazi, 2020). The lack of research funding for ECAs has been reported in studies undertaken in Australia (Bazeley, 2003; McKay & Monk, 2017), China (Cao & Suttmeier 2001), Europe (Bauer, 2005; Cismaş & Florian, 2005; Lola, 2005; Herlenius, Perrson &Wefer, 2005; Susi *et al.*, 2019), South Africa (De Villiers & Steyn, 2009), and the USA (Monastersky, 2007; Bartels, Lebowitz, Reynolds, Bruce, Halpain, Faison & Kirwin, 2010; Powell, 2016; Tong, Madhur, Rzeszut, Abdalla, Abudayyeh, Alexanderson, Buber, Feldman, Gopinathannair, Hira, Kates, Kessler, Leung, Raj, Spatz, Turner, Valente, West, Sivaram, Hill, Mann & Freeman, 2017). Hence, the lack of research funding limits their research endeavours and, subsequently, their career progression.

Research grants enable academics to grow a research career (Angervall *et al.*, 2015; Smith & Chudleigh, 2016) by supporting research production in a number of ways. Research grants are used to establish research laboratories (Garrison & Deschamps, 2014) by for example, acquiring research assistants (Teodorescu, 2002; Trower & Gallagher, 2010; Conn *et al.*, 2018) and research materials and equipment (Cox, 2011; Adcroft & Taylor, 2013). Moreover, research grants are used to fund participation in conferences (Hesli & Lee, 2011; Price *et al.*, 2015; Baker, 2016; Koelkebeck, Stefanovic, Frydecka, Palumbo, Andlauer, Riese, Jovanovic & Da Costa, 2019) and time away from teaching duties so that an academic can focus on research activities (Jagsi, Motomura, Griffith, Rangarajan & Ubel, 2009; Foote, 2011; Dobele *et al.*, 2014; Spurling, 2015; Browning *et al.*, 2017)

1.1.4.5 *Lack of mobility opportunities*

Scarcity, or a lack, of mobility opportunities pose an added constraint to ECAs in building their career. This challenge has been confirmed by studies undertaken in China (Cao & Suttmeier, 2001) and Croatia (Prpić, 2000). In instances where mobility opportunities are available, it is difficult for ECAs, particularly females, to use these due to family responsibilities (Shaumann & Xie, 1996; Ward & Wolf-Wendel, 2004; Campion & Shrum, 2004; Shen, 2013). Some female academics are unable to leave their family behind, so they forego these opportunities (Akinsanya, 2012). The decision to be internationally mobile is therefore not only a personal one, but it is influenced by the views of other parties – such as a life partner, spouse or close family relations – who may dissuade female ECAs from taking up the opportunity to travel for work (Ramos & Bosch, 2012). A study by Campion and Shrum (2004) of female scientists in India, Kenya and Ghana established that they are less internationally mobile than male scientists.

Female ECAs who choose to take their families along when they travel for work, have to consider whether the culture of their destination country is gendered (Ramos & Bosch, 2012), and find accessible, affordable child-care services and schools. In some instances, securing job opportunities for accompanying spouses of these female ECAs, may prove to be problematic (Leemann, 2010; Ramos & Bosch, 2012; Toader & Dahinden, 2018). Furthermore, balancing work and family responsibilities may be more challenging to the female ECAs due to the absence of support networks from extended family members such as grandmothers and aunts (Saltford, 2005). Fittingly, Ramos and Bosch (2012) point out that "[a]ny type of mobility (short-term or long-term) shapes the life-course and the daily life of professional women".

Besides the challenge of family responsibilities, female ECAs – particularly those in STEM fields – experience difficulties finding female academics or researchers as international collaborators, due to their under-representation in STEM (Zippel, 2017). Consequently, these female scientists do not benefit from research or education opportunities in institutions abroad and are instead "subject to educational and research localism" (Campion & Shrum, 2004:472) which then leads to them to have limited professional networks. The importance of mobility in academic career development is discussed in detail in the next chapter.

1.1.4.6   *Balancing work and family responsibilities*

Balancing work and family responsibilities has been highlighted as another obstacle to the career development of ECAs (H. Johnson, 2016; Hartmann, Sundermann, Helton, Bird & Wood, 2018). The imbalance in responsibilities occurs because the early-career phase overlaps with the stage when ECAs plan their lives, establish life partnerships through for example marriage (Ramos & Bosch, 2012) and the family establishment stage (Riordan & Louw-Potgieter, 2011; Friesenhahn & Beaudry, 2014; Chen, Sandborg, Hutchins, Sanford & Bachrach, 2016). Female ECAs face this challenge more so than male ECAs (European Comission, 2012): for them, the early-career period is considered a "turning point" (Toader & Dahinden, 2018:67), as it coincides with the age range biologically most suitable for women to bear children (Campion & Shrum, 2004; Holmes & O'Connell, 2007; Akinsanya, 2012; Cochran *et al.*, 2013; Sawarkar *et al.*, 2018).

1.1.4.7   *Limited job opportunities and job insecurity*

ECAs also have to contend with limited job opportunities (Le Grange, 2005; Price *et al.*, 2015; Vilakazi, 2020), which stems from an oversupply of graduates (Åkerlind, 2009; Maher & Anfres, 2016; Subbaye & Dhunpath, 2016). The reduced provision of funding to HEIs by governments restricts the number of academics that HEIs can appoint (Jones, 2007; Berg, Huijbens & Larsen, 2016), thus further compounding this challenge. The restriction in available jobs leads to intense competition between ECAs and their peers or other more experienced colleagues (Åkerlind, 2009; Price *et al.*, 2015).

Those ECAs who are fortunate to secure employment may still experience job insecurity, since they concurrently occupy part-time positions in different institutions, or work in a single institution in casual, part-time, short-term or contract positions (Bennion & Lock, 2010; Kaplan, 2010; Scaffidi & Berman, 2011; Waaijer *et al.*, 2017; Prozesky & Mouton, 2019). Such non-permanent positions are a hindrance to the long-term career planning of ECAs, because they lack

the social and occupational safety nets associated with permanent positions. For example, these positions lack paid sick and annual leave or lack access to work resources, such as office space, printers, telephones and personal computers (Price *et al.*, 2015). Because ECAs have to get by with casual and short-term positions (Caretta *et al.*, 2018), it places them under pressure to be awarded fellowships and grants to fund their present positions or progress in their careers in the shortest time possible (Price *et al.*, 2015). Cao and Suttmeier (2001) highlight that when job opportunities in academia are abundant, ECAs can secure stable employment. This, in turn, boosts their career fulfilment, as they are more motivated to engage in teaching and research activities, which in turn enhances their career progression (Cao & Suttmeier, 2001).

The job insecurity faced by many ECAs is further complicated by, on the one hand, conflicting advice on – and unclear requirements for – promotion (Smith *et al.*, 2016; Chen *et al.*, 2016; Maddrell *et al.*, 2019; Susi *et al.*, 2019). The ambiguity in HEIs on information concerning promotion has been referred to by some ECAs as "archery in the dark" (Trower & Gallagher, 2010:21). On the other hand, the application of "one size fits all prescribed individual performance targets", particularly concerning the publication of scholarly articles, is perceived by ECAs as setting the performance bar unreasonably high (Pithouse-Morgan *et al.*, 2016:10). The ambiguity in requirements includes which peer-reviewed journals are preferable to publish in; how many scholarly articles or books need to be published; how much in monetary value of grants needs to be raised; what is the best teaching-assessment score; what type of committees are considered valuable to participate in; and what is an acceptable timeframe to achieve all the aforementioned (Waxman, 1992; Trower & Gallagher, 2010; Sutherland, 2017). Thus, Maddrell *et al.* (2019) emphasise that eligibility requirements for promotion need to be transparent to provide equal opportunity to ECAs.

1.1.4.8   *Lack of key skills*

Lastly, ECAs tend to lack skills and training opportunities in other essential career aspects, such as time management (Geber, 2009; Osbaldiston *et al.*, 2019), negotiation (Tong *et al.*, 2017), conflict management (Taherian & Shekarchian, 2008) and career planning (Hemmings, 2012). In addition, ECAs lack skills in grant writing and management (Sawarkar *et al.*, 2018), scientific writing (Stanley, Hom, Chu & Joiner, 2017), stakeholder management (Conn *et al.*, 2018), and team management (Sawarkar *et al.*, 2018).

Ultimately, ECAs who choose to pursue an academic career and endure these challenges may have minimal, if any, prospects for career advancement if they do not receive support to overcome

these challenges (Austin, 2002; Stephan, 2008). Hence, it is the responsibility of HEIs to build and maintain an environment that nurtures ECAs so that they can develop and succeed in their academic careers and to ensure that ECAs are retained in the profession (Henkel, 2004; Herlenius *et al.*, 2005; Martinez *et al.*, 2007; Waddell, Martin, Schwind & Lapum, 2016; Browning, Thompson & Dawson, 2017). An example of how HEIs can achieve this is through career-development policies that must include measures such as provision of mentoring to guide ECAs through the critical formative years of their career (Sawarkar *et al.*, 2018).

1.1.5   Mentoring as a human resource development tool

It is evident from the preceding discussions that support for the career development of academics who are female and at an early-career stage is critical for ensuring their equitable participation in academia and sustainability of the academic enterprise. An examination of the challenges has revealed that three of them affect the career development of both female academics and ECAs. These are, namely, lack of mentoring, balancing work and family responsibilities and substantial teaching, administrative and service responsibilities. Therefore, this dissertation's primary focus is mentoring as a human resource development tool (Hezlett & Gibson, 2005). Mentoring can support the career development of individuals with this dual academic status of female and early-career (McGuire & Reger, 2003; Gardiner *et al.*, 2007; Schmidt & Faber, 2016) by enabling them to navigate and surmount all the other career challenges that they face, and in taking advantage of career opportunities as detailed in the following subsections.

1.1.5.1   *Advantages of mentoring early-career academics*

Numerous scholars[7] have established that mentoring is a vital tool, since it has manifold benefits for ECAs' career advancement. Mentoring is recognised as a key tool that gives ECAs "a leg up" (B. Johnson, 2016:6), by ushering and inducting them into academia (Remmik *et al.*, 2011; Specht, 2013; B. Johnson, 2016; Caretta *et al.*, 2018; Adi Badiozaman, 2020); and transitioning them from a graduate student into faculty member (Geber, 2009). Mentors create a supportive academic

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[7] Taljanovic, Hunter, Krupinski, Alcala, Fitzpatrick & Ovitt, 2003; Schrubbe, 2004; Hardwick, 2005; Daley, Wingard & Reznik, 2006; Kosoko-Lasaki, Sonnino & Voytko, 2006; Gardiner *et al.*, 2007; Thorndyke, Gusic, George, Quillen & Milner, 2006; Kahn & Greenblatt, 2009; Ali & Coate, 2013; Iversen, Eady & Wessely, 2014; Holliday, Jagsi, Wilson, Choi, Thomas & Fuller, 2014; Ansmann, Flickinger, Barello, Kunneman, Mantwill, Quilligan, Zanini & Aelbrecht, 2014; Cossa, Buque & Fringe, 2016; Muschallik & Pull, 2016; Ackerman, Hunter & Wilkinson, 2018; Efstathiou, Drumm, Paly, Lawton, O'Neill & Niemierko, 2018.

climate for ECAs (Trower & Gallagher, 2010) and impart knowledge and insight to the mentees' careers (Conn *et al*., 2018; Wyllie *et al*., 2019).

Furthermore, mentors offer a "listening ear" and act as sounding boards to mentees (Herlenius *et al*., 2005; Ugrin, Odom & Pearson, 2008; Tettey, 2010; Hemmings, Hill & Sharp, 2013). Mentors also identify needed skills and impart new skills that ECAs require (Taherian & Shekarchian, 2008; Tong *et al*., 2017). Additionally, mentors inspire and assist ECAs in career planning and strategising (McCormack & West, 2006) through, for instance, drafting an individual development plan (Conn *et al*., 2018). Other arguments in favour of mentoring are that mentors provide access to networks (Lutter & Schröder 2016) which in turn facilitates the building of ECAs networks (Foran-Tuller *et al*., 2012) and enhances the visibility of ECAs among other academics within the network (Scaffidi & Berman, 2011). Mentors also provide feedback to their mentees regarding their work performance (Sawarkar *et al*., 2018). Mentoring guides ECAs in managing personal and institutional performance expectations (Hollywood *et al*., 2019) and in developing their professional character and identity (Ragins & Cotton, 1999; Steele & Fisman, 2014).

Mentoring fosters wellness in ECAs by offering advice on personal and professional matters, which prevents them from experiencing burnout (Bullough, 2005; Hobson, Ashby, Malderez, & Tomlinson, 2009), improves their self-confidence (Lindgren, 2005; Hemmings, 2012) and increases the ECAs' job satisfaction (Marable & Raimondi, 2007; Perry & Parikh, 2017). Furthermore, Conn *et al*. (2018) state that mentors assist ECAs in refining their research focus, identifying suitable funding sources, and locating and growing research collaborations. Finally, mentors support ECAs in developing their research knowledge and skills in aspects such as data collection, data analysis, scholarly writing, research presentation and grant application (Schmidt & Faber, 2016; Pinto da Costa, Oliviera & Abdulmalik, 2018).

1.1.5.2   *Advantages of mentoring female academics*

Mentoring enables female academics to excel in their careers (Mukhwana *et al*., 2020) through three key routes. First, mentoring empowers female academics by raising their awareness of promotion requirements (Prozesky, 2006). Second, mentoring increases and supports their participation in academia through offering advice on work-life balance (Gaidzanwa, 2007; Foote & Solem, 2009; Howe-Walsh & Turnbull, 2016) and management of priorities (Bettinger & Long, 2005; Misra *et al*., 2011). Third, it creates a supportive and collegial academic environment for female academics (Maddrell *et al*., 2019). Such a collegial environment enables female academics

to overcome the various career challenges already discussed (August & Waltman, 2004; Christiansen & Slammert, 2006; Singh, Ragins & Tharenou, 2009).

Similarly, mentoring supports female academics in making key career decisions (Caretta *et al*., 2018), such as applying for a position in a higher rank, or with better conditions of employment (Maddrell *et al*., 2019). Lastly, mentoring supports female academics in increasing their production of scholarly articles (Dobele *et al*., 2014; Obers, 2014). The enhancement of research production through mentoring occurs by firstly developing their research skills, of both a "soft" and technical nature (Schulze, 2010; Schmidt & Faber, 2016). Secondly, mentoring provides access to wider networks from which useful collaborations can be forged or information and contacts can be obtained (Obers, 2014; Meschitti & Smith, 2017). Thirdly, mentoring improves their understanding on the critical role of conducting research and producing outputs in academic career progression (Baker, 2010).

1.2   Significance of the study

To build a gender-balanced and equitable academic community (Miegroet *et al*., 2019), it is appropriate for HEIs, as the key stakeholders, to create a work environment that nurtures the talents of female ECAs and supports their career development. However, HEIs in Africa cannot forge such an environment if they do not know the characteristics of these female ECAs, and the extent to which varied challenges have had a negative impact on their careers. Also, HEIs in Africa can utilise mentoring as a key tool to support female ECAs in their career development but, they first need to know whether female ECAs receive mentoring especially on aspects that are related to research output. Even though previous research has documented the powerful potential of mentoring through the vast array of benefits that it offers, very little is known on, the mechanisms and features on how mentoring works. Ragins and Kram (2007:4) in expressing this uncertainty assert, "we know it works; we are still grappling with why, when and how". Also, Ma *et al*. (2020:14077) articulate that, "[m]entorship is arguably a scientist's most significant collaborative relationship; yet of all collaborations, comparatively little research exists on the link between mentorship and protégé success".

Chaiyachati, Liao, Weissman, Morgan, Shea and Armstrong (2018) therefore emphasise that it is crucial to understand how mentoring in various aspects is related to relevant outcomes that are thought to determine career advancement in academia. However, as the next chapter demonstrates, studies conducted in Africa that examine the relationship between mentoring in specific aspects and relevant career outcomes are sparse. My study will be useful to the higher education sector at

large since it will fill four key gaps in knowledge on the career development of female ECAs in Africa. These gaps are the profile of female ECAs in Africa in terms of several characteristics, the extent of the negative impact of various challenges on their careers, whether they received mentoring, and the link between mentoring and their career outcomes.

1.3 Aim and objectives of the study

The overall aim of this study is to understand the role of mentoring in the career outcomes of female ECAs in Africa. More specifically, the objectives of this research are to:

- provide a profile of female ECAs in Africa;
- establish the extent to which various challenges have, according to female ECAs, negatively impacted their careers;
- assess the extent to which female ECAs have received mentoring in seven career aspects, namely: career decisions, attaining a position/job, introduction to research networks, research methodology, fundraising, scientific writing and presentation of research results; and
- investigate the possible influence that mentoring of female ECAs in a selection of academic career aspects has had on their academic career outcomes that are relevant to those aspects.

1.4 Research methodology

This study entails a secondary analysis of existing data, which researchers have previously collected as part of a project called 'Young Scientists in Africa' (YSA). The YSA project followed a mixed methods research approach, particularly the explanatory sequential design, which I also applied. I made this decision because a mixed methods approach would enhance my study by combining analysis of quantitative and qualitative data to provide a more comprehensive understanding of the research problem. In particular, the qualitative data were useful to explain, contextualise and illustrate the results from the analyses of the quantitative data. The quantitative data were collected using a questionnaire, whereas the qualitative data were collected using semi-structured interviews conducted on a selected sub-sample of survey respondents.

1.5   Synopsis of the dissertation chapters

This section outlines the six chapters that comprise the remainder of the dissertation and summarises the content in each of the chapters.

Chapter 2: A review of literature on the significance of research production, empirical findings on factors influencing research production and conceptual frameworks on academic career development and mentoring

The second chapter provides a review of the empirical and theoretical literature that is deemed relevant to the study's aims and objectives. The chapter commences by further expounding the relationship between research production and academic career development. It then progresses with a review of factors that have been found to facilitate the research production of ECAs. The discussion on factors starts with a detailed exploration of mentoring, and thereafter mobility, networks, collaboration and research funding. The chapter concludes with a discussion on the conceptual and theoretical frameworks that guide this study, beginning with a definition of the term "career". This is followed by an exploration of what academic career development encompasses, a description of the early phase in an academic career, and a review of different theoretical perspectives on mentoring and how it has been found to relate to career outcomes.

Chapter 3: Research methodology – secondary analysis of data following a mixed methods approach

This chapter describes the methodology that was used for this research. It includes a description of the strategies, designs, and methods used to collect the existing data and the methods I used in the selection, processing, and analysis of those data. The chapter starts with an explanation of how secondary data were used to address the study's research questions and the challenges encountered in undertaking secondary analysis. Next, it discusses the overarching mixed methods research strategy employed to produce the existing data. It presents arguments in favour of using data produced through mixed methods research, specifically to address the research questions of this study. The chapter concludes with a description of the quantitative and qualitative research strands that formed part of the mixed-methods design. For each of the two strands, the research design and the methods that were originally used to produce the existing data are explained, and those methods used for the secondary processing and analysis of data are described.

Chapter 4: Female early-career academics in Africa – a profile of survey respondents

Chapter four is the first of three chapters that present the results of the analysis of the secondary data. This chapter describes the profile of the female ECAs for which data were available, according to various features grouped into seven major categories. These categories include demographic background, field of specialisation, employment, research output, funding, international mobility, collaboration with other researchers and lastly, tasks occupying working time.

Chapter 5: Impact of challenges on the careers of female early-career academics in Africa

Chapter five is the second results chapter and it provides a quantitative description of the extent to which female ECAs perceived a set of challenges as having had a negative impact on their careers. These challenges are lack of mentoring, balancing work and family demands, lack of research funding, lack of funding for research equipment, lack of training opportunities to develop professional skills, and lack of mobility opportunities. Additionally, I present the results of analysis that I conducted to determine whether the perceived extent of the negative impact of various challenges on female ECAs' careers differs across fields.

Chapter 6: Mentoring received by female early-career academics and its relationship to their career outcomes

In this third and last results chapter, I present two sets of results. The first set of results is descriptive and focuses on whether female ECAs had or had not received mentoring in seven aspects of an academic career. These aspects are fundraising, making career decisions, attaining a position/job, being introduced to research networks, presentation of research results, scientific writing, and research methodology. Furthermore, I present the results of analysis that I conducted to determine whether mentoring that was received or was not received in a specific aspect differs across fields. The second set of results focuses on the relationship between having been mentored on five aspects on the one hand, and a selection of career outcomes in academia on the other. The five aspects include mentoring by being introduced to research networks, as well as mentoring in research methodology, scientific writing, presentation of research results and, lastly, fundraising. The career outcomes include the publication of articles in peer-reviewed journals, international mobility, collaboration, receipt of research funding, and presentations at academic conferences.

Chapter 7: Conclusions and recommendations

Chapter seven concludes the dissertation with a summary of the main empirical findings of the research and offers conclusions based on those findings. Thereafter, this chapter highlights the study's contributions to the body of knowledge on mentoring and career development of female ECAs and underscores the study's limitations. Finally, the chapter ends with a discussion of the recommendations for future research that can advance this knowledge further. In this chapter, the findings are also implemented in the form of recommendations to inform interventions, such as policies or strategies aimed at the career development of female ECAs.

Chapter 2: Review of the relevant literature and outline of conceptual frameworks

2.1 Introduction

The purpose of this chapter is two-fold. First, it presents previous research on the significance of research production and factors influencing research production. Secondly, it presents conceptual frameworks for academic career development and mentoring. I commence this chapter by highlighting the significance of research production in the career development of academics. It is essential to do so because this study focuses on the career outcomes of female ECAs that are particularly related to research production. Thereafter, I explore factors that have been found to facilitate the research production of ECAs. I begin the discussion on factors with a detailed exploration of mentoring as a factor that reportedly enhances research production and, in the process, also possibly facilitates the achievement of ECAs' career outcomes. Next, I examine other factors specifically research funding, networks, collaboration and mobility, for two important reasons. One is that these four factors are documented in the literature as having a positive effect on research production. Two, these four factors are related to mentoring in the sense that they are aspects on which ECAs could receive mentoring and are possible outcomes of receipt of mentoring. Lastly, I examine conceptual frameworks on academic career development and mentoring. This entails defining the term "career", discussing what academic career development is comprised of, describing the early phase of the academic career, and reviewing conceptual frameworks on mentoring and how mentoring is thought to influence career outcomes.

2.2 Significance of research production in academia

Research production refers to the generation of research outputs, in other words, products that originate from academic research (Long & Fox, 1995). These include articles in peer-reviewed journals, conference papers, book chapters, books and patents (Xie & Shaumann, 1998; Kaya & Weber, 2003; Hesli & Lee, 2011; Callaghan, 2016; Hollister, 2016). HEIs in countries such as Australia (Bentley, 2011), Canada (Nakhaie, 2002), Malaysia (Zyoud, Al-Jabi, Sweileh & Awang, 2014), the Netherlands (Leišytė, 2016), South Africa (Prozesky, 2008), Spain (Albert, Davia & Legazpe, 2016), Sweden (Angervall & Beach, 2017), the UK (Barrett & Barrett, 2010) and the USA (Moore, Aref, Manyibe & Davis, 2016) consider research production as the most critical factor in advancing one's academic career. Van Eck Peluchette and Jeanquart (2000:554)

emphasise the significance of research production when they state: "[a]dvancement, therefore, depends more on the number of publications one is able to produce".

Whitley (1984), in his analysis of the dynamics of the contemporary science system in which academics work, argues that the key driver of the contemporary sciences is the production of novel knowledge and innovations or improvement of previously produced knowledge. Modern science is further guided by the ethos of communism and disinterestedness (Merton, 1973). The ethos of communism stipulates that the knowledge produced by academics belongs to the community and so must be openly shared. The ethos of disinterestedness stipulates that science must be free of bias as far as possible and must be undertaken for — and should contribute to — the greater good of science and not only for the interest of oneself (Merton, 1973). Consequently, the production of research outputs, such as articles in peer-reviewed journals, is a highly regarded measure of scholarly achievement, because it builds an academic's reputation (Nakhaie, 2002; Perumal, 2003; Kaya & Weber, 2003; Aiston & Jung, 2015; Albert *et al*., 2016) and positively influences the ranking and reputation of his/her HEI (Horodnic & Zaiţ, 2015; Leišytė, 2016). For reputation building to occur, the new knowledge created must be of a quality that can influence other academics to either produce novelties or improve on the research that they are currently conducting (Whitley, 1984) and must be openly shared with other academics as dictated by the communism ethos. However, the mode of reputation building in academia prioritises the individual academic and goes against the ethos of disinterestedness.

Science and its norms are universal and thus, academics in Africa are not exempt but are expected to prove their worth, skills and rigour through production of research outputs (Teferra & Altbach, 2004; Oloruntuba & Ajayi, 2006; Ajegbomogun & Popoola, 2013). Research production subsequently determines their career trajectory and eminence in a discipline (Prozesky, 2006; Long, Plucker, Yu, Ding & Kaufman, 2014; Opesade *et al*., 2017). Interestingly, the importance of research outputs in the career development of academics has led to the rise of a culture of "publish or perish" (Wilson, 1942, cited in Garfield, 1996). This culture leads to questionable research practices, such as "salami slicing", whereby some academics publish as many scholarly articles as possible, regardless of quality (Larivière & Costas, 2016:2), and some of these articles make no genuine contribution to knowledge (De Rond & Miller, 2005). Following this discussion on the significance of research production, the next section focuses on factors that facilitate the production of research outputs.

2.3 Facilitators of research production

Previous studies have documented various factors that are facilitators of research production for female academics and ECAs. A selection of these factors which include mentoring, mobility, networks, collaboration and research funding, as well as the various challenges that ECAs face in relation to these factors, are discussed in this section. The first factor, mentoring, is the main focus of this study, which examines the role of mentoring in the career outcomes of female ECAs. The other factors are related to mentoring in that they are hypothesised to be career outcomes of receipt of mentoring on relevant aspects.

2.3.1 Mentoring

Mentoring is traditionally defined as an interpersonal relationship (Higgins & Kram, 2001; Kram, 1985 cited in Ragins & Kram, 2007) whereby an experienced individual, who is the mentor, guides a mentee by providing advice for personal and professional development (Okurame, 2008; Henwood, Bartlett & Carroll, 2011; Meschitti & Smith, 2017). Wanberg, Welsh and Hezlett (2003:41) describe mentoring as "…the most intense and powerful one on one developmental relationship, entailing the most influence, identification, and emotional involvement". Specific to academia, B. Johnson (2016:27) defined mentoring as follows:

> Mentoring is a personal and reciprocal relationship in which a more experienced (usually older) faculty member acts as a guide, role model, teacher, and sponsor of a less experienced (usually younger) student or faculty member. A mentor provides the mentee with knowledge, advice, counsel, challenge, and support in the mentee's pursuit of becoming a full member of a particular profession.

Mentoring is used as a human resource development tool (Hezlett & Gibson, 2005) for career management and advancement (Allen, Eby, Poteet, Lentz & Lima, 2004; Koontz, Walters & Edkin, 2019). Zulu (2003:103) aptly emphasises the value of mentoring by stating that "successful people have mentors during their careers". The ultimate aim of mentoring is to forge an environment free of judgment, and foster empowerment between a mentor and mentee so that they both succeed in their professional and personal lives (Perry & Parikh, 2017). A mentor and mentee can be located in similar or different institutions (Burke & McKeen, 1990), and within academia, mentoring can occur between four sets of parties, namely faculty and undergraduate students; faculty and postgraduate students; senior academics and ECAs (McLaughlin, 2010); and between academics who are peers (Duranczyk, Madyun, Jehangir & Higbee, 2011; Varkey, Jatoi, Williams,

Mayer, Ko, Files, Blair & Hayes, 2012; Gregoric & Wilson, 2015; Schmidt & Faber, 2016). There can generally be said to be two types of mentoring, as discussed in the following subsection.

2.3.1.1   Types of mentoring

Customarily, mentoring is classified as either formal or informal (Gardiner *et al.*, 2007; Muschallik & Pull, 2016; Lunsford, Crisp, Dolan & Wuetherick, 2017).

- **Formal mentoring**

Formal mentoring is initiated by an institution as a support mechanism for the professional growth of its members (Johnston & McCormack, 1997; Quinlan, 1999; Ortiz-Walters, 2009; Steele & Fisman, 2014), whereby a senior and experienced individual is assigned and acts as a mentor to a mentee who is a junior, and usually less experienced, individual (Ragins & Cotton, 1999; McLaughlin, 2010; Trower & Gallagher, 2010; B. Johnson, 2016). Ehrich and Kimber (2016:14) describe formal mentoring as "…an interventionist strategy modelled on the processes and activities of informal mentoring". As a result, formal mentoring is endorsed by the institution's leadership so that the interactions between the mentor and mentee are explicitly recognised as mentoring (Elby, Rhodes & Allen, 2007) and so that the expectations to be met are officially outlined (Leslie, Lingard & Whyte, 2005; Foote & Solem, 2009; Gregoric & Wilson, 2015) and the outcomes are evaluated (B. Johnson, 2016).

Formal mentoring occurs within a set period, at the outset of which goals are identified and agreed upon (Ragins & Cotton, 1999). Traditionally, formal mentoring has taken the form of a dyad, in which the interaction is hierarchical in nature and occurs between a pair of individuals (Quinlan, 1999; Okurame, 2008; Darwin & Palmer, 2009; Meschitti & Smith, 2017). In formal mentoring, the skills and knowledge of the mentor may be matched with the interests and needs of the mentee by a third party (Elby, Rhodes & Allen, 2007; Schmidt & Faber, 2016). The activities and interactions within a formal mentoring relationship are set up through an orientation programme, directed by a structured programme and strengthened through the mentee's training in different skills (Meschitti & Smith, 2017).

Formal mentoring has both advantages and disadvantages. A key benefit of formal mentoring is its enhancement of equity in terms of access to mentoring opportunities, particularly for female academics (Eliasson *et al.*, 2000; B. Johnson, 2016). Access to mentoring opportunities is crucial for female academics because, in comparison to male academics, they have limited access to networks that could be leveraged for mentoring purposes (Johnston & McCormack, 1997; Eliasson

et al., 2000; Leslie *et al.,* 2005; Okurame, 2008; Meschitti & Smith, 2017). A criticism of formal mentoring is that it implies an asymmetrical power dynamic (Wasburn, 2007) that assumes that knowledge transfer is unidirectional, therefore only occurring from the mentor to the mentee (Driscoll, Parkes, Tilley-Lubbs, Brill & Pitts Bannister, 2009; Ortiz-Walters, 2009). Another disadvantage of formal mentoring is that it requires monitoring to assess whether the set objectives are being met (Trower & Gallagher, 2010). Additionally, the structure of formal mentoring mainly supports passive participation rather than pro-activeness by the mentee (Boice, 1992). Finally, Eliasson *et al*. (2000) highlight that, in contrast to informal mentoring, formal mentoring does not provide sponsorship and visibility opportunities, even though these have a significant role to play in career development.

- **Informal mentoring**

Informal mentoring is instinctively established when individuals proactively decide to enter into a reciprocal relationship (Ragins & Cotton, 1999; Wanberg *et al.*, 2003; McLaughlin, 2010; Gregoric & Wilson, 2015). The key distinguishing feature of informal mentoring is that it is entered into discretionarily with no external influence and with mutual commitment and agreement (Leslie *et al*., 2005; Schulze, 2009, Trower & Gallagher, 2010; B. Johnson, 2016). The mentor and the mentee in informal mentoring may also have shared interests (Meschitti & Smith, 2017).

Advocates of informal mentoring highlight that those who participate in an informal mentoring relationship are usually well suited for each other, since they self-select (Leslie *et al*., 2005; Ackerman *et al.*, 2018). Moreover, informal mentoring does not usually have set timeframes and can occur over a longer time than formal mentoring, which benefits the mentee's career development (Ehrich, 2013). Informal mentoring has the added advantage of flexibility in comparison to formal mentoring because the aims of the relationship can change with time, based on the needs of the mentor and mentee (Ragins & Cotton, 1999). A drawback of informal mentoring is that it is not possible to monitor the relationship, which makes accountability and evaluation of its failures and triumphs difficult (Trower & Gallagher, 2010). Also, informal mentoring is voluntary and casual, and therefore female academics may be excluded (Smith, Calderwood, Storms, Lopez & Colwell, 2016). Lastly, because female academics have smaller networks than men and sometimes experience isolation in their work environment, opportunities that would enable them to initiate this type of mentoring may be limited (Quinlan, 1999; Wasburn, 2007). Having explored the two major types of mentoring, the following subsection delves into

the relationship between mentoring and research production, since, as discussed previously in section 2.2, the latter is a critical determinant of career development in academia.

2.3.1.2   *Mentoring and research production: the connection*

Burke and McKeen (1990:318) state that mentors "help their proteges learn the ropes and adapt to organisational expectations", which displays the relevance of mentoring female ECAs, since research production is an expectation that they are expected to meet. Some important outcomes of mentoring of ECAs include increasing the number of scholarly publications (B. Johnson, 2016) and grants secured (Palepu, Friedman, Barnett, Carr, Ash, Szalacha & Moskowitz, 1998; B. Johnson, 2016). Concerning female academics, mentoring facilitates the publication of scholarly articles (Schor, 1997; Turnbull & Roberts, 2005; Athanasiou, Patel, Garas, Ashrafian, Shetty, Sevdalis, Panzarasa, Darzi, & Paroutis, 2016), and networking and collaboration (Varkey *et al.*, 2012).

Mentoring has been found to result in increased research outputs by mentees (Schor, 1997; Kirchmeyer, 2005; Sambunjak, Straus & Marusić, 2006; B. Johnson, 2016). The enhancement of research production through mentoring occurs in various ways. Mentees can receive training in and master research-related skills and aspects (Mullen, 1994). These skills include research design and methods (Waddell *et al.*, 2016; Ackerman *et al.,* 2018); data analysis techniques (Reynolds, Martin, Ryan, Dahl, Pilkonis, Marcus, & Kupfer, 1998; Straus, Chatur & Taylor, 2009); scholarly writing (Reynolds *et al.*, 1998; Ambler, Harvey & Cahir, 2016; Freel, Smith, Burns, Downer, Brown & Dewhirst, 2017); and drafting and reviewing of manuscripts (Zulu, 2003).

Mentees are also trained in other aspects of academic life, such as time management (Geber, 2009); identification of suitable journals for publication of articles (Thanacoody *et al.*, 2006); and writing grant applications (McGuire *et al.*, 2004; Ugrin *et al.,* 2008; Darwin & Palmer, 2009; Varkey *et al.*, 2012; Ambler, Harvey & Cahir, 2016). Besides training, mentors stimulate the mentee's research interest (Johnston & McCormack, 1997), offer information on prospects of research projects (Levinson *et al.*, 1991; Bauer, 2005), and provide advice on choice, planning and implementation of research projects (Brown *et al.*, 2009). Additionally, mentors direct mentees towards funding opportunities (Brown *et al.*, 2009), review mentees' research proposals (Reynolds *et al.*, 1998), and assist mentees in finding research collaboration opportunities (Muschallik & Pull 2016; Ackerman *et al.,* 2018). Finally, mentoring is essential to ECAs because mentors introduce mentees to networks within and outside of their disciplines and HEIs (Kahn & Greenblatt, 2009; Brown *et al.*, 2009; Sambunjak, Straus, & Marusić, 2009; Duranczyk *et al.*, 2011; Kaderli, Muff,

Stefenelli & Businger, 2011). The importance of networks as a facilitator of research production is discussed in section 2.3.3.

Of specific relevance to this dissertation is mentoring provided to African female ECAs on five aspects included in the questionnaire for the YSA project. These aspects are critical to an academic career because they enhance research production and possibly result in the achievement of specific career-related outcomes. The aspects include an introduction to research networks, research methodology, fundraising, scientific writing and presentation of research results. Being mentored on these aspects could lead to outcomes such as publication of articles in peer-reviewed journals, international mobility, collaboration, receipt of research funding and presentations at academic conferences. A search of the literature with a focus on mentoring of ECAs in Africa found fewer than ten studies. The first batch of five studies mainly centre around the role of mentoring in improving the teaching skills of ECAs. These studies were conducted in Ghana (Alabi & Abdulai, 2016), Nigeria (Udegbe, 2016), Uganda (Ssempebwa, Teffera & Bakkabulindi, 2016), and South Africa (Osman & Hornsby, 2016; Subbaye & Dhunpath, 2016).

The second batch of an even smaller number of studies (only two) demonstrated the relationship between mentoring of ECAs in specific aspects and achieving outcomes related to research production. The first study undertaken by Gureje, Seedat, Kola, Appiah-Poku, Othieno, Harris, Makanjuola, Price, Ayinde and Esan (2019) investigated fellowships provided to ECAs by an African research consortium (comprised of partners from Ghana, Kenya, Liberia, Nigeria and South Africa) on mental health. The fellowships were provided to the ECAs to receive mentoring, specifically on research methods and scholarly writing. At the end of the fellowships, it was reported that the ECAs who had been mentored were able to publish more journal articles, including some as first authors. In the second study, a mentoring programme was initiated in Cameroon by senior female academics in the health sciences to provide mentoring in research methodology and scholarly writing to female ECAs (Kwedi Nolna, Essama Mekongo & Leke, 2017). At the end of the mentoring programme, the female ECAs reported that they had secured international research fellowships, prepared conference paper abstracts from their research projects and received invitations to present at conferences.

A search of the literature on studies conducted beyond Africa identified several that found that mentoring had a positive effect on the research production of ECAs. These studies include Buddeberg-Fischer, Vetsch and Mattanza (2004); Gardiner *et al.* (2007); Blau *et al.* (2010); Cirasella and Smale (2011); Gregoric and Wilson (2015); Burns, Clayton, George, Mitchell and Gitlin (2015); Ambler *et al.* (2016); Freel *et al.* (2017); Browning *et al.* (2017); Ackerman *et al.*

(2018); Chaiyachati *et al.* (2018); Kirsch, Duran, Kaizer, Buum, Robiner and Weber-Main (2018); and Efstathiou *et al.* (2018). However, only four studies (Ambler *et al.*, 2016; Freel *et al.*, 2017; Kirsch *et al.*, 2018; Efstathiou *et al.*, 2018) specified the aspects in which the ECAs had received mentoring and that subsequently impacted their research production positively.

Regarding mentoring in scientific writing and fundraising, Kirsch *et al.* (2018) studied general internal medicine ECAs in the USA who had received mentoring as part of a career development programme. The mentees had been mentored on scholarly writing and grant writing, and an evaluation at the end of the programme revealed that the mean number of scholarly articles and mean number of grants acquired by the ECAs had increased from the years before and the year of the programme launch, to the succeeding years. However, the authors noted that the increase in scholarly production could not exclusively be attributed to the mentoring programme. Other studies conducted in the USA (Freel *et al.*, 2017; Efstathiou *et al.*, 2018) and Australia (Ambler *et al.*, 2016) examined the influence of mentoring ECAs in writing grant applications. The three studies established that the number of successful grant applications achieved by the ECAs increased after receiving mentoring. While Kirsch *et al.*'s (2018) study specifically highlighted the positive effects of a workshop on grant writing fundamentals, the other researchers did not indicate exactly what was involved in the mentoring that had had a positive effect on fundraising. Although mentoring is beneficial in various ways, it is not without challenges, as the subsequent subsection reveals.

2.3.1.3   Challenges associated with the mentoring of female academics and early-career academics

Even though mentoring has been established as a key support system for the research production and subsequent career development of female academics and ECAs, they may not receive mentoring, due to various reasons outlined below.

- **Lack of mentors or mentoring programmes**

Some HEIs lack mentors that can provide mentoring to female academics and ECAs (Ackerman *et al.*, 2018). The absence of mentors at HEIs in Africa could be attributed to brain drain, which is a result of African academics' emigration to other developed countries (Gaillard, 2003; Sawyerr, 2004; Teferra & Altbach, 2004; Tijssen, 2007; Beaudry, Mouton & Prozesky, 2018a) where HEIs offer better remuneration, infrastructure and standards of living (Nchinda, 2002; Gaidzanwa, 2007; Tettey, 2010; Guramatunhu-Mudiwa, 2010; Onah & Anikwe, 2016). Other studies (Sonnad & Colletti, 2002; Levine *et al.*, 2011; de Saxe Zerden, Ilinitch, Carlston, Knutson, Blesdoe &

Howard, 2015; Seemann, Webster, Holden, Moulton, Baxter, Desjardins & Tulin, 2016) have established that absence of mentoring programmes in HEIs is another reason why female ECAs do not receive mentoring. According to studies conducted in Nigeria by Okurame (2008) and in the USA by Efstathiou *et al.* (2018), the absence of mentoring programmes in HEIs was attributable to lack of funding.

- **Lack of knowledge on finding a mentor**

Female academics and ECAs lack knowledge on finding a mentor (Austin, 2002; Lola, 2005; Herlenius *et al.*, 2005; Whitworth *et al.*, 2008; Tettey, 2010). In instances where mentors are available, female academics and ECAs may still not receive mentoring. One explanation is that female academics, and ECAs do not know how to select a suitable mentor (Iversen *et al.*, 2014) or to initiate a mentoring relationship (Ragins & Cotton, 1991). The lack of knowledge could be attributed to low self-confidence (Okurame, 2008), a dread of rejection by prospective mentors (Ragins & Cotton, 1991), or an inherent fear of being labelled as needy and incompetent (Leslie *et al.*, 2005; Thomas, Lunsford & Rodrigues, 2015). The absence of orientation programmes at HEIs that could inform ECAs of existing mentoring programmes also explains why ECAs do not utilise available mentoring opportunities (Teferra, 2016).

Another explanation is that available mentors might be too busy (Turnbull & Roberts, 2005; Straus *et al.*, 2009; Levine *et al.*, 2011). Such a scenario is often the case in Africa, where many senior academics supplement their income by undertaking additional activities – such as private consultancies or part-time teaching at other institutions – that leaves them with no spare time to mentor ECAs (Nchinda, 2002; Sawyerr, 2004; Harle, 2013; Arthur & Arthur, 2016; Cossa *et al.*, 2016).

Particularly considering that mentoring is a time-intensive endeavour which some HEIs underestimate (Paice, Moss, Heard, Winder, & McManus, 2002), the lack of protected time for a mentor and mentee (Brown *et al.*, 2009), lack of incentives (such as compensation) (Luckhaupt, Chin, Mangione, Phillips, Bell & Leonard, Tsevat, 2005; Kashiwagi, Varkey & Cook, 2013) or lack of formal recognition for mentors (Ramani, Gruppen & Kachur, 2006; Steele, Fisman & Davidson, 2013; Morrison, Lorens, Bandiera, Liles, Lee, Hyland, Mcdonald-Blumer, Allard, Panisko, Heathcote & Levinson, 2014) hinder female ECAs from establishing relationships with available mentors.

- **Scarcity of senior female academics**

Although female academics perceive mentoring to be more pertinent to their professional development than male academics do (Turnbull & Roberts, 2005), studies have found that female academics experience more difficulty in establishing mentoring relationships (August & Waltman, 2004) or finding mentors than male academics do (Bryson, 2004; McKeen & Bujaki, 2007; Johnson, Xu & Allen, 2007). The scarcity of senior female academics who can act as mentors (as already discussed in the previous chapter) is to blame for these difficulties experienced by female academics in Africa (Akinsanya, 2012; Muthumbi & Sommerfield, 2015) and elsewhere (Koopman & Thiedke, 2005; Straus *et al*., 2009; Polkowska, 2013; Fakhr, Bianco & Bilal, 2016; Kerr, Armstrong & Cade, 2016).

An outcome of the scarcity of female mentors is that ultimately, there is a higher incidence of female ECAs being mentored by male mentors (Colletti, Mulholland & Sonnad, 2000; Foster, McMurray, Linzer, Leavitt, Rosenberg & Carnes, 2000; Martinez *et al.*, 2007; Steele *et al*., 2013; Seemann *et al*., 2016), which poses unique challenges. Firstly, male mentors may not understand, or even be aware of, the organisational or personal factors that impact the career development of female ECAs (Burke & McKeen, 1990; Levinson *et al*., 1991; Chandler, 1996; Quinlan, 1999).

Secondly, some male mentors usually prefer to mentor other male academics because being of the same gender, they can identify with each other (Chandler, 1996; Ballenger, 2010; Kosoko-Lasaki *et al*., 2006). Hence, male mentors may not be keen to mentor female ECAs, particularly those who are married or have children. This is because male mentors may assume that these female ECAs are more committed to their families than their careers (Long, 1990; Grant *et al.*, 2000). Moreover, male mentors are hesitant to mentor female ECAs due to the fear of a close working collegial relationship being misinterpreted as a sexual affair (Mullen, 1994; Quinlan, 1999; Grant *et al*., 2000; Okurame, 2008; B. Johnson, 2016).

Thirdly, some female academics prefer female mentors (Holliday *et al*., 2014). This preference is notable since female mentors can relate to the distinct stressors and challenges those female academics face and can provide insights (Conway, Sims, McCrary-Quarles, Nicholson, Ethridge, Maultsby, Thomas & Smith, 2018). Consequently, female academics may feel more comfortable discussing certain issues with female mentors than with male mentors (Bettis, Thrush, Slotcavage, Stephenson, Petersen & Kimbrough, 2019). Examples of such issues are work-life balance (Straus *et al*., 2009; DeCastro *et al*., 2013; Seemann *et al*., 2016; Alisic, Boet, Sutherland & Bould, 2016) and career planning (Straus *et al*., 2009).

Notably, a shortage of female mentors could create an additional challenge of overburdening such mentors with mentoring duties. Consequently, the female mentors would have limited time to undertake other equally critical academic responsibilities such as research (McLaughlin, 2010). Finally, it is essential to highlight that these difficulties that female academics generally experience in finding mentors and establishing mentoring relationships have been disputed in other studies (Ragins, 1999; Wanberg *et al.*, 2003).

- **Other challenges**

Other challenges experienced by female academics and ECAs in mentoring are difficulty in finding a mentor with similar interests (Elliott, Dorscher, Wirta & Hill, 2010; Levine *et al.*, 2011) or personality mismatches between mentor and mentee, which result in strained mentoring relationships (Straus *et al.*, 2009; Steele & Fisman, 2014). Moreover, mentors' inexperience (Straus *et al.*, 2009; Nakanjako, Byakika-Kibwika, Kintu, Aizire, Nakwagala, Luzige, Namisi, Mayanja-Kizza & Kamya, 2011) leads to unproductive relationships. Lastly, female academics have limited networks, and therefore, opportunities to interact with potential mentors are few (Mullen, 1994; Koopman & Thiedke, 2005; Levine *et al.*, 2011; de Saxe Zerden *et al.*, 2015).

The objective of the study undertaken by Nakanjako *et al.* (2011) in Uganda was to determine the state and needs of mentoring among academics and researchers (the mentors) and graduate students and junior scientists (the mentees) at the Makerere University College of Health Sciences. The study found that mentors and mentees were mismatched, and mentoring was informal. Thus, meetings between mentors and mentees were ad hoc and brief; and the number of available mentors was insufficient in relation to the number of individuals who required mentoring. Specifically, it was reported that the mentors had insufficient training in mentoring or had little time to commit to mentoring owing to time pressures from other responsibilities. As for mentees, it was reported that they did not know what was expected of them or of their mentors.

2.3.2 Research funding

Research is funded through grants sourced from private sources (such as corporates, philanthropies, foundations, individual endowments) or public sources (taxes collected by governments) (Saygitov, 2014; Garrison & Deschamps, 2014; Conn *et al.*, 2018; Vilakazi, 2020). In Africa, research is primarily funded by prominent international research and donor organisations such as the European Union, German Research Foundation-DFG, Wellcome Trust, and the National Institutes of Health (NIH) of the USA (Teferra & Altbach, 2004; Gaidzanwa,

2007; Beaudry *et al*., 2018a). Funding of research by most African national governments is minimal, due to insufficient allocation of money in national budgets to research and development (R&D). For instance, in 2013, the gross domestic expenditure on R&D as a percentage of the gross domestic product (GDP) was only 0,42% for sub-Saharan Africa compared to 2,45% for North America and Western Europe (UNESCO Institute for Statistics, 2018). The allocation seems to have even reduced, since Beaudry *et al*. (2018a:71) state that "government investment in R&D as a proportion of gross domestic product across Africa averages between 0,2% and 0,3%".

Senior academics tend to win more grants, because they have more work experience, more publications, and highly likely have a previous history of successful grant applications. These characteristics then place senior academics in more favourable positions during grant applications than ECAs (Etzkowitz & Ranga, 2011; Powell, 2016). Nevertheless, in Africa, there are grants exclusively available to ECAs. For example, the Future Leaders – African Independent Research (FLAIR) Fellowships administered by the African Academy of Sciences (AAS) are offered to ECAs to enable them to establish research careers in HEIs within Africa (AAS, 2020). In South Africa, the National Research Foundation (NRF) has various funding instruments, some of which provide grants exclusively to ECAs, for example, the TWAS-NRF Postdoctoral Fellowship (TWAS-SAREP, 2020).

Beyond the African continent, the USA has various grants that are explicitly earmarked for ECAs. For instance, the K Awards and postdoctoral fellowships offered by the NIH offer mentoring and protected time from teaching responsibilities to ECAs so that they can develop their research careers (Jagsi *et al.*, 2009; Sumandea & Balke, 2009; Garrison & Deschamps, 2014; Conn *et al*., 2018). In Australia, the Discovery Early Career Researcher Awards (DECRA) provide research funding exclusively to ECAs (McKay & Monk, 2017). In Europe, the European Research Council (ERC) grant programme has one particular grant targeted at ECAs (Powell, 2016).

Academics who are active in research tend to have a strong publication record, which strengthens their research grant applications and increases their chances of winning grants (Teodorescu, 2002; González-Brambila & Veloso, 2007). This means that female ECAs with nascent research profiles and a weak scholarly publication history are at a disadvantage as they may find it challenging to secure research grants (Long & Fox, 1995; Gardiner *et al.*, 2007; Larivière *et al.*, 2011). Therefore, these female ECAs fail to break through the "paper ceiling" (Callaghan, 2016:8) as they are not research productive and ultimately, their career advancement is inhibited (Vasil, 1992; Van Staden *et al*., 2001).

2.3.3   Networks and collaboration

Networks can be identified in many facets of life, be it in the form of professional or casual associations (Quinlan, 1999; Ibarra, Kilduff & Tsai 2005; Prozesky, 2008). Networks build the social capital, human capital or financial capital of an individual (Ryazanova & McNamara, 2015; Moore *et al*., 2016). Strong networks are built over a long period (McKay|& Monk, 2017) and are critical for building a successful academic career (Ibarra, 1997). Relationships established through networking can result in outcomes such as collaboration in research (Conn *et al*., 2018).

Collaboration is a driver of research production. It creates opportunities for ECAs to work together with senior academics (Greene *et al*., 2008; Ackerman *et al.,* 2018) or with their peers (McGrail, Rickard & Jones, 2006). The collaboration between academics can be in research projects (McKeen and Bujaki, 2007; Zulu 2013; Angervall *et al.*, 2015), grant applications (Sung, Gordon, Rose, Getzoff, Kron, Mumford, Onuchic, Scherer, Sumners & Kopell, 2003; Howe-Walsh & Turnbull 2016; McKay & Monk, 2017), and article co-authorship (Stack, 2004; Van den Brink & Benschop, 2011; Howe-Walsh & Turnbull 2016; B. Johnson, 2016; Efstathiou *et al*., 2018). Consequently, the quantity and quality of research outputs produced by ECAs are enhanced (Stephan & Levin, 1987 cited in Kyvik & Teigen, 1996; Stack, 2004; Zutshi, McDonald & Kalejs, 2012; Albert *et al.,* 2016).

In some disciplines, such as the physical sciences, highly productive academics usually work collaboratively (Zyoud *et al*., 2014; Sugimoto & Larivière, 2018), which enables them to share tasks in a project, leverage their colleagues' area of expertise, and participate in multiple projects concurrently (Ryazanova & McNamara, 2015). Collaboration also aids in building a network of academic co-authors (Etzkowitz, Kemelgor, Neuschatz, Uzzi & Alonzo, 1994). Such a network is useful for brainstorming research ideas, reviewing draft manuscripts, and identifying potential journals for publication (Ryazanova & McNamara, 2015). Hence, the more extensive the co-authorship network and the stronger the rapport between academics, the higher the research output (Ryazanova & McNamara, 2015). Finally, collaboration, particularly of an international nature, enhances the reputation and visibility of academics (Aksnes, Piro & Rørstad, 2019) by expanding the range of the research project (De Kleijn, Jayabalasingham, Falk-Krzesinski, Collins, Kuiper-Hoyng, Cingolani, Zhang, Roberge, Deakin, Goodall, Whittington, Berghmans, Huggett & Tobin, 2020).

Even though collaboration has its advantages, Gaidzanwa (2007) postulates that, for ECAs, collaboration involves the risk of much or even all of the credit accruing to senior collaborators. This risk was identified and termed the "Matthew Effect" by Merton (1968), who noted that within

collaborative research teams, senior academics receive greater recognition than ECAs. Rossiter (1993:326) notes that this "accumulation of advantage" to senior academics occurs because ECAs do not yet have a strong research track record and a solid reputation among other academics. ECAs are only able to receive significant recognition if they independently conduct groundbreaking research later in their careers. Senior academics are productive in terms of research output because, besides having access to material resources such as grants, they are part of key professional and social networks (Nakhaie, 2002; Perumal, 2003; Tsikata, 2007; Akinsanya, 2012; Brew, Boud, Namgung, Lucas & Crawford, 2016).

Besides creating opportunities for collaboration, networks offer other benefits to ECAs that contribute to enhanced research production. Networks enable ECAs to know and be known by other academics who can facilitate access to research equipment and funding (Van den Brink & Benschop, 2011; Angervall *et al.*, 2015). In addition, networks facilitate the evaluation of research projects by gaining access to experts (Campion & Shrum, 2004), and they also facilitate wider dissemination of research outputs (Bentley, 2011; Van den Brink & Benschop, 2011). Furthermore, networks enhance ECAs' self-confidence and credibility through the establishment of relationships with other scholars (Debowski, 2006 cited in Hemmings, 2012) which in turn aids to build their professional identity as independent researchers (LaRocco & Bruns, 2006; S. Baker, 2009).

Networks minimise the isolation that ECAs experience by creating a collegial atmosphere (Hemmings, 2012), and they assist ECAs to gather information on current research trends (Paina, Ssengooba, Waswa, M'Imunya & Bennett, 2013). Finally, networks provide a platform for enhancing the competitiveness of funding proposals by receiving extra input from other scholars (Polkowska, 2013). Considering that networks have numerous benefits that enhance academics' research production, Sebestéyn and Varga (2013) highlight that networks possess three important features. These are the existing knowledge accrued by the network members, the regularity of interaction amongst the members, and the members' connections to other networks outside of their own region. Van den Brink and Benschop (2011:515) articulate well the domino effect of networks on research production by stating that,

> [s]ocial network connections can function as an accelerator: publications can lead to a better position at the university, and this higher position subsequently leads to a greater number of network contacts, more prestige, more funding, all of which can result in more publications.

Focusing on literature specific to female ECAs, fewer than five studies were found that demonstrated the positive link between networks, collaboration and research production. Kyvik

and Teigen (1996), in their study of female academics in Norwegian universities, found that those who did not collaborate produced fewer research outputs than those who did. In Africa, Gaidzanwa's (2007) study at the University of Zimbabwe found that it had become difficult for the institution to fund sabbatical leave for academics, due to the collapse of the country's economy. The restriction in taking sabbatical leave affected ECAs the most, as they could not visit other universities for research collaboration (Gaidzanwa, 2007). In Uganda and Kenya, the Fogarty International Center (an American organisation) conducted an assessment to ascertain whether the training programmes that it had funded assisted ECAs in developing research networks and collaborations. The evaluation found that ECAs in HEIs that did not participate in the training programmes experienced difficulty accessing research networks. In contrast, those ECAs in HEIs that were beneficiaries of the Fogarty programmes established fruitful networks that resulted in joint grant applications (Paina *et al*., 2013).

Despite the many advantages of networks in enhancing research production, studies report that the networks of female academics tend to be limited in number and size and are unvaried and localised (Prozesky, 2008; Larivière, Vignola-Gagné, Villeneuve, Gélinas & Gingras, 2011; Larivière, Gingras, Cronin & Sugimoto, 2013; Fakhr *et al.,* 2016). These network characteristics are detrimental to female ECAs (McKeen & Bujaki, 2007), as they negatively impact their research production. The negative impact is attributable to restricted access to valuable information such as potential research projects, collaboration partners, and funding opportunities, which can be obtained through networks (Perumal, 2003; Gardiner *et al*., 2007; Larivière *et al.*, 2011).

An explanation that has been provided by some scholars (Tsikata, 2007; Larivière *et al*., 2011; Akinsanya, 2012; Zulu, 2013; Raburu, 2015) for female academics' fewer networks is because of the isolation that female academics experience in HEIs. Kyvik and Teigen (1996:56) term the isolation that female academics experience and its negative impact on their research output, as the "exclusion hypothesis". Female academics feel isolated because most networks in academia are exclusive "good old boy network[s]" (Ballenger, 2010:12), and some academic departments and disciplines, particularly in the physical and natural sciences, are dominated by male academics (Subotzky, 2001; Perumal, 2003; Thanacoody *et al.*, 2006; Cheng, 2010; Larivière *et al*., 2011).

Networks are gendered in that firstly, the "old boy" networks of male academics exclude and are uninviting to female academics. These networks are exclusive because social activities such as playing golf, watching football matches or having drinks with colleagues occur after-work hours or on weekends during which female academics are unavailable (Xie & Shauman, 1998; Bagilhole, 2000; Petersen & Gravett, 2000). During these social activities, network members engage in

essential discussions such as promotion or research funding opportunities (Ballenger, 2010). Secondly, male academics are more likely to recommend fellow male academics within their networks for such opportunities (Bagilhole & Goode, 2001; Kantola, 2009). Thus, for female ECAs, the link between, on the one hand, networks and collaboration and, on the other, enhanced research output and career advancement is very significant.

2.3.4   International mobility

International mobility is vital for academics, as it offers several opportunities and benefits. These include postdoctoral positions, research fellowships, participation in conferences (Austin, 2002; Gaillard, 2003; Smolentseva, 2003; Moore *et al.,* 2016), the establishment of relationships with academics abroad, collaboration in research projects (Lewison, 2001; Fritsch, 2015); and overcoming career barriers such as gender discrimination in their home countries (Ramos & Bosch, 2012). For ECAs, the interaction facilitated through international mobility is essential. Firstly, conference presentations are the foundational steps for ECAs in building a research portfolio and career (Callaghan, 2016). Secondly, interaction with other academics internationally, enables ECAs to build and strengthen networks (Cruz-Castro & Sanz-Menéndez, 2010; De Kleijn *et al*., 2020), acquire varied research skills (Kerey & Naef, 2005; Ryazanova & McNamara, 2015) and work experience in multicultural international environments (Ramos & Bosch, 2012), all of which could result in enhanced research production (Geber, 2009). Because of the benefits that international mobility offers, countries such as Switzerland consider it a compulsory criterion for ECAs (Toader & Dahinden, 2018) and in Spain it is compulsory for researchers (Ramos & Bosch, 2012), to be considered for promotion.

An examination of the literature identified few studies that demonstrated the positive link between international mobility and the research production of ECAs. Notably, none of the studies was conducted in Africa. Prpić (2000) established that in Croatia, the research output of ECAs was boosted by their attendance of international conferences, as it led to the ECAs' co-authorship of papers with other international scholars that they had met, as well as publication in international journals. In China, Cao and Suttmeier (2001) found that ECAs who had the opportunity to travel to foreign countries for research fellowships and attend conferences reported some benefits that boosted their research output. These benefits included improved research skills and the forging of lifelong collaborative relationships with academics abroad.

Although international mobility has been found to boost the research output of ECAs, ECAs continue to encounter some challenges. ECAs find difficulty in becoming internationally mobile

because of limited funding or lack of funding for mobility at HEIs (Browning *et al*., 2017). In addition, female academics specifically face unique challenges that hinder them from taking up available international mobility opportunities. In Africa, female academics are less likely to be internationally mobile than male academics, due to family responsibilities, such as caring for children (Campion & Shrum, 2004; Prozesky, 2008; Callaghan, 2016), undertaking household chores (Raburu, 2015), and providing companionship to a spouse (Akinsanya, 2012). As a result, female academics who are not internationally mobile, are unable to access the afore-mentioned benefits.

This section has discussed four select factors that facilitate research production, which is a critical element that is intertwined with and determines the career development of academics. It is therefore, also necessary that I examine the concept of academic career development in the next section.

2.4   Conceptual frameworks on academic career development

In this section of the chapter, I review literature of a more conceptual nature. I begin with a definition of the term career, followed by examining the concept of academic career development. Clarification of these two concepts is useful for two reasons. The first reason is that one cannot fully comprehend the concept of mentoring and its role in career outcomes without knowing what an academic career and career development in academia entail. The second reason is that career outcomes eventually affect career development.

2.4.1   Definition of career

A conceptual analysis of what academic career development constitutes in different contexts first requires a definition of the term career. A career is defined by Super (1980) as the blend and order of work roles undertaken by an individual over a lifetime. Savickas (2002:151) simply defines a career as "the development of vocational behaviour over time". Rusconi and Solga (2011 cited in Fritsch, 2015:621) define a career as "a profession that corresponds to one's formal educational achievements and implies professional advancement in terms of higher levels of qualification, higher occupational rank, or upward social mobility".

A career evolves (Baldwin, 1990), it is developmental (Baldwin & Blackburn, 1981; Gianakos, 1999; Ginzberg, Ginsburg, Axelrad & Herma, 1951 cited in Brown, 2002), but it is also a gendered concept, because the definition, composition and purpose of a career are inseparably

intertwined with gender (Savickas, 2002). An occupation or profession within an individual's career is considered a key anchor of an individual's life, since it facilitates development of identity, is a medium for attaining aspirations (Baldwin, 1990), and is a determinant of income, wealth, lifestyle and social status (Johnson & Mortimer, 2002).

Specifically, in the context of academia, a career refers mainly to the roles of researcher, teacher, and counsellor that are assumed by an academic during his/her working life (Probert, 2005; Fox & Colatrella, 2006; Kelly & McCann, 2019). These academic roles may be assumed simultaneously, or they may interchange from time to time (Jones *et al.*, 2012; Breetzke & Hedding, 2017). Within these roles, the primary responsibilities of an academic constitute teaching, conducting research and community service (Misra *et al.*, 2012; Zacher, Rudolph, Todorovic & Ammann, 2019), otherwise referred to as the "academic trilogy" (Mendel, Mendel & Battle, 2004:5). The degree to which an academic is expected to undertake these responsibilities varies according to his/her rank (Misra *et al.*, 2012; Zacher *et al.*, 2019).

2.4.2   Academic career development

Career development is defined by Brown (2002) as a change or a sequence of changes in a person's career over a period of time. Also, the career development of an individual entails an interplay between work and life – a notion that is captured in Wolfe and Kolb's (1980, cited in Patton & McMahon, 2014:9) definition of career development as involving "one's whole life, not just occupation. More than that, it concerns him or her in the ever-changing contexts of his or her life".

Academic career development has been defined in the literature as a pre-determined set of steps through which an academic advances on the career ladder (Fritsch, 2015; Winslow & Davis, 2016). It is also defined as a "lock-step career progression over time" (Philipsen, Case, Oetama-Paul & Sugiyama, 2017:625) that entails passing "through different occupational phases" (Fritsch, 2015:622). In addition, academic career development has been referred to as an uninterrupted progression through each academic step that is enhanced by publishing scholarly articles (Heward, 1994; Thornton, 2013). Lastly, it is also defined as a course that is governed by established norms and deliverables that every academic is expected to adhere to (Shaw, 2005; Marquina, Yuni & Ferreiro, 2015).

In academia, career development is founded on a meritocratic system (Van den Brink & Benschop, 2011) that places academics in positions according to their accomplishments (Scully, 1997). Career development in academia exhibits several features. These include relatively few ranks (Baruch & Hall, 2004) based on a hierarchy (van den Brink & Benschop, 2011), building a

global reputation as a measure of success, and opportunities for academics to take sabbatical leave to undertake new projects or reflect on a career (Baruch & Hall, 2004). Other unique features of academic career development are unrestricted mobility for academics between HEIs (Baruch & Hall, 2004) and multiple pathways in roles, such as taking on an administrative role such as a dean, and later going back to research (Baruch & Hall, 2004). Nevertheless, academic career development has been described as an extremely complicated process that is influenced by external and internal factors (Baldwin & Blackburn, 1981).

Considering the definitions of academic career development, it is clear that traditionally, career development in academia is premised on a progressive, linear, pipeline model (Raddon, 2002; Wolfinger, Mason & Goulden, 2008; Shaw & Stanton, 2012; Linková 2017 cited in Cidlinská, 2019; Adi Badiozaman, 2020) that is predominantly influenced by research output (Van den Brink and Benschop, 2011). The linear academic career development model is viewed as the norm (Ramos & Bosch, 2012), and therefore it is assumed that the careers of female academics develop in line with it (Parker *et al.*, 2018). However, this linear model is gendered, as it is biased towards male academics and is inappropriate for defining the career development of many female academics.

The linear model is inherently patriarchal (Bagilhole & Goode, 2001; Krefting, 2003; Niemeier & González, 2004; Monroe, Ozyurt, Wrigley & Alexander, 2008) as it is only compatible with an "ideal worker" (Williams, 2000 cited in Eddy & Ward, 2015:7). An ideal worker refers to an academic whose life is devoted to work and is devoid of household and family responsibilities (Drago & Williams, 2000; Ely & Meyerson, 2000; Bailyn, 2003; Williams, 2005; Kelly & McCann, 2019) or work takes priority over family commitments since someone else such as a partner takes care of the family (Kelly, Ammons, Chermack & Moen, 2010; Eddy & Ward, 2015; Cidlinská, 2019). Thus, the linear model suitably describes the careers of male academics, who, in most cases, are fully committed to their professional occupation (Probert, 2005; Baker, 2010; Bingham & Nix, 2010; Cech & Blair-Loy, 2010; Moss-Racusin *et al.*, 2012) and their careers advance progressively with minimal interruptions (Quinlan, 1999; Van den Brink & Benschop, 2011; O'Connor, 2015; Philipsen *et al.*, 2017; Cidlinská, 2019).

In contrast, the career paths of female academics are "non-standard" (Van den Brink & Benschop, 2011:518), "cyclical" (Ramos & Bosch, 2012:13), and are perceived as "problematic" (Hewlett & Luce, 2005; Wyatt-Nichol, 2014; Winslow & Davis, 2016; Parker *et al.*, 2018) since they develop non-linearly (Powell & Mainiero, 1992; Park, 1996; Sullivan & Mainiero, 2007; Ramos & Bosch, 2012). The linear model of academic career development does not recognise that

"[w]hile making a living, people live a life" (Savickas, 2002: 159) which simply means that academic careers are not developed in isolation but develop within the context of an academic's life course (Shaw, 2005). Thus, the model does not align with the careers of female academics that are rooted within the context of life as a whole and are not developed as independent components of life (O'Neil, Hopkins & Bilimoria, 2008; Reitman & Schneer, 2008).

To illustrate, the linear model does not reflect the lives of female academics, as they commonly experience pressure from balancing work and family responsibilities (Raddon, 2002; Thornton, 2013). Instead, the model rather suits the life of a male academic who is assumed to be the breadwinner with a partner at home fulfilling family responsibilities (Mason & Goulden, 2002; Wolf-Wendel & Ward, 2006; Mabokela & Mlambo, 2014). In addition, the model does not recognise that females bear the brunt of life-course events, such as bearing and rearing children and caring for sick or elderly family members (Quinlan, 1999; Wolfinger *et al.*, 2009; Obers, 2014). These life-course events have a significant negative influence on the careers of female academics, since they often lead to interruptions that hinder their career progression (Bagilhole & Goode, 2001; Monroe *et al.*, 2008; Gasser & Shaffer, 2014; Tomlinson, Baird, Berg & Cooper, 2017).

The linear model is rigid in structure in that it allows for only one point of entry into an academic career and penalises non-conformance (Krais, 2002; Monroe *et al.*, 2008). It does not make adequate provision for exit and re-entry (Quinlan, 1999; Philipsen *et al.*, 2017), which would be required by female academics whose careers have been interrupted. Disappointingly, many HEIs have very few, if any, supportive mechanisms that enable female academics to effectively continue or resume their academic responsibilities despite these interruptions (Bagilhole & Goode, 2001; Raddon, 2002; Caretta *et al.*, 2018). As for those female academics who experience career interjections but still manage to attain or surpass the stipulated level of research outputs, they are often overlooked in promotions because they are usually older than male academics with equivalent qualifications (Van den Brink & Benschop, 2011). The implicit age range within which academics can expect to be appointed in senior ranks only makes matters worse for female academics because their career path is non-traditional (Van den Brink & Benschop, 2011). Hence, Thornton's (2013:138) statement that "the ideal academic does not have time for work/life balance; work/work is what is demanded" illustrates well the paradox of what is required by the linear model as it does not consider the context in which the careers of female academics' progress.

In conclusion, it seems that the linear model is an imposition that sets up female academics to fail, and it is then no wonder that Crabtree and Shiel (2018:901) describe academia as "a hard

taskmaster, particularly where women are concerned". For female academics in general, their options are limited, as they are forced to choose between professional accomplishment and personal fulfilment (LaPan *et al.*, 2013; Obers, 2014), or they have to adapt and strive for career progression within a model that does not suit their life-course (Kelly & Fetridge, 2012; Neale & White, 2014; Penney *et al.*, 2015; Tomlinson *et al.*, 2017). Additionally, the linear model propagates inequality between male and female academics (Toader & Dahinden, 2018), even though some scholars tout it as gender-neutral (Van den Brink and Benschop, 2011; Ceci *et al.*, 2014). Accordingly, an academic career has been described as a challenging course, a "harsh path to the stars" (Krais, 2002:411) and a path laden with triumphs, trials and disappointments "comprising individualistic, output-driven characteristics" (Fritsch, 2015:625). The following subsections examine the stages in academic career progression and describe the ECA phase.

2.4.2.1 *An exploration of the stages in academic career progression*

The academic career ladder has distinct inception and peak points and provides a track for the formal development of an academic occupation (Baldwin, 1990). However, academic ranks and educational qualifications for entry appointment into an academic career vary within and between countries, as discussed below.

- **Academic ranks**

In HEIs in the UK and other Commonwealth countries (Bagilhole & Goode, 2001), such as Australia (Baruch & Hall, 2004; Toffoletti & Starr, 2016), New Zealand (Sutherland, 2017), Nigeria (Udegbe, 2016), Uganda (Ssempebwa, Teferra & Bakkabulindi, 2016) and South Africa (Subbaye & Dhunpath, 2016; Breetzke & Hedding, 2017), an academic career commences with an appointment as a junior/associate/assistant lecturer, followed by advancement to lecturer, senior lecturer or reader[8], associate professor and, finally, to full professor (Baruch & Hall, 2004; Marchant & Wallace, 2013; Bosanquet, Mailey, Matthews & Lodge, 2016; Ssempebwa *et al.*, 2016; Seo, Mehdiabadi & Huang, 2017). Senior lecturer is considered a middle academic rank whereas reader, associate professor and professor are considered senior academic ranks (Bazeley, 2003).

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[8] The rank of reader is used in the UK where an individual has made contributions to research
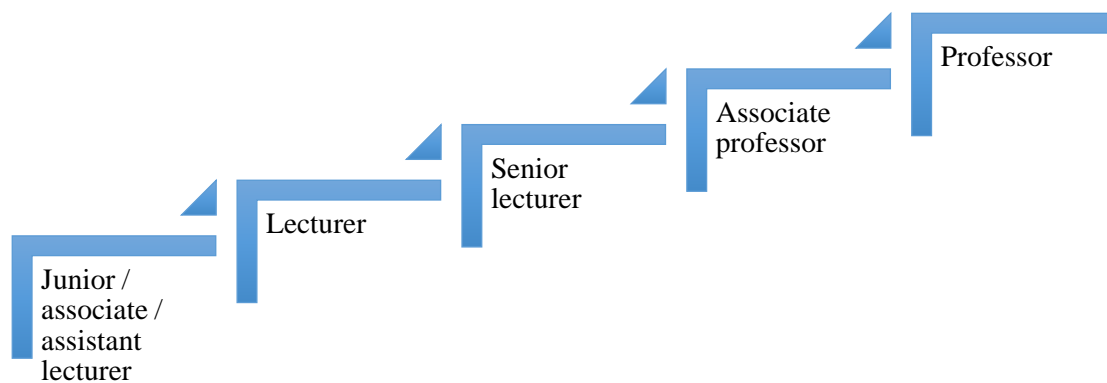
Figure 1: Academic career progression in Commonwealth countries

An academic career in the USA can commence with either a first appointment while an individual is a doctorate candidate (Foote, 2010) or after receipt of a doctorate in the rank of an assistant professor (Krefting, 2003; Acker & Armenti, 2004; Thedwall, 2008; Foote, 2010; Thomas *et al.*, 2015). The assistant professor rank places an individual on the tenure track by acting as a mandatory probation position of five to seven years (Mendel, Mendel & Battle, 2004; Ballenger, 2010; Gasser & Shaffer, 2014; Winslow & Davis, 2016). Thereafter, an academic advances to associate professor and, lastly, to the post of a full professor and these two positions are considered senior and assure academics of permanent employment, also referred to as securing tenure (Baruch & Hall, 2004; Kirchmeyer, 2005; Wolfinger *et al.*, 2009; Levine *et al.*, 2011; Sutherland, 2017).

Similar to the USA, an academic career in Canada (Gravestock & Gregor Greenleaf, 2008) and the Netherlands (Van Balen, Van Arensbergen, Van der Weijden & Van den Besselaar, 2011) starts with appointment of an individual as an assistant professor, and from this rank, one advances to associate professor and finally to full professor. Generally, academics in the ranks of full or associate professor have minimal teaching responsibilities because more of their time is allocated to research and supervision of postgraduate students (Dobele *et al.*, 2014; Seo *et al.*, 2017). In addition, professors have the privilege of selecting research areas for further development according to their preference (Van den Brink and Benschop, 2011). Full professors usually hold the Chair in specific areas of research specialisation (Seo *et al.*, 2017).

Figure 2: Academic career progression in the USA, Canada and the Netherlands

Regardless of these differences and similarities in ranks between countries, excelling in academia, which includes a progression from one rank to another on the academic career ladder, is determined by set statutes and norms in an HEI (Acker & Armenti, 2004). These include assessing an academics' performance, predominantly in terms of their research output and, to a lesser extent, their teaching and service provision (Raddon, 2002; Probert, 2005; Fox & Colatrella, 2006). Not only does an academic excel through adherence to set requirements, but other factors play a supportive role. Examples of such factors include individual ambition (Fritsch, 2015); stable employment (Thornton, 2013); resilience and belief in one's abilities (Baruch & Hall, 2004); significant investment of time and self-promotion of an academic (Krais, 2002); and social capital, in other words, key contacts who can facilitate access to material resources (Marquina *et al.*, 2015; Angervall, Gustafsson & Silfver, 2018).

- **Educational qualifications for entry appointment into an academic career**

The acquisition of a doctorate is traditionally considered as the inception point of an academic career in HEIs in Australia (Asmar, 1999; Winchester & Browning, 2015), New Zealand (Sutherland, 2017), Netherlands (Van Balen *et al.*, 2012), the UK (Bagilhole & Goode, 2001), and the USA (Baruch & Hall, 2004). However, in some HEIs in Australia (Hemmings, 2012), Ghana (Alabi & Abdulai, 2016), Malaysia (Adi Badiozaman, 2020), Mozambique (Cossa *et al.*, 2016), Nigeria (Teferra, 2016), South Africa (Geber, 2009; Pithouse-Morgan, Naicker & Pillay, 2016), the USA (Foote, 2010), and Uganda (Ssempebwa, Teferra & Bakkabulindi, 2016), a doctorate is not necessary for appointment to an academic position.

For instance, in Ghana, the qualification for entry into an academic career is either a master's degree by research or a doctoral degree (Alabi & Abdulai, 2016). However, there are increasing proposals to make possession of a doctorate, a mandatory requirement for appointment in academic positions in that country (Ansah, Swanzy & Obeng, 2019). In Nigeria, Teferra (2016) found that 60% of academics at the rank of lecturer in 124 universities did not have a doctorate. In

Mozambique, a study of ECAs by Cossa, Buque and Fringe (2016) found that most academics in HEIs possess only an undergraduate bachelor's degree and that only 3% of ECAs held a doctorate (Cossa *et al.*, 2016). In South Africa, the number of academics in possession of a doctorate stood at 42% in 2015 (Mouton, Basson, Blackenberg, Boshoff, Prozesky, Redelinghuys, Treptow, Van Lill & Van Niekerk, 2019).

In other HEIs in countries such as the USA (Evers & Sieverding, 2015) and indeed some scientific disciplines (Åkerlind, 2009), an individual is required to hold a postdoctoral position for some years after acquiring a doctorate before they can be considered for appointment to a full-time academic position. A postdoctoral position is usually a fixed-term contract position that requires an individual to undertake research on a full-time basis (Åkerlind, 2009) while under the supervision of a senior academic (Price *et al.*, 2015). Thus, a doctorate is considered very important by some HEIs, because it strengthens the core skills required for an academic career, namely, independently undertaking research, publishing scholarly articles and presenting research findings (Brown *et al.*, 2009; Evers & Sieverding, 2015).

2.4.2.2 *Characterising the early-career academic phase*

The early-career phase is the entry, formative and foundation stage of an academic career (Baldwin, 1990; Waxman, 1992). There is no standardised and universally agreed-upon definition of an ECA. A common definition of an ECA in countries such as the UK (Hemmings, Hill & Sharp, 2013), South Africa (Petersen, 2011; Osman & Hornsby, 2016) and Australia (Bazeley, 2003; Hemmings, 2012; Crome *et al.*, 2019) is an individual who has held full-time, part-time or periodical teaching and research positions in academia for no more than five years since obtaining a doctorate.

Other definitions of ECAs comprise individuals who are still pursuing their graduate studies (Foote, 2010; Matthews *et al.*, 2014), commencing their academic career regardless of when the PhD was obtained (Price *et al.*, 2015) or individuals holding their first academic post having obtained their doctorate in the preceding seven years or fewer (Sutherland, 2017). ECAs are also called early-career researchers (Bazeley, 2003; James, Norman, De Baets, Burchell-Hughes, Burchmore, Philips, Sheppard, Wilks & Wolffe, 2009; Bridle, Vrieling, Cardillo, Araya & Hinojosa, 2013). However, the term ECA was selected for use in this study because it encompasses the full complement of academic responsibilities, that is, both research and teaching (Price *et al.*, 2015; McKay & Monk, 2017).

The early-career phase entails developing competencies, acquiring further knowledge and acculturation to an institution (Baldwin, 1990). This phase is an important period for the professional development of an academic (Kirchmeyer, 2005) because, at this stage, the individual strives to establish their career (Riordan & Louw-Potgieter, 2011). Career establishment occurs through advancement in rank, building a reputation and an occupational identity through specialising in a specific disciplinary domain (Baldwin, 1990). Likewise, the early career constitutes a phase during which the individual character of an academic – specifically self-regard, outlook and ambitions in the profession – develops (Baldwin, 1990), and the structure of adult life comprising relationships and career is formed (B. Johnson, 2016).

Interpreted according to the various ranks on the academic career ladder discussed in the previous subsection, ECAs usually occupy the ranks of postdoctoral fellow, junior lecturer, assistant lecturer, associate lecturer, lecturer or assistant professor. The length of the early-career phase varies from one country to another. For example, in the USA it spans a period of 10 to 13 years (Foote, 2010). To conclude, the early-career phase is the most crucial in determining whether an academic advances, stagnates or even exits from an academic career (Mason, 2013). Therefore, Geber (2009) states that, for an ECA, successful career development is founded mainly on establishment of a research track record through publication of scholarly articles in accredited and peer-reviewed journals. The subsequent section examines the different concepts that comprise mentoring.

2.5   Conceptual frameworks on mentoring

The discussion in this section commences with a review of the origin of mentoring and a brief history of studies conducted on mentoring. It is then followed by an explication of the main features and functions of mentoring and concludes with an exploration of conceptual frameworks on mentoring, specifically those that pertain to its functions and influence.

2.5.1   A brief history of research on mentoring

Various individuals are recognised as the pioneers of research on mentoring. In the early 1970s, Levinson, Darrow, Klein and McKee studied human development and the effect of mentoring on the development of adult men in several occupations. They documented the study in a 1978 book titled *The Seasons of a Man's Life* (Carden, 1990; Eleanor, Sandra, Ragins & Kram, 2007; Elby, Rhodes & Allen, 2007). In a paper presented at a conference one year later, Levinson put forward

that the process of mentoring entails "teaching, demonstration, interaction with the phenomenon, feedback and counselling" (Burke & McKeen, 1990:321). Kathy Kram's qualitative study of 18 mentor-protégé pairs was documented in a book published in 1985 titled *Mentoring at Work* (Dougherty, Turban & Haggard, 2007). Kram's work is now considered the first, groundbreaking case of research on mentoring at work and has even been used to inform quantitative research studies (Wanberg *et al.*, 2003).

Kram's study stimulated more empirical research on mentoring in general, which in turn advanced mentoring as a field of study (Allen *et al.*, 2004). For instance, B. Johnson (2016) studied mentoring, which he portrayed as a relationship and defined the functions of a mentor. Also, Elby *et al.*'s (2007) study describes the phases of mentoring and outlines the complications associated with mentoring across genders. Nonetheless, it should be noted that although the general meaning of the concept of mentoring is widely understood and agreed upon, there is still no uniform definition of the term that can be applied across different disciplines, contexts, and organisations, in studies that have been conducted to date (Wanberg *et al*., 2003; McLaughlin, 2010; Ehrich, 2013; B. Johnson, 2016). Nonetheless, the features that constitute mentoring are explored in the ensuing subsection.

2.5.2   Origins of mentoring

Carden (1990) notes that the emergence of mentoring and the derivation of the word mentor can be traced back to Greek mythology in Homer's work titled *The Odyssey*. The king of Ithaca, Odysseus (also known as Ulysses by the Romans), went to fight in the Trojan war and left his young son, Telemachus, under the care of his long-time male friend Mentor, who acted as a foster parent and guardian. During the ten years that Odysseus was away and Mentor was raising Telemachus, Athena, the goddess of wisdom, descended to earth under the guise of Mentor. Athena protected and advised Telemachus, an act which was later coined mentoring (Monaghan & Lunt, 1992; Dougherty & Dreher, 2007; Ehrich, 2013; Parikh & Redberg, 2015; B. Johnson, 2016). The following subsection briefly discusses the history of research undertaken on mentoring.

2.5.3   Features of mentoring

Mentoring is a relationship or interaction that occurs between two parties, the mentee and mentor. Some researchers also refer to a mentee as a protégé, a term drawn from *protéger*, a French verb which means "to protect" (Carden, 1990; B. Johnson, 2016). Despite the wide variability in

definitions of mentoring (Carden, 1990), eight features uniquely identify mentoring. First, mentoring is an interactive, dynamic, reciprocal, sometimes complex, development-oriented and long-term relationship between persons (Wanberg *et al.*, 2003; Medford, 2015; B. Johnson, 2016). Second, the benefits of mentoring are mutual but not necessarily equal (B. Johnson, 2016). Third, mentors should ideally have professional experience and achievements superior to those of their mentee (B. Johnson (2016), so that the mentor is able to convey the insights and lessons gained from their own experiences and inspire the mentee to attain similar or even greater accomplishments. Fourth, using various strategies such as coaching, mentors assist mentees to prepare, build and succeed in their careers. Fifth, mentors act as professional models in behaviour and skills (B. Johnson, 2016). Sixth, mentors support mentees emotionally and socially by encouraging and counselling mentees (B. Johnson, 2016). Seventh, mentoring transforms the mentee's identity; and eighth and last, mentoring is a safe haven for the mentee to discover himself or herself (B. Johnson, 2016).

Mentoring is considered to be distinct from advising, supervision, coaching and sponsorship. B. Johnson (2016) states that advising is a defined role allocated to faculty members in an academic institution. Advising involves providing technical assistance (mainly information on academic programmes and requirements) to students who are in programmes or departments similar to those of the advisor. In contrast, mentoring need not be formal and can occur within or outside the confines of the academic institution.

B. Johnson (2016) also affirms that supervision is similar to advising, because it is an allocated role. However, a supervisor does not have to hold a post in the same institution or department as the person being supervised. A supervisor oversees a research project and ensures that the research expertise of the individual under supervision is developed. Mentoring is distinct from supervision in that the latter involves appraisal (Leslie *et al.,* 2005; Ehrich, 2013; Iversen *et al*., 2014). Also, unlike an individual under supervision, a mentee is more likely to discuss various matters more openly with a mentor (Kram, 1983) and has more negotiation power to determine objectives that should be met during the relationship (Meschitti & Smith, 2017).

Coaching is a short-term, targeted intervention that aids learning and development of specific skills and could be used to resolve specific challenges being experienced by an individual (Geber, 2009; Ehrich, 2013; Medford, 2015). A coach deliberately seeks to instil and build skills and attitudes in the person being coached to perform their job productively. In addition, coaching is always provided by a professional that is not from the same institution or department as the individual being coached, to ensure confidentiality and objectivity (B. Johnson, 2016). On the

contrary, mentoring seeks to achieve the "overall development" of a mentee so that his/her career and personal life are successful (Ehrich, 2013:20), and the mentor is usually someone known by the mentee (B. Johnson, 2016).

Although sponsorship is distinct from mentoring, according to de Vries and Binns (2018:6), it complements mentoring. They define sponsorship as "the active and deliberative use of power (organisational position, professional, standing, influence and connections) to facilitate the careers of others". De Vries and Binns (2018) highlight a number of features – including type of activity, responsibility, agency, purpose, capability, power and risk – that vividly distinguish the two concepts. Mentoring is passive; has an objective of improving an individual's job proficiency and efficacy; poses limited risk to the mentor's reputation; and is not pre-determined by the mentee's capability and success potential. Moreover, a mentor is not necessarily an influential individual; he/she facilitates the mentee's progression and success; and the mentee is the impetus in the relationship. On the contrary, sponsorship is active; has an aim of aiding an individual's advancement; poses significant risk to the sponsor's reputation; and is pre-determined by the recipient's capability and potential to succeed. Additionally, a sponsor is usually an influential, highly networked individual, with material and financial resources; he/she is the force behind the relationship; and is very interested in the recipient's success, to the point of advocating for and protecting him/her.

In summary, mentoring is a strong working alliance underpinned by trust and offers a high level of social support, such as emotional, informational, and instrumental support. Besides, it is a relationship that is transformational and not transactional (B. Johnson, 2016) whose functions are examined in the next subsection.

2.5.4 The functions of mentoring

Kram's seminal study describes mentoring as a type of developmental relationship rooted in the career setting and is focused on the career progression of a mentee (Eleanor *et al*., 2007). Mentoring relationships have characteristics that fulfil two types of functions for a mentee, namely career and psychosocial functions (Carden, 1990; Hezlett & Gibson, 2005; Eleanor *et al*., 2007). These two categories of mentoring functions are not mutually exclusive (Ramaswami & Dreher, 2007), but they differ in origin and result (Eleanor, Sandra, Ragins & Kram, 2007). The career functions – namely, sponsoring, coaching, offering challenging tasks, visibility and exposure – focus on career growth (Ramaswami & Dreher, 2007) and "directly enhance the likelihood of the protégé becoming successful in his or her career" (Dougherty & Dreher, 2007:74). Psychosocial

functions, such as counselling, friendship and role modelling (Ramaswami & Dreher, 2007), serve to develop character, competence, and self-esteem, as they "…tend to enhance a protégé's sense of professional competence and identity" (Dougherty & Dreher, 2007:74).

Mullen (1994), in her endeavour to further develop Kram's view on mentoring as a developmental relationship, presented a new perspective that describes mentoring as a process of information exchange between a mentor and mentee. Mullen (1994) defines the mentoring relationship as, a structure through which a mentee can obtain wide-ranging information or opinions from a mentor. Consequently, mentoring relationships are entrenched in HEIs' educational process (Lunsford *et al.*, 2017). Mentoring relationships occur within the existing regulations, policies and cultural framework of an organisation (McKeen & Bujaki, 2007). Also, a mentee can be in a mentoring relationship within or outside his/her organisation.

Scandura and Pellegrini (2007) indicate that mentoring theories encompass three distinct approaches to mentoring outcomes, namely mentee outcomes, organisational outcomes and mentor outcomes. The first approach, which is founded on a career theory perspective, is related to mentoring outcomes for a mentee and is therefore relevant to this study (Scandura & Pellegrini, 2007). The mentee outcomes can be categorised as either objective or subjective (Allen *et al.*, 2004; Hezlett & Gibson, 2005). Objective outcomes are tangible, and include research outputs such as scholarly articles, career advancement, research grants, and collaborations. On the other hand, subjective outcomes are intangible and include job satisfaction, work morale, and career commitment (Gardiner *et al.*, 2007). According to Hezlett and Gibson (2005), the realisation of both career and psychosocial mentoring functions was associated with a mentee benefitting from both objective and subjective career outcomes. In contrast, Allen and colleagues' (2004) meta-analysis of the career advantages related to mentoring established that mentoring that is focused on fulfilling career functions is more closely related to objective career outcomes than psychosocial mentoring is, although the process that explains this effect is unknown.

It is worth bearing in mind that mentoring functions can be fulfilled by more than one mentor at any given time (Burke & McKeen, 1990), and an individual mentor may only be suitable for the fulfilment of some functions for a mentee (Ragins & Cotton, 1999; B. Johnson, 2016). Therefore, in order for an ECA to maximise benefits from mentoring, it may be worthwhile for him/her to have more than one mentor and to be in more than one mentoring relationship (Higgins & Kram, 2001), a phenomenon referred to by Johnson (2016:37) as "mentoring constellations". Similarly, the impacts of mentoring might not be visible over the short term but instead may materialise in the medium to long term (Ragins & Cotton, 1999; Eliasson *et al.*, 2000; Ortiz-Walters, 2009). The

psychosocial functions of mentoring are more likely to be visible immediately or in the short term, whereas the career functions of mentoring are only likely to be experienced in the long term (Kirchmeyer, 2005; Meschitti & Smith, 2017). Since the focus of this dissertation is on the role of mentoring in the career outcomes of female ECAs, the discussions in the following subsection focus on the career functions of mentoring.

Mentoring functions

sponsoring, coaching, challenging tasks, visibility, exposure, counselling, friendship, role modelling, information exchange

Mentee outcomes

Objective: scholarly articles, research grants, collaborations

Subjective: job satisfaction, work morale, career commitment

Career development
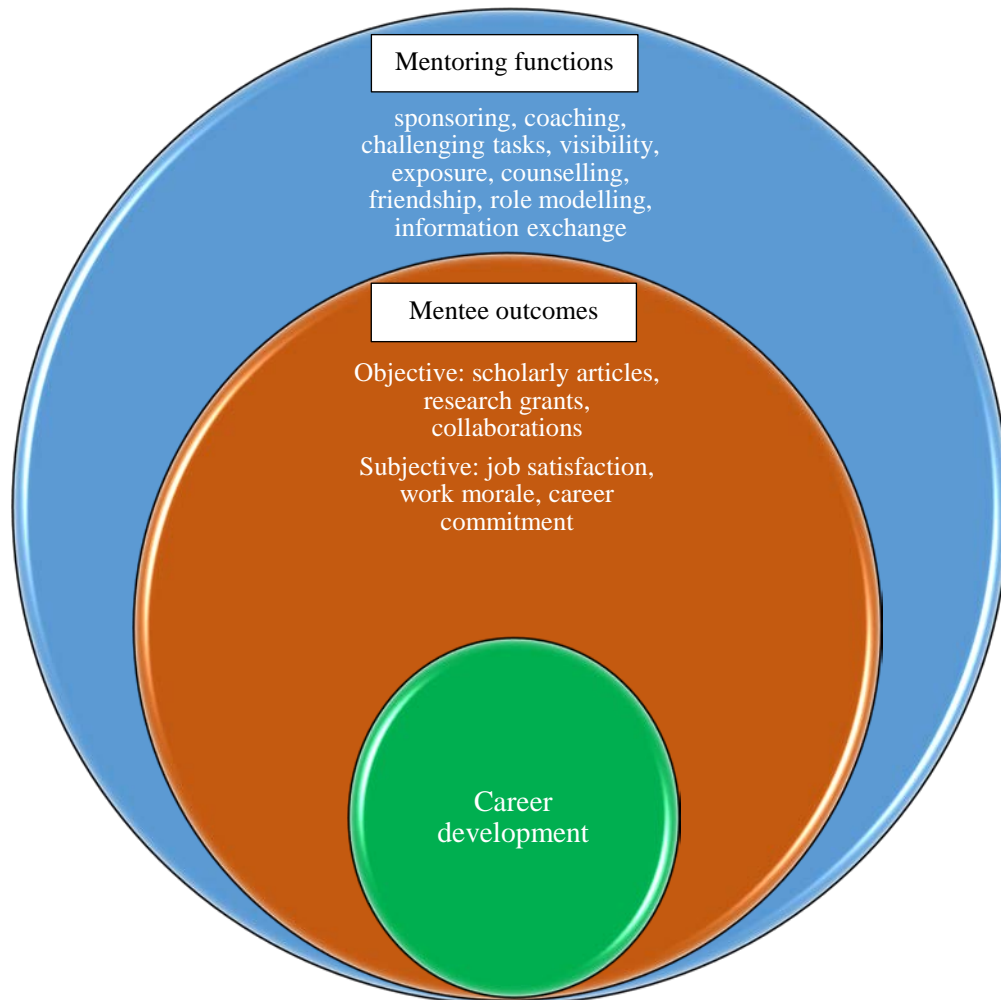
Figure 3: The link between mentoring and academic career development

2.5.5   Influence paths of mentoring

Ramaswami and Dreher (2007) state that mentoring relationships that fulfil career functions impact on a mentee's career through three paths. The first is the human capital path, which enables the improvement of the mentee's existing skills, abilities and knowledge, or transfers new ones to the mentee, and consequently results in enhancement of job performance. The second is the movement capital path, which enables the provision of varied information on labour market

opportunities within and outside an organisation to a mentee. Visibility, coaching and exposure are the mentoring functions that drive this second path. Ramaswami and Dreher (2007:217) explain that "[e]xposure and visibility involve the mentor providing opportunities for the protégé to meet or correspond with key decision-makers and senior managers – those who can judge the protégé's potential for further advancement". Coaching is whereby "the mentor coaches the protégé regarding what may be the most appropriate or viable mobility option".

The third is the social capital path (Ramaswami & Dreher, 2007), which through networking, enables the mentee to achieve exposure and credibility, and makes the mentee's potential and attributes known to influential decision-makers (Allen *et al*., 2004; Dougherty & Dreher, 2007; Ramaswami & Dreher, 2007; Angervall, Gustafsson & Silfver, 2018). Social capital can be described as resources that are developed or found in relationships, and that move by way of relationships and social networks. These resources include knowledge, goodwill, support, authority, counsel, and information (Bagilhole & Goode, 2001; Ragins, 2007; Angervall *et al*., 2018). Effective mentoring relationships result in the accumulation of social capital by a mentee, which in turn boosts his/her ability to prosper (Baker & Dutton, 2007 cited in Ragins, 2007). Mentoring itself is thought to be "both a form of positive social capital and the means by which positive social capital is developed in organizations and careers" (Ragins, 2007:288). Closely related and similar to Ramaswami and Dreher's (2007) views, Kirchmeyer (2005) states that the impact of mentoring on a mentee's career may be viewed from two perspectives – the performance and political perspectives – which influence career outcomes in the same manner as the human capital and social capital paths.

2.6   Conclusions

In this chapter, I firstly presented literature that I reviewed on the significance of research production and factors influencing research production. The literature review focused on five factors that drive the research output of ECAs and which were in line with the secondary data available from the YSA project. I paid particular attention to mentoring because it is a significant factor that is related to all the other four factors, namely mobility, networks, collaboration and research funding. It is essential to highlight that the studies that focused on these factors span a broad range of countries and contexts, and, where available, studies from Africa were highlighted since they relate directly to the subject of this dissertation.

Considering the literature on these factors more closely, I identified several gaps in knowledge on the situation in Africa. First, few studies have been conducted in Africa on factors affecting the

research production of ECAs. Second, studies in Africa that focus on the relationship between mentoring and career outcomes of ECAs in general, are almost non-existent – I was able to identify only two. The first study involved ECAs in five African countries, namely, Ghana, Kenya, Liberia, Nigeria and South Africa, who had received fellowships so that they could be mentored on research methods and scholarly writing. The mentoring programme aimed to enhance the mental health research capacity in sub-Saharan Africa (Gureje *et al.*, 2019). The second study was conducted in a single country, Cameroon, and involved 80 female ECAs (mentees) and 20 female senior academics (mentors) in the field of health sciences, in a mentor-mentee programme. The objective of the programme was to reduce the gender gap and increase the number of female researchers in the field of health in Cameroon (Kwedi Nolna *et al.*, 2017). These two studies focused mainly on mentoring in research methodology and scholarly writing. It is therefore clear that there is a gap in knowledge pertaining to the provision of mentoring in other key aspects, and specifically within the African context. These aspects include fundraising, presentation of research results and introduction to research networks, which are likely to play a role in career outcomes that are related to research production.

Secondly, in this chapter, I also presented literature on the conceptual frameworks on academic career development and mentoring. The concepts of career and academic career development were examined. In addition, two conceptual frameworks on mentoring, namely functions and influence paths, were examined. The conceptual framework on functions directs that mentoring indeed impacts on career outcomes, whereas the conceptual framework on influence paths orders the mechanism through which the effect of mentoring occurs. The two conceptual frameworks provide a foundation for predicting and understanding how mentoring in certain aspects could be related to specific career outcomes.

In consideration of all the aforementioned, this study involves a large-scale, secondary multi-country study, which aims to address the knowledge gap in Africa on the role of mentoring in the career outcomes (particularly those related to research production) of female ECAs. The next chapter describes the methodology that I applied for the study, including the strategy, designs and methods used for the collection of the data for the YSA project as well as the secondary processing and analysis that I undertook.

Chapter 3: Research methodology

3.1   Introduction

This chapter describes the methodology that I used for this study, including the strategy, designs and methods used for the collection of the existing data that were analysed, as well as the secondary processing and analysis that I performed. The chapter commences by explaining the way in which secondary data were used to address the study's research questions and the challenges that I encountered in undertaking secondary analysis. Next, I discuss the overarching mixed-methods research strategy that I employed for the collection of the existing data that were analysed, I present arguments in favour of using data collected through mixed-methods research to address the research questions for this study, and I conclude with an exploration of the quantitative and qualitative research strands that formed part of the mixed-methods design. Thereafter, for each of the two strands, the research designs, the methods that were originally used for the collection of the primary data, and the secondary processing and analysis of data that I conducted are explained.

3.2   Secondary analysis of existing data

This study entails a secondary analysis of existing data, which is defined by Bryman (2012:312) as "…the analysis of data by researchers who will probably not have been involved in the collection of those data, for purposes that in all likelihood were not envisaged by those responsible for the data collection". Babbie (2010:288) defines secondary analysis as a "form of research in which the data collected and processed by one researcher are reanalyzed—often for a different purpose—by another". The data for this study were collected by other researchers as part of a project titled 'YSA', which was the first multinational investigation aimed at studying factors that influence the research performance and career development of young scientists in Africa (Beaudry, *et al.*, 2018a).

The YSA project spanned the entire African continent, except for Libya (Beaudry, Solar-Pelletier, Mouton & Prozesky, 2018b) and was funded by the International Development Research Centre (IDRC) of Canada, the Robert Bosch Stiftung of Germany and the South African DST-NRF Centre of Excellence in Scientometrics and Science, Technology and Innovation Policy. The project was collaboratively undertaken by École Polytechnique de Montréal in Canada and CREST at Stellenbosch University in South Africa (Beaudry *et al.,* 2018b). Under the IDRC project grant, scholarships for master's and doctorate studies were awarded to various individuals to undertake

research relevant to the general project topic. I was awarded a scholarship in 2016 under this grant to pursue a PhD in Science and Technology Studies as a part-time student enrolled at Stellenbosch University, and hence I compiled and submitted a research proposal in the same year. However, in January 2017, I gave birth to my daughter and was unable to do any meaningful doctoral work that year. As a result, I did not participate in the YSA project activities as originally planned and so when I resumed my studies in 2018, I had to change plans to a study founded on the secondary analysis of existing data.

3.2.1 Benefits of secondary analysis

Secondary analysis of existing data offered several advantages. Firstly, it was more feasible, for me as a PhD student constrained in terms of time and finances, to utilise a relatively large, existing data set, rather than collecting the data myself (Babbie, 2010; Bryman, 2012). Therefore, I devoted more time to familiarising myself with the data, learning new data analysis techniques and then undertaking the analysis and interpretation (Bryman, 2012). Secondly, the data have a much broader geographical coverage (essentially, the whole of the African continent) than would have been possible if I were to collect the data myself (Bryman, 2012). Thirdly, the large amount of the quantitative data that was collected allowed me to conduct a more detailed analysis than would have been possible with smaller data sets (Bryman, 2012). Although others had already analysed the data (Beaudry *et al.*, 2018a; Prozesky & Mouton, 2019), I analysed the data from a new perspective, using the conceptual and theoretical frameworks discussed in the previous chapter, focusing on a subset of the data, namely female ECAs, and newly assessing relationships between variables (Bryman, 2012).

Fourthly, the secondary analysis provided an opportunity for me to access high-quality data (Bryman, 2012) from the well-funded YSA project. The data were collected by highly skilled individuals and included rigorous quality control measures. For instance, quantitative data were collected using a questionnaire adapted from a survey that had been conducted as part of a global study, titled the Global State of Young Scientists (GLoSYS) precursor study (Beaudry *et al.*, 2018a). Also, the questionnaire was tested during a pilot study undertaken in Zambia to ensure that it functioned well before broader distribution to other potential respondents (Beaudry *et al.*, 2018a). Moreover, qualitative data were collected by means of semi-structured interviews with interviewees who were purposely chosen to ensure representativity in terms of age, gender and field. In addition, priority was given to selecting interviewees affiliated with universities as the

institutions of higher education. Fifthly and last, analysing existing data, as I did, worked towards ensuring that the data were utilised to the fullest extent possible (Bryman, 2012).

3.2.2 Limitations of secondary analysis

According to Bryman (2012) and Babbie (2010), secondary analysis has few limitations in contrast to the advantages that it offers. Most of the limitations that do exist applied to me as I was conducting the secondary analysis. Since I was not involved in the data collection, I was initially quite unfamiliar with the large data set that the YSA project had produced, and therefore, had to spend a significant amount of time becoming acquainted with and understanding different aspects of the data set. Additionally, I had no control over the questionnaire design, which was of poor quality in some sections, and which consequently affected the quality of the data that had been collected. I did not have the background information as to why the questionnaire designers asked some questions and I did not participate in the data collection. For example, the questionnaire asked respondents two questions in one in the section on challenges where respondents were asked whether they lacked mentoring, mobility opportunities, training opportunities to develop professional skills, research funding, and funding for research equipment, and if so, whether these challenges had a negative impact on their careers. Finally, even though a large amount of data were available, those relevant to my study were limited, and I had no alternative but to work with the data in the format that it was available in.

3.3   Research strategy: mixed-methods research

Bryman (2012:35) defines a research strategy as "a general orientation to the conduct of social research", and it can be categorised as either quantitative, qualitative or mixed-methods research. A mixed-methods strategy is described by Creswell and Plano Clark (2018:5) as one during which

> the researcher collects and analyses both qualitative and quantitative data rigorously in response to research questions and hypotheses; integrates (or mixes and combines) the two forms of data and their results; organizes these procedures into specific research designs that provide the logic and procedures for conducting the study; and frames these procedures within theory and philosophy.

The YSA project followed a mixed methods strategy, and I argue in the following two subsections that my research questions, as formulated in chapter 1, would be best answered by utilising both sets of data. The research questions are:

1. What is the profile of a female ECA in Africa in terms of both demographic and work-related characteristics?

2. To what extent do female ECAs perceive that various challenges have negatively impacted their careers and are there any differences amongst fields in this regard?

3. Have female ECAs received mentoring in seven career aspects, namely: career decisions, attaining a position/job, introduction to research networks, research methodology, fundraising, scientific writing and presentation of research results? Are there any differences amongst fields in this regard?

4. Has receipt of mentoring of female ECAs in a selection of academic career aspects had an influence on their academic career outcomes that are relevant to those aspects?

3.3.1   Quantitative research

Quantitative research comprises measurement and analysis of collected data (Bryman, 2012), and for the YSA project, those data were collected using a questionnaire. I considered measurement important, as it firstly enabled me to describe small distinctions between cases of the study population, according to the characteristics indicated in my research questions (Bryman, 2012). Secondly, measurement provided a steady gauge for me to assess distinctions in those characteristics. Thirdly, it provided a foundation for me to obtain an exact estimation of the level of interrelation between concepts.

In the first research question, I characterised the study population according to demographic background (chronological age, nationality, country of work or residence, dependents, distribution of care work and general housework), field of specialisation (field in which female ECAs obtained their doctorate or equivalent degree), employment status, employment rank, research output, research funding, international mobility, collaboration and tasks occupying working time. For the second research question, I examined the extent to which female ECAs perceived various challenges as having had a negative impact on their careers. The challenges were namely lack of mentoring, balancing work and family demands, lack of research funding, lack of funding for research equipment, lack of training opportunities to develop professional skills and lack of mobility opportunities. In the third research question, I examined whether female ECAs had or had not received mentoring during their career, in seven academic career aspects, namely career decisions, attaining a position/job, introduction to research networks, research methodology, fundraising, scientific writing and presentation of research results. For the fourth research question, I analysed whether receiving mentoring in five aspects was related to one or more

relevant career outcomes. These aspects are research methodology, fundraising, scientific writing, presentation of research results and introduction to research networks.

Even though quantitative research is widely used in the social sciences, it is not without disapproval and some of its disadvantages apply to this study. Firstly, in quantitative research, "the measurement process possesses an artificial and spurious sense of precision and accuracy" (Bryman, 2012:178). This issue arises because the concepts under study and their measures are presumed, and respondents in a study rarely interpret keywords in a question in the same way. This disadvantage is applicable to this study because, as I discussed in the previous chapter, there is no agreed-upon definition of mentoring, and so this had an implication on my study because, in the challenges item of the questionnaire, respondents were asked to indicate whether, among other listed factors, lack of mentoring and support had negatively impacted on their careers. Additionally, in the mentoring item of the questionnaire, respondents were asked whether they had received mentoring, support or training during their career. The implication of how these two questions were structured was significant because the terms mentoring, support or training were not defined; instead, the terms were lumped together in each of the questions. Hence, the questionnaire respondents were left to interpret these terms on their own and yet it was highly likely that these terms held different meanings for various respondents.

Quantitative research also utilises tools such as self-completion questionnaires and processes that do not necessarily connect to respondents' actual, day-to-day circumstance. An extreme example is that mentoring, the topic I chose to study, may not have been of importance to a respondent, and it is possible that the responses to the questionnaire may have been influenced by external factors experienced by the respondent. Moreover, quantitative research is criticised for utilising the natural science model in its epistemological orientation. Consequently, it does not distinguish between the social world (which includes individuals who interpret events around themselves) and the natural world (which includes objects that do not have the ability to interpret). The examination of connections between variables portrays the social world as separate from individuals' lives, while in fact the latter constitute the social world.

3.3.2   Qualitative research

A qualitative research strategy is mainly concerned with the pursuit of making sense of – and comprehending – phenomena, and fittingly, Merriam and Associates (2002:3) write that

> the key to understanding qualitative research lies with the idea that meaning is socially constructed by individuals in interaction with their world. The world, or reality, is not the

fixed, single, agreed upon, or measurable phenomenon that it is assumed to be in positivist, quantitative research. Instead, there are multiple constructions and interpretations of reality that are in flux and that change over time.

Merriam and Associates (2002) state that in qualitative research, the researcher is the principal tool for collection and analysis of data. However, for my study, I was the principal tool for data analysis. Babbie (2010:394) defines qualitative analysis as "[t]he nonnumerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships". Bryman (2012) states that qualitative research focuses on words and language analysis and perceives the social world as consisting of processes. In addition, qualitative research pursues general research questions and is also mainly unstructured to enable flexibility (Bryman, 2012). Finally, recognising that the social sciences mainly deal with individuals and their unique social spaces, qualitative research aims to interpret the social world from the perspective of persons who are the subject of a study (Merriam & Associates, 2002; Bryman, 2012).

Research methods used in qualitative research include focus groups, semi-structured interviews, unstructured interviews, participant observation, documents and ethnography (Merriam & Associates, 2002; Bryman, 2012). For the YSA project, the qualitative data were collected using semi-structured interviews by means of telephone or via Skype. The collection of qualitative data was not a stand-alone process, but the data were collected in order to enhance the quantitative data that had already been collected, as described in section 3.4.2.2. The qualitative data were useful for my study for three main reasons. Firstly, although this is not directly related to the focus of my study, the data provided compelling information on explanations for some findings from the quantitative data analysis. The qualitative data were especially useful in providing explanation for why female ECAs lacked research funding, mentoring and funding for research equipment and how these challenges negatively impacted on their career. Secondly, the qualitative data provided a broader discussion of issues by contextualising the findings from the quantitative data, and this was useful in demonstrating how the challenge of balancing work and family demands had negatively impacted on the careers of female ECAs. Thirdly, the qualitative data were used to illustrate/put "meat on the bones" (Bryman, 2012:634) of the findings from the quantitative data. The illustration was useful for the findings from quantitative data on lack of training opportunities to develop professional skills, lack of mobility opportunities and receipt of mentoring in different aspects by female ECAs.

Qualitative research is criticised for a number of reasons. First, qualitative research is not considered "objective", because it mainly relies on the views of the researcher about what is crucial

(Merriam & Associates, 2002) and the individuals being studied (Bryman, 2012). This applied to the YSA project, because the researchers purposely selected potential interview respondents based on whether they were viewed as able to provide specific information (Beaudry *et al*., 2018a) and this critique also applied to my study because I analysed and only used portions of the qualitative data that I deemed important for my study. Also, the unstructured nature of qualitative research makes it difficult to precisely replicate a study (Bryman, 2012). Although there was never an intention to replicate the qualitative strand of the YSA project, this criticism is applicable, as a total of 259 interviews were conducted in varying contexts across the African continent, which would make replication of the qualitative strand challenging, if not impossible. Moreover, the results of the qualitative strand of the YSA project cannot be generalised to a broader population than the interviewees (Bryman, 2012) who were purposively selected according to their responses to the questionnaire.

Lastly, qualitative research is not considered transparent, in that it is not easy to determine "what the researcher actually did and how he or she arrived at the study's conclusions" (Bryman, 2012:406). This argument is applicable to the qualitative data collected as part of the YSA project because the researchers posed questions to interviewees based on their assessment of how interviewees had responded to questionnaire items. Hence, it is possible that the researchers could have missed asking other questions which would have generated additional useful qualitative data for my study. In other words, my study is limited to the analysis of qualitative data that were collected by other researchers, based on how useful they thought the questionnaire responses of each selected interviewee were and which ones deserved to be probed further.

3.3.3 Advantages of mixed methods research

Creswell and Plano Clark (2018) highlight that it is important for a researcher to justify the reason for choosing mixed methods for his/her study. Therefore, I do so now by describing, in general, the advantages that a mixed methods strategy offered my study. The key advantage is that a mixed methods strategy provided added evidence in investigating the research problem, because two sets of data were utilised, rather than either a qualitative or quantitative data set. Combining quantitative and qualitative research, therefore, enhanced the credibility of my results (Bryman, 2012), which is important, considering that I analysed data collected by other researchers. A mixed methods approach enabled me to reinforce the strengths and balance the weaknesses of both the quantitative and qualitative strands, which I have described in the previous subsections (Bryman, 2012; Creswell & Plano Clark, 2018). Lastly, a combination of qualitative and quantitative

research strategies enabled me to gain a multi-dimensional understanding of my research problem by harnessing both numbers and words, which also meant that I gained new skills in analysis of quantitative and qualitative data.

3.4   Research design

In this section, the research design employed in this study will be described. The discussion includes the data collection methods employed by the YSA project and the data processing and analysis methods I employed. There are three core types of research design in mixed-methods research, namely the convergent design, explanatory sequential design, and exploratory sequential design (Creswell & Plano Clark, 2018). The explanatory sequential design was applied in the YSA project, in that it started with a quantitative strand (a survey), followed by a qualitative strand (semi-structured interviews). The quantitative strand took priority, as it was the critical data collection method and, therefore, was undertaken before the qualitative strand, which was a secondary data collection method. Using some of the results from the quantitative strand as a guide, the YSA research team identified a subset of research participants from which they collected qualitative data. More specifically, and as will be described in more detail in the relevant subsections below, the results from the quantitative strand facilitated purposive sampling, because respondents who were eligible to be interviewed could be identified beforehand (Bryman, 2012; Creswell & Plano Clark, 2018).

In an explanatory sequential design, the qualitative data can be used to obtain explanations for the results produced by the quantitative strand (Creswell & Plano Clark, 2018). In the semi-structured interviews conducted in the qualitative strand of the YSA project, respondents were requested to elaborate upon, and thereby explain, some of the responses they provided to the questionnaire (Bryman, 2012; Creswell & Plano Clark, 2018). For my study, I applied the explanatory sequential design in that the qualitative data provided additional information which I then, as already discussed in subsection 3.3.2, used to explain, contextualise and illustrate the results of the quantitative strand hence, enriching the findings (Bryman, 2012). In the remainder of this chapter, each strand will be discussed separately in terms of general strategy (quantitative or qualitative) and methods employed.

3.4.1   The quantitative research strand: a cross-sectional survey

Using Bryman's (2012) classification of five types of research designs (case study design, comparative design, experimental design, cross-sectional design and longitudinal design), the quantitative strand may be best described as a cross-sectional survey design, for a number of reasons. The data were collected by means of a structured questionnaire from many individuals at the same time. Most of the data were collected in a quantified format, while the YSA project team quantified responses to the few open-ended questions during data processing. Lastly, I analysed the quantitative data set in order to establish whether selected variables of interest were related (Bryman, 2012).

3.4.1.1   *Selection of potential respondents*

For the YSA project as a whole, a young scientist was defined as an individual not older than 45 years, with a doctorate or equivalent degree as the highest qualification, which was attained not more than 10 years before the time of data collection. In broader terms, a young scientist was considered to be "a postgraduate or early-career researcher of any discipline actively pursuing a research career, usually without being fully established yet" (Beaudry *et al*., 2018a:45). In addition, the YSA project defined an African scientist as an individual who is a national of an African country, resides or works in an African country and holds a doctorate or equivalent degree in any discipline under six scientific fields viz., natural sciences, agricultural sciences, engineering, medical and health sciences, social sciences and the humanities (Beaudry *et al*., 2018a).

Despite the fact that a young African scientist was defined, as indicated in the previous paragraph, the actual selection of the research participants was conducted differently because it was difficult to identify those scientists that met the criteria implied in the definitions. Research participants including their emails were identified from articles published within 10 years from 2005 to 2015, with an African institutional address and that were indexed in the Web of Science (WoS) and Scopus databases. Recognising that some African scientists publish articles in journals that are not indexed in the WoS or Scopus databases, the plan was to examine local journals in various countries to identify eligible individuals. However, this plan was not feasible, therefore only local journals in Zambia were examined, and this was done by a PhD student who was conducting a study in that country at the time. Emails were additionally sourced from the South African Knowledgebase database, internet and snowball sampling, in other words, requesting potential respondents to send the survey invitation to other African scientists (Beaudry *et al.*, 2018a). Hence, it is noteworthy that there was a discrepancy between the planned implementation

of the selection criteria, which was abandoned because it was unfeasible, and how the selection of participants was actually executed. In addition, it is possible that other potential respondents were overlooked because they did not have an African institutional address, or they only published in local journals in their respective countries (with the exception of Zambia).

3.4.1.2   Data collection

A self-administered, structured, web-based questionnaire was used to collect data from the potential respondents of the YSA study (Beaudry *et al.*, 2018a). As the name self-administered suggests, the respondents themselves read the questionnaire and provided answers to the listed items (Babbie, 2010; Bryman, 2012). The self-completion questionnaire was adapted from two questionnaires that had been used in other studies, specifically the GLoSYS precursor study conducted in 2013, and the GLoSYS in Southeast Asian countries – specifically Indonesia, Thailand, Malaysia and Singapore – conducted in 2015 (Beaudry *et al.*, 2018b). According to Bryman (2012), the use of questionnaires from previous studies is advantageous in that the items have already been piloted. This advantage was useful for the YSA project research team, as the available questionnaires provided ideas on how to structure the items to suit their project. Items that were pertinent to the African setting, and which also aimed to fill gaps in literature, were added to the questionnaire. Subsequently, the questionnaire was translated from English to French in consideration of potential respondents from Francophone countries (Beaudry *et al*., 2018b). The questionnaire (see Appendix A) was composed of ten sections, which appeared in the following order: educational background, employment, working conditions, research output, funding, challenges, international mobility, collaboration, mentoring and demographic background.

The self-administered web-based questionnaire was piloted (pre-tested) in Zambia in May 2016 before dissemination to other countries (Beaudry *et al.*, 2018a). Bryman (2012) states that piloting the questionnaire before distribution is necessary for various reasons that were also applicable to the YSA project. Piloting enabled the researchers to determine whether the questionnaire operated well from a technical viewpoint, considering that the YSA project research team could only assist respondents via email in the event that any challenge arose. Piloting also allowed the researchers to establish whether instructions to respondents were suitable, and whether questions were clearly understood. One month after piloting the questionnaire, the survey was launched in other countries.

The part of the project team that was based in South Africa managed the administration of the questionnaire in countries where English is the predominant language. It used CheckBox as its

preferred platform. The other part of the project team, based in Canada, used its preferred platform – LimeSurvey – to manage the administration of the questionnaire in countries where French is the predominant language. Although "[t]here were minor differences between the two platforms […] the results were merged into one dataset without compatibility issues" (Beaudry *et al.*, 2018b).

No sample was drawn for the YSA project. More than 120 000 invitations to complete the questionnaire were sent out in three waves during the period beginning June 2016 and ending in February 2017. In the first wave, all potential respondents were contacted via email to establish whether they were interested in participating in the survey. The sending of this message made it possible to identify email addresses that were not functional, because messages to some email addresses were undelivered. In the second wave, all potential respondents that had indicated an interest to participate were sent an email with a link directing them to the questionnaire. After one week, the potential respondents were reminded via email to complete the questionnaire. In the third and last wave, all potential respondents who had not answered the first email, but had active email addresses, were reminded to complete the questionnaire (via an email message that again contained a link to the questionnaire). At the end of this process, 7 515 responses, varying in completeness, were received (Beaudry *et al.,* 2018a).

A self-administered/self-completion questionnaire was chosen as the data collection method for the quantitative strand of the YSA project because it has several advantages. These advantages are presented by Bryman (2012) and Babbie (2010), and I have applied them to the YSA study, since information on the advantages and disadvantages of this data collection method was not explicitly communicated in the YSA project outputs. Firstly, the self-administered questionnaire was cost-effective to administer, as there were no geographical limitations to its administration. Secondly, the questionnaire was faster to administer compared to for instance using interviewers, because the link to the questionnaire was simultaneously sent to thousands of email addresses of potential respondents that were identified. Thirdly, respondents completed the questionnaire at a time and place of their convenience. Fourthly, the use of a self-administered questionnaire ensured that respondents completed it without being influenced by characteristics of the data collector (such as gender, age, or race, were it to be done face to face), and responses were submitted confidentially. Fifthly, the wording of the questions was constant, and therefore similar for all respondents compared to if interviewers had been used and could possibly have asked the questions in a different way. Sixthly, the self-administered questionnaire was appropriate for the population of young scientists who, one may reasonably assume, have a good command of the

language in which the questionnaire was developed, thus decreasing the likelihood of items being misunderstood.

The self-administered questionnaire had disadvantages as identified by Bryman (2012) and which were applicable to the YSA study. To maximise the response rate, the questionnaire had to be short and limited to relatively few questions: very few of the open-ended kind, and only those items that the potential respondents would deem sufficiently relevant to respond to. Also, some respondents did not answer all items in the questionnaire, and this was observed in the fact that submitted questionnaires varied in their completeness. Moreover, it was not possible to collect additional data from the respondents by, for example, observing his/her surrounding work or home environment. Furthermore, self-administered questionnaires are characterised by a low number of completed questionnaires which increases the risk of non-response bias. (Babbie, 2010; Bryman, 2012). A low number of completed questionnaires were submitted by respondents of the YSA project considering that the questionnaire was sent to over 120,000 email addresses. However, it should be noted that the questionnaire was sent to some individuals who were not meant to receive it, for example, because they were not African. Hence, the total number of questionnaires sent to email addresses of individuals not relevant to the YSA project remains unknown. Finally, the self-administered questionnaire may have been completed by individuals other than those targeted, but researchers of the YSA study could not ascertain or confirm this.

The use of a web-based/online questionnaire also had its advantages, as highlighted by Bryman (2012) and Babbie (2010). A significant benefit of this type of questionnaire is that it was able to effortlessly reach many individuals. Also, the online questionnaire could reach individuals who were located in different geographical locations of the continent. Similarly, it was more cost-effective to administer the online questionnaire than if the postal service had been used, which would have incurred costs in printing, posting and staffing to place the questionnaire in envelopes. Another benefit of the web-based questionnaire is that, in comparison with a postal questionnaire, the responses were received immediately the respondent submitted the questionnaire.

Moreover, the questionnaire was designed to automatically skip items that were not applicable to a respondent. Besides, the questionnaire was set in such a way that respondents could not review all questions before answering the first question, which prevented them from providing responses that had been influenced by other questions. Additionally, the responses were collected rapidly because they were automatically captured in databases rather than being captured manually – a process which is prone to error. Other advantages of the web-based questionnaire are that fewer questions are left unanswered, and respondents provide more details in open-ended questions when

compared to a postal questionnaire. It should however be noted that I was not able to determine from the available outputs of the YSA project whether these two benefits applied.

The web-based questionnaire also has drawbacks (Bryman, 2012), which could have possibly been factors that influenced the number of questionnaires that were eventually completed. Though this is just speculation, as it was not possible to ascertain that these disadvantages applied to the YSA project, I felt that it was essential to highlight them. One drawback is that accessible, affordable and reliable internet is not available in all African countries or even in some regions within a country; hence, respondents may have been unable to complete the questionnaire. Similarly, a respondent would need access to a computer, so if respondents lacked this facility or it was not easily accessible, they would not have been able to participate in the survey. In other instances, individuals find surveys to be a nuisance, and so the targeted respondents might just have ignored the email invitation. Potential respondents could have been dissuaded from completing the web-based questionnaire due to the lack of human connection that would otherwise be experienced if it was an interview survey. The need to provide some form of motivation that will persuade identified individuals to respond to the online questionnaire is also a disadvantage, especially because they may be receiving requests to complete other surveys. Finally, an online questionnaire carries the risk of multiple responses by a single individual in instances where he/she completes it several times.

Since my study depended on data that was collected by other researchers, as described in the preceding paragraphs, I could avoid the issues of reliability and validity of the data that was collected. Some of the items listed in the questionnaire and which specifically relate to my study raise the concern of whether the data collected is reliable and valid. One item in the questionnaire asked respondents whether in their career so far, they had ever received mentoring, support or training in a number of aspects. The terms mentoring, support or training were not accompanied by definitions, and so it is possible that respondents inconsistently interpreted the question, leading to instability in measurement. The concern with reliability is also related to validity because if the measurement of mentoring, support or training was highly likely unreliable, it then means that the validity of results obtained from the collected data cannot be assured. Hence, I must treat them with caution. With regard to validity, the results that I obtained from this data can only be applied to female ECAs who were part of the respondents and cannot be generalised to other female ECAs who were not research participants because the results are not externally valid. Additionally, I am concerned with internal validity because I used the collected data to conduct an analysis to determine whether receipt of mentoring in a particular career aspect has a causal relationship to

one or more career outcomes that one could reasonably expect. Consequently, I had to conduct tests to determine the statistical significance of observed relationships so that I could confidently infer that the receipt of mentoring in a particular aspect was linked to the relevant career outcome.

3.4.1.3   *Date capture, selection and processing of data*

The quantitative data collected using the self-administered, web-based questionnaire were captured in the databases of the CheckBox and LimeSurvey platforms. Thereafter, the data were downloaded from each of these platforms and combined into a single data set. Examination of the responses to the item requesting respondents' nationality led to the discovery that, of the 7515 respondents, 9,8% were not of African nationality, and 14,3% did not reveal their nationality. These respondents' data were deleted from the data set, which resulted in a data set of 5700 cases. These data were prepared for analysis by the YSA project team using SPSS and STATA software. They removed errors from the data, assigned codes to responses to closed-ended items, categorised responses to open-ended questions (including "other" responses to closed-ended questions), and created new variables, where necessary, depending on the requirements of the project (Beaudry *et al.*, 2018b).

To answer the research questions of this study, I selected a subset of data consisting of only female respondents who fit the criteria of an early-career academic, from the YSA project data set for analysis. This subset is henceforth referred to as the sample, following Bryman's (2012) definition of a sample as a portion of a population that is the subject of an investigation. As a crucial first step in secondary analysis, I explored the YSA project data set, which entailed the inspection of the data set in order to acquaint myself with the information (for example, variables) that was available, and to understand the structure of the data set. To process the quantitative data, I used versions 26 and 27 of the IBM SPSS Statistics software. I created a new data set of female ECAs out of the larger data set that had been collected as part of the YSA project. The creation of the data set entailed the selection of cases according to four eligibility criteria: (1) females; (2) employed in the higher/tertiary education sector; (3) holding a PhD or equivalent degree (for example, doctorat d'etat, "state doctorate", or habilitation à diriger des recherches, the highest qualification in French higher education) as the highest qualification; and (4) the degree was awarded in the five years (2012, 2013, 2014, 2015, 2016) during or prior to the year when data collection commenced (2016).

Once the data set had been created, it contained a total of 297 cases that fit all of these criteria. This relatively small number of cases is not surprising, considering that only 30% of the YSA

project questionnaire respondents were females (Beaudry *et al.*, 2018b). Since I was undertaking a study founded on secondary data analysis, the small total number of cases in my data set presented a limitation in that I could only undertake analysis using the available data. At the same time, I was satisfied with the small number of cases contained in my dataset. This is because as a secondary analyst, I could not do much about the limitation, and it was vital that I embraced both the advantages and disadvantages of secondary analysis and made the most of what was available.

After the creation of the data set, I transformed (recoded) some variables into different variables to allow for easier interpretation of results. In the YSA project data set, the variable on field of highest qualification was divided into five categories, namely natural and agricultural sciences, engineering and applied technologies, health sciences, humanities, and social sciences. I recoded this variable by combining the humanities and social sciences categories into one, because the number of cases in the humanities category were too few (17) to ensure stability of results of bivariate analyses involving field. Similarly, the variable on employment ranks was divided into five categories in the original YSA project data set. These were professor, senior lecturer, lecturer, researcher/scientist, and postdoctoral fellow. I transformed this variable by excluding from analysis the number of cases in the researcher/scientist and postdoctoral fellow categories and instead conducted analysis using data in the remaining three categories. I did this because the ranks of researcher/scientist and postdoctoral fellow are not considered a traditional academic rank in HEIs. Although a postdoctoral fellow and researcher/scientist are not considered academic ranks, it was noted that 8% and 6% (of the 297 female ECAs who responded to the questionnaire item on employment status) stated that they were postdoctoral fellows and researchers/scientists, respectively. Finally, for bivariate analyses, the questionnaire item on receipt of research funding (during the three years before the survey) had four response categories ("no"; "yes – but not the primary recipient/grant holder of the funding"; "yes – the primary recipient/grant holder"; "yes – not the primary recipient/grant holder"; and "yes – in some cases the primary recipient and in some cases not the primary recipient") which I transformed to two ("did not receive funding", and "received funding").

In addition, I used a number of variables that had been recoded by the YSA project researchers, because they also made my interpretation of the results easier. In the questionnaire, the set of items on challenges had three response categories: "not at all", "to some extent", and "to a large extent". For my cross-tabulation analyses of field with all the challenges (lack of mentoring, research funding, funding for research equipment, training opportunities to develop professional skills, mobility opportunities, and balancing work and family demands), I used the recoded variables that

have two categories: "not at all" and "at least to some extent". Furthermore, the set of items in the questionnaire on mentoring had three response categories: "never or very rarely", "yes, but it was not valuable", and "yes and it was valuable". According to Bryman (2012:257), items such as these, which actually ask two questions in one, should be avoided. For my analysis, and especially the cross-tabulations, I therefore used the recoded variables, which have only two categories: "never/rarely" and "yes" in terms of the main focus of the analysis, namely whether mentoring had been received. Lastly, I realised that the number of valid cases for each variable differed, which was the result of two factors. In some cases, respondents may have chosen to "skip" some items or even entire sections. In other cases, responses to some items were not applicable to all respondents (in other words, they were dependent on a response to a previous one).

3.4.1.4 Data analysis

To answer the research questions, concepts in the research questions were measured through variables in the data set. The variables were analysed in four parts or objectives. The first objective was to describe the female ECAs according to the available background and other characteristics. The second objective was to determine the extent to which female ECAs perceived that several challenges had negatively impacted on their career. The third objective was to establish the extent of mentoring the female ECAs had already reportedly received, at the time of data collection, in seven career aspects. The fourth objective was to determine the possible influence of the mentoring that they had received on five aspects on the career outcomes of the female ECAs.

For the second and third objectives, I undertook bivariate analysis in the form of cross-tabulation. Bryman (2012:339) defines bivariate analysis as "concerned with the analysis of two variables at a time to uncover whether or not the two variables are related". Also, Bryman (2012:341) states that a cross-tabulation is also known as a contingency table, which "…allows two variables to be simultaneously analysed so that relationships between the two variables can be examined". For the fourth objective, I utilised suitable statistical tests, depending primarily on the level of measurement of the variables involved (Creswell & Plano Clark, 2018). The statistical significance of observed relationships in cross-tabulations was determined using the probability (p) value as generated by a Chi-square test, while for comparison of means, it was established using the f-statistic and the p-value, as generated by the one-way analysis of variance (ANOVA) test. Bryman (2012:347) states that "[w]hen examining statistical significance in relation to the relationship between two variables, it also tells us about the risk of concluding that there is in fact a relationship in the population when there is no such relationship in the population". The way in

which data analysis was conducted will now be described in more detail for each of these four objectives.

- **Profiling female ECAs**

To create a profile of female ECAs, I undertook a univariate analysis of specific variables by generating frequency tables and diagrams (bar graphs and pie charts, which indicate percentages). At this point, it is important to state that I am bound by the categories (response options) provided for each item in the questionnaire because they were determined by the research team of the YSA project, and hence, I had no power over them.

The first set of variables provided a profile of the demographic background of female ECAs, and included chronological age, nationality, the name of the country in which they work or live, the number of children or dependents that they each have, and the distribution of care work and general housework in their family, relationship or household. Following the questionnaire, the number of children or dependents were classified into three age categories: zero to five years, six to 18 years, and 19 years or older (including elderly dependents). Distribution of care work and general housework was measured in terms of three categories: percentage undertaken by the female ECA, percentage undertaken by the partner, and percentage undertaken by others, such as extended family or paid service.

The second main characteristic, field of specialisation, was divided into four categories, namely natural and agricultural sciences, engineering and applied technologies, health sciences, and social sciences. In the YSA project data set, the classification of the field in which the female ECAs obtained their doctorate degree into five categories was determined by the YSA project team. This is because the YSA project research team was interested in establishing whether the preference of their research participants in terms of publication strategies and whether research aspects such as networking, collaboration and raising funds or grants for research, differed according to their field (Beaudry *et al.*, 2018b).

Employment-related variables comprised the third set, which included employment status and rank. Employment status was measured as either permanent (employees are employed on an ongoing basis until the employer or the employee ends the relationship) or contract-based (employees are employed for a specific period of time or task, and the employment ends on the date specified in the contract). Rank of employment was limited to academic ranks only, namely professor (this included full professor, associate professor or reader), senior lecturer, and lecturer.

The fourth characteristic of the female ECAs' profile is research output. The questionnaire collected data on a wide variety of research outputs that respondents may have produced during the three years preceding the data collection. Research output was classified into twelve types in the questionnaire, namely articles that had been published or accepted (including co-authored) in refereed or peer-reviewed academic journals; books, including both monographs and edited volumes; book chapters, including those that had been co-authored; conference papers published in proceedings; presentations at conferences to predominantly academic audiences; research reports compiled from contract or consultation research; written input to official public policy documents; articles in popular journals or magazines, essays, newspaper articles or other public outreach media; patents which had been applied for and/or granted; computer programmes, including co-writing; creative or artistic works of art performed or exhibited for example, music, sculpture, paintings, theatre, film; and other research output which had to be specified by the respondent. For my study, I only selected the first five types of research output for analysis, as they are considered traditional outputs of research production (Whitley, 1984; Long & Fox, 1995).

The data on research output were self-reported by the questionnaire respondents, and covered a period of three years, namely 2014, 2015 and 2016. Due to the self-reported nature of the data, it may have limited validity, as over-reporting because of social-acceptability bias is likely, and limited reliability, as the precise number of each output type (requested in the questionnaire), may have led to recall issues, or respondents providing estimates. The ideal situation would have been to use bibliometric data, but the anonymised survey data could not be linked to bibliometric data for ethical reasons.

The fifth feature according to which the female ECAs were profiled was their research funding, which was examined according to whether they had received funding over a period of three years – 2014, 2015 and 2016 – and excluded bursaries or scholarships for studying purposes. Of those female ECAs who had received funding, data were available for further analysis to distinguish between those who were (1) the primary recipient/grant holder; (2) not the primary recipient/grant holder; or (3) in some cases, the primary recipient and in some cases not the primary recipient.

The data collected also allowed me to profile the female ECAs in terms of international mobility as the sixth characteristic. Two aspects were analysed: (1) whether they had studied or worked abroad (defined in the questionnaire as a country other than what they considered their home country); and (2) the extent to which those who had studied or worked abroad, considered it important for their career development.

The seventh feature according to which female ECAs were profiled was their research collaboration with other researchers either in joint research or through joint publications. Collaboration was examined according to the extent of their collaboration in four categories: intra-institutional (with researchers at their own institution), inter-institutional (with researchers at other institutions in their own country), inter-African (with researchers at institutions in other African countries) and international (with researchers at institutions outside of Africa, for example Europe, Asia, Australia, Antarctica, and the Americas). The eighth and final characteristic according to which the female ECAs were described was the percentage of their working time that they spent on tasks in a typical year. These tasks included undergraduate and postgraduate teaching; training or supervising postgraduate students; research, administration and management; service in terms of counselling of students, voluntary services within or outside their HEI, article review, or editorial duties; consultancy; and raising funds or grants for research.

- **Extent of a negative impact of various challenges on careers**

To determine the extent to which female ECAs perceived that a number of challenges had negatively impacted their careers, an analysis was conducted by generating bar graphs. Bivariate analysis in the form of cross-tabulation was conducted between the extent of negative impact of each challenge, and the field of the female ECAs. The purpose of the cross-tabulations was to establish whether there were any patterns between the field of female ECAs and the perceived negative impact of several challenges on their careers.

The questionnaire listed ten challenges: lack of mentoring; lack of research funding; lack of mobility opportunities; lack of training opportunities to develop professional skills; balancing work and family demands; lack of funding for research equipment; job insecurity; lack of access to a library or information sources; limitation of academic freedom; and political instability or war. However, of these ten challenges, only the first six were selected for analysis, as they were related to the subject of the study. It is crucial that I mention the possible overlap between two challenges: a lack of mentoring, and a lack of training opportunities to develop professional skills. Although they are treated separately in the questionnaire item on career challenges, the questionnaire item on mentoring tends to conflate mentoring and training. First, it asks "During your career so far, have you ever received mentoring, support *or training* in the following". Secondly, at least three types of this mentoring, support or training may also be considered to be "training opportunities to develop professional skills", namely research methodology, scientific writing, and presentation of research results. This issue is compounded by the fact that no definitions of mentoring and

training were provided in the questionnaire. However, as these two challenges were considered distinct from each other by the developers of the questionnaire, I decided to follow their approach in my analysis of the challenges.

- **Receipt of mentoring**

Descriptive analysis, producing frequencies and percentages, was undertaken in order to ascertain the extent to which female ECAs had received mentoring in seven aspects of an academic career. These aspects included career decisions, attaining a position/job, introduction to research networks, research methodology, fundraising, scientific writing and presentation of research results. Bivariate analysis in the form of cross-tabulation was also conducted between the receipt of mentoring in each aspect, and the field of the female ECAs. The objective of the cross-tabulations was to establish whether there were any patterns between receipt of mentoring in each of the seven aspects and the field of female ECAs.

- **Relationship between mentoring and academic career outcomes**

To answer the fourth question on whether receipt of mentoring of female ECAs in a selection of academic career aspects had an influence on their academic career outcomes that are relevant to those aspects, bivariate analyses were undertaken. Bivariate analyses in the form of comparison of means and cross-tabulations were undertaken between, on the one hand, five aspects on which mentoring may have been received (research methodology, fundraising, scientific writing, presenting research results and introduction to research networks) and, on the other, career outcomes that are directly related to research production. Receiving mentoring in these aspects is hypothesised to have a positive influence on career outcomes that are related to research production, which is considered critical in the development of an academic career, as discussed in chapter two. A comparison of means was done to investigate whether a relationship exists between a nominal variable (the variable in the questionnaire was ordinal, but I used the variable that had been recoded into nominal by the YSA project researchers) that is, mentoring received on each of the aspects and the interval/ratio variable, namely research output (Bryman, 2012). These analyses were done to determine whether there was any relationship between a female ECA being mentored in a career aspect and a career outcome associated with that aspect.

3.4.2 The qualitative research strand: semi-structured interviews

3.4.2.1 Selection of potential participants

As discussed previously in section **Error! Reference source not found.**, the survey responses from the quantitative strand were used as a guide by the YSA project team to identify a subset of potential interview participants, from which they collected qualitative data. In the last section of the questionnaire on follow-up (see Appendix A), respondents were asked whether they would be available for an interview, depending on their respective responses and if so, they were asked to provide their email address for ease of contact (Beaudry *et al.*, 2018b). According to Beaudry *et al.* (2018a:186),

> [a] total of 3295 (57.8%) of the survey population agreed to be interviewed. However, the number of in-depth interviews we could conduct was limited, and we were specifically interested in interviewing young African scientists, with a focus on gender and research output. Based on the final number of completed questionnaires by the close of the survey date (February 2017), we identified those individuals that were eligible to be included in the sample of possible interviewees. We subsequently purposefully selected potential interviewees on the basis of institutional affiliation (prioritising universities), gender, age and field.

More detail on the inclusion criteria for selection is unfortunately not reported in any of the outputs produced by the YSA project team. However, according to Beaudry *et al.* (2018b), of the 3 295 survey respondents who agreed to be interviewed, 265 were females. 136 were from Arabic- and French-speaking African countries, namely Algeria, Benin, Burkina Faso, Cameroon, Cote d'Ivoire, Morocco, Senegal and Tunisia, while 129 were from English-speaking African countries, namely, Ethiopia, Ghana, Kenya, Nigeria, South Africa, Tanzania, Uganda, and Zimbabwe. These prospective interview participants were contacted via email and requested to state the date and time of when they would be available to be interviewed. For those who did not respond, two other follow-up emails were sent (Beaudry *et al.*, 2018b). Due to factors such as lack of response to invitations to be interviewed and cancellation of interview appointments because of poor telephone and internet connections, a total of 105 interviews with females were eventually completed (Beaudry *et al.*, 2018b).

As will be described in more detail below, the interviews were transcribed, and one of the two principal investigators (PIs) of the YSA project, Prof. Johann Mouton, the Director of CREST, provided me with the transcripts of the 79 interviews conducted on female participants from English-speaking African countries. Transcripts of interviews with female participants from

Arabic- and French-speaking African countries had not been translated by the time I undertook the analysis and were therefore not available.

The file name of each transcript included information (in the form of abbreviations) on each participant's age and country and, in the case of South African participants, their institutional affiliation. However, the information was insufficient for me to determine which female interviewees fit the definition of a female ECA that I used for selecting quantitative data (see subsection 3.4.1.3). This limitation of my secondary analysis of existing qualitative data was further compounded by the above-mentioned lack of detailed information on the selection criteria of potential interviewees. I therefore had no option but to consider all the transcripts of interviews with female participants for analysis, and it is very likely that some of the qualitative data that I used were obtained from female participants who unfortunately do not fit my definition of a female ECA.

3.4.2.2 *Data collection*

Interviews were conducted by the YSA team during different time periods, beginning with South Africa in October and November 2017. Thereafter, interviews were conducted in other English-speaking African countries from April to June 2018, and lastly, interviews in French-speaking and Arabic-speaking African countries were conducted from May to July 2018. The English interviews were conducted by four researchers based at CREST, whereas the French and Arabic interviews were conducted by four researchers based at the École Polytechnique de Montréal (Beaudry *et al.*, 2018b).

The interviews that were conducted to collect data for the qualitative strand met the definition of a semi-structured interview, as they consisted of a mixture of structured and less structured questions (Merriam & Associates, 2002). Also, the interviews were less formal than a structured interview, in the sense that questions were not asked with the same wording and in the same order by the interviewers (Bryman, 2012). Instead, individual information on the selected participants was extracted from their questionnaire responses, and each interview was tailored to this information (Beaudry *et al.*, 2018b). Each interview schedule was therefore distinctive, in the sense that interviewees were requested to expound on their particular responses to the questionnaire, by provide more information about, and reasons for, those responses. Interviewees were further requested to suggest recommendations that could aid the professional development of early-career scholars (Beaudry *et al.*, 2018b). The interviewers also had the latitude to ask the interviewee further questions based on specific interview responses (Bryman, 2012).

3.4.2.3 *Data capturing, processing and analysis*

All the interviews were audiotaped with the interviewees' permission. The English interviews were transcribed by a private firm based in Cape Town, whereas the French and Arabic interviews were transcribed by four researchers based at the École Polytechnique de Montréal (Beaudry *et al.*, 2018a).

I thoroughly read each of the 79 transcripts and coded the data by identifying and highlighting key remarks made by the interview participants and by also assigning names to themes emerging from the data. Bryman (2012:579) notes that themes "are the product of a thorough reading and rereading of the transcripts… that make up the data". A theme is defined by Bryman (2012:580) as:

> a category identified by the analyst through his/her data; that relates to his/her research focus (and quite possibly the research questions); that builds on codes identified in transcripts…; and that provides the researcher with the basis for a theoretical understanding of his or her data that can make a theoretical contribution to the literature relating to the research focus.

I then undertook a thematic analysis (Bryman, 2012) of the coded data by reviewing and extracting phrases that matched the various themes of my study and were relevant in terms of providing illustration, context or explanations for some of my quantitative findings. Of the 79 transcripts, 62 provided relevant data. The average age of the 62 interview participants was 39 years, and their ages ranged from 24 years to a high 59 years. Additionally, the interview participants were predominantly (85%) from South Africa, and the rest were comprised of 13% and 2% from Nigeria and Zimbabwe, respectively. I incorporated direct quotations (or paraphrased versions of these) from these transcripts into the presentation of my quantitative results and interpreted the combined results.

3.5 Ethical considerations

For the YSA project, ethical clearance was granted by the relevant research ethics committees of Stellenbosch University (Proposal #: SU HSD-002130) and Polytechnique Montréal (N/Réf: Dossier CÉR-1516-43). And from the methodological descriptions in various outputs of the YSA project, it is clear that the research team ensured that the quantitative and qualitative strands were conducted ethically. Participation in the survey was voluntary, and informed consent was obtained from all respondents before they could proceed to the online questionnaire. It was again indicated

in the introductory page of the questionnaire that respondents reserved the right to answer only those questions that they chose to, and to withdraw from the survey at any time.

Also, respondents were assured that their personal and organisational information would be anonymised in any outputs generated from the survey, that the data collected would be kept confidential, and that only the research team would gain access to it (for further details, refer to Appendix 2 on page 187 in Beaudry *et al.*, 2018a). For the qualitative strand of the YSA project, interviews were also conducted according to acceptable ethical standards. Only the respondents who had indicated at the end of the questionnaire that they would be available for an interview were invited for an interview, for which they again were asked to provide informed consent.

Initially, the intention of the PIs was that I would be part of the YSA project research team, as one of the CREST-affiliated doctoral students funded by the project, who would therefore, have access to the data collected. However, my participation in the project was prevented primarily by my maternity leave, which coincided with much of the fieldwork. Therefore, I was not formally identified as a team member in the above-mentioned ethics clearance applications. As the research team of the YSA project did not obtain permission from the questionnaire respondents or interviewees for the data to be accessed and analysed by other individuals than the identified team members, I had to follow a number of additional ethics-related procedures.

First, to gain access to the anonymised survey data, I had to seek permission from Prof. Mouton, who was one of the two PIs of the YSA project. Permission was granted in November 2019, with the stipulations that (1) the permission only applies for use for my PhD and not for any other (future) project; and (2) that I am not allowed to share these data with a third party (see Appendix B for a copy of the letter). In addition, the other PI of the YSA project, Prof. Catherine Beaudry, a Research Chair at the Polytechnique Montréal in Canada, submitted a request for an amendment to the original ethics application to Polytechnique Montréal's Ethics Committee for Research Involving Human Beings, adding me as a researcher. The application was accepted in November 2019 (see Appendix C for a copy of the approval letter).

Finally, I also submitted an ethics-clearance application to Stellenbosch University's Research Ethics Committee for Social, Behavioural and Education Research (REC: SBER) for my own study. Clearance was granted in March 2020 (Ref. # CREST-2019-13085; see Appendix D for a copy of the clearance letter). Both the quantitative and qualitative data that I received excluded any personal identifiers. However, to ensure that survey respondents and interview participants could not be identified in any other way, results on the former are reported in the aggregate, and

in the case of the latter, potential identifiers, such as institutional affiliation, were excluded from the results.

3.6   Conclusion

This chapter provided a description of and reflection on the methodology that was implemented by the YSA project team to produce the data that I used for this study, as well as the data processing and analysis methods I used to answer my research questions. The step-by-step account started from a discussion on secondary analysis, proceeded to identification and justification of the mixed-methods research strategy and research design that were employed in the YSA project, and which I decided to also apply. This was followed by an explanation of the methods used for the quantitative and qualitative strands that formed part of the mixed-methods strategy, in order for the YSA project researchers to select potential participants, collect data from them, and capture and process that data. For each strand, I described how and why I selected the data for my study, and what the data analysis entailed. I then ended the chapter with a discussion on the ethical considerations of both the YSA project and my study. The following chapter presents the results from the data analysis with a focus on the description of female ECAs in Africa.

Chapter 4: A profile of the survey respondents

4.1   Introduction

In this chapter, I describe the profile of female ECAs whose survey data were analysed. Although it is recognised that a comparison with male ECAs – or with the other respondents as a whole – would have been interesting, such an analysis falls beyond the scope of this dissertation. Instead, the intention is to provide the reader with background information on the characteristics of the population that is the focus of the results presented in selected the next two chapters.

As I have already described in chapter 3, an ECA is defined in this study as an individual whose highest qualification is a doctorate that was awarded in the five years preceding the time of data collection for the survey, and who is employed at a HEI. The first research question calls for a profiling of these female ECA respondents to the survey, by describing them according to various features that are of relevance to this study. These features are grouped into seven major categories, namely demographic background, field of specialisation, employment, research output, funding, international mobility, collaboration with researchers (in terms of research or publications), and lastly tasks occupying working time. To illustrate and contextualise the findings from the quantitative data analysis on some features namely, research funding and working conditions, I have also presented qualitative data.

4.2   Characteristics of female early-career academics

4.2.1   Demographic background

In this subsection, five features are used to describe the demographic background of the female ECAs: chronological age, nationality, country of work or residence, dependents, and distribution of care work and general housework.

4.2.1.1 *Chronological age*

The chronological age of the female ECAs in the survey data set ranges from 27 to a very high 68 years. The median ($\tilde{x}$) age of the female ECAs is 40 years. Figure 4 illustrates the chronological-age distribution across three categories, showing that half of the female ECAs are 39 years or younger, over a third are aged between 40 and 50 years, while the minority are older than 50 years.
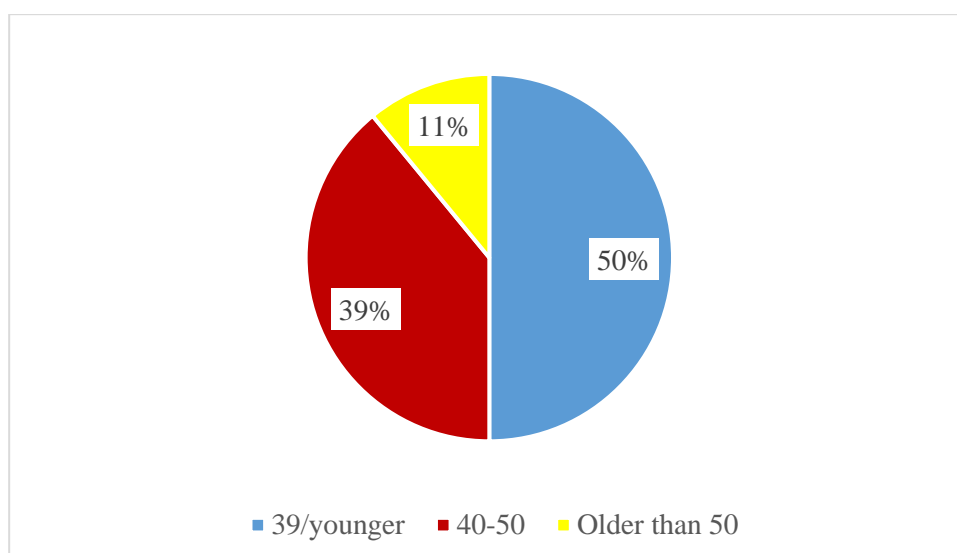
Figure 4: Age distribution of female ECAs (n=292)

4.2.1.2   Nationality

In terms of nationality, the female ECAs are spread across 25 African countries, as shown in Table 2 below. Female ECAs that are nationals of South Africa comprise the largest percentage, followed by Algeria and then Nigeria. In contrast, female ECAs that are nationals of Burkina Faso, Democratic Republic of Congo, Cote d'Ivoire (Ivory Coast), Gabon, Lesotho, Mozambique, and Senegal constitute the lowest percentage.

Table 2: Frequency distribution of female ECAs across 25 African nationalities

Country	n	%		n	%
South Africa	123	41,4	Benin	2	0,7
Algeria	51	17,2	Botswana	2	0,7
Nigeria	35	11,8	Cameroon	2	0,7
Tunisia	27	9,1	Ethiopia	2	0,7
Morocco	9	3,0	Madagascar	2	0,7
Egypt	7	2,4	Burkina Faso	1	0,3
Zimbabwe	6	2,0	Democratic Republic of Congo	1	0,3
Kenya	5	1,7	Cote d'Ivoire	1	0,3
Ghana	4	1,3	Gabon	1	0,3
Zambia	4	1,3	Lesotho	1	0,3
Malawi	3	1,0	Mozambique	1	0,3
Tanzania	3	1,0	Senegal	1	0,3
Uganda	3	1,0	**Total**	**297**	**100,0**

In terms of regions in Africa, Figure 5 indicates that almost half (47%) of the female ECAs are Southern African, 32% are North African, 15% are West African, while only 5% and 1% are East African and Central African, respectively.

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Figure 5: Region of nationality of female ECAs (n=297)
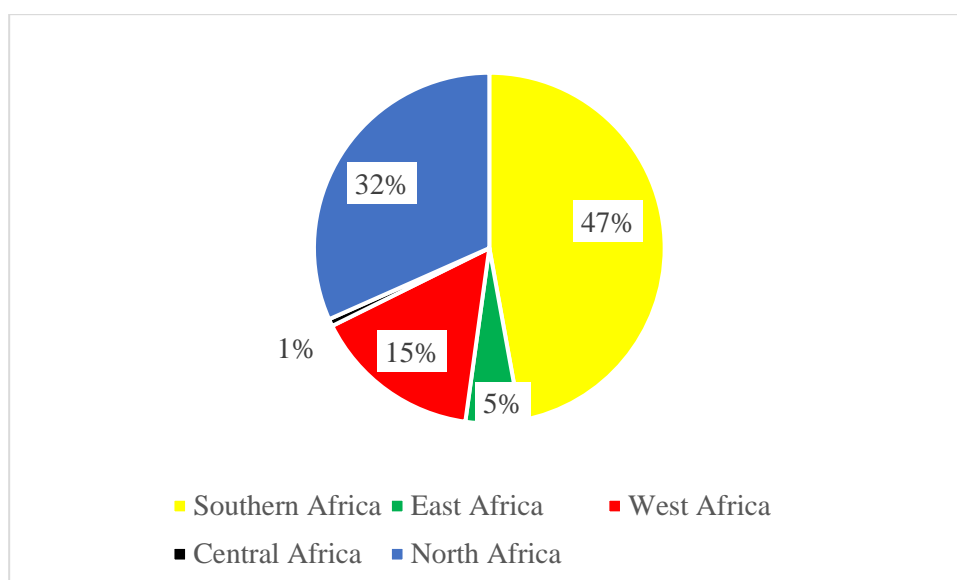
4.2.1.3 Country of work or residence

The female ECAs work or reside in 25 African countries that are the same as their countries of nationality (but exclude Lesotho). As was found for nationality, the three largest percentages of female ECAs work or reside in South Africa (43%), Algeria (17%) and Nigeria (11%).

4.2.1.4 Dependents

Pertaining to children and/or other dependents of female ECAs, an analysis of the survey data distinguished between these children or dependents in terms of three age categories. The results show that more than half (55% of the 221 female ECAs who responded to the question) do not have children or dependents in the youngest age category (zero to five years), and the 100 that do have two children, on average. On the other hand, more than half (55% of the 230 female ECAs that responded to the question) have children or dependents in the older age category of six to 18 years, and, on average, they again have two such children or dependents. The oldest category of dependents, those aged 19 or older, includes elderly dependents. The results show that more than half (57% of the 222 female ECAs that responded to the question) have such adult dependents, and on average, those female ECAs have two such adult dependents.

4.2.1.5 Distribution of care work and general housework

An analysis of the distribution of care work and general housework in the female ECAs' family, relationship or household shows that, on average, female ECAs report undertaking 59% of such

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work (n=268), while their partners undertake only 23% (n=227), and other individuals (for example, extended family or paid service) undertake 28% (n=200).

4.2.2   Field of specialisation

This section describes the fields in which the female ECAs obtained their doctorate degree. As Figure 6 shows, the highest percentage (35%) of female ECAs hold a doctorate in the social sciences, followed by 30% who hold it in the natural and agricultural sciences. Almost a quarter (23%) of female ECAs hold a doctorate in the health sciences, whereas 12% hold it in the engineering and applied technologies.
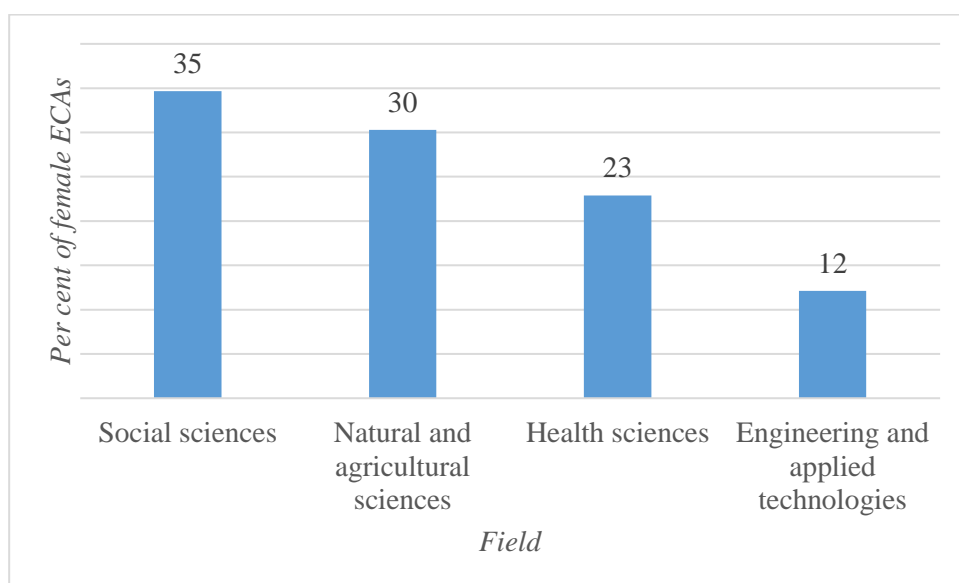
Figure 6: Field of doctorate degree of female ECAs (n=297)

4.2.3   Employment

The employment of female ECAs in HEIs is described in terms of two attributes, namely status (whether an individual is hired on a permanent or contract basis) and rank (academic position in which an individual is hired). Results on employment status indicate that female ECAs are predominantly (90%) employed on a permanent basis.

Pertaining to rank (regardless of status), with the lowest being a lecturer and highest rank a professor, Figure 7 illustrates that the highest percentage (46%) of female ECAs are employed at the rank of senior lecturer, closely followed by 41% at the rank of lecturer. In comparison, only 13% occupy the rank of professor (full or associate).
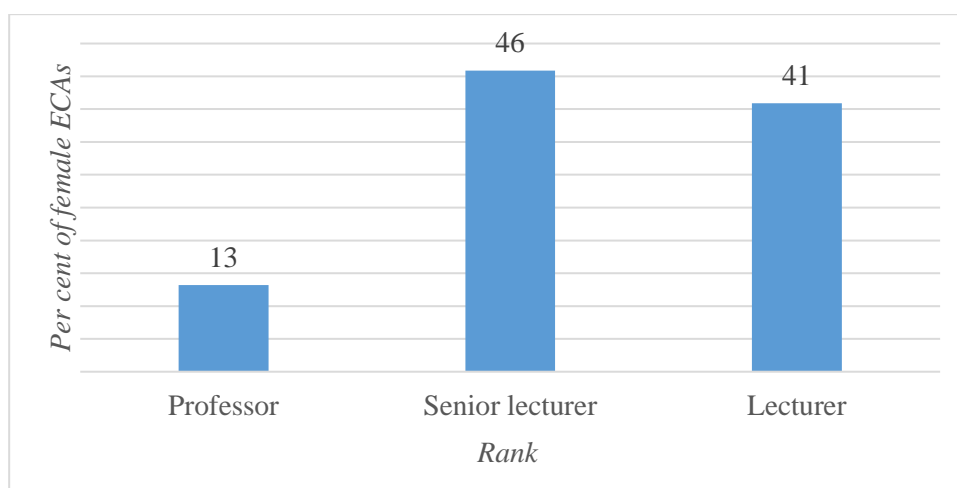
Figure 7: Employment rank of female ECAs (n=242)

4.2.4 Research output

Table 3 below provides, for a selection of the research-output types provided in the questionnaire (as described in subsection 4.1.4.1 of chapter 3), the number of female ECAs that reported producing, in the three years preceding the survey, at least one such output, as well as the range, median and average number of each output type produced by those female ECAs. In terms of scholarly articles, female ECAs produced 5,9 on average, with a $\tilde{x}=5$ and a range of 1 to 20. With regard to books, they produced an average of 1,4 with a $\tilde{x}=1$ and a range of 1 to 6. Additionally, female ECAs produced two book chapters on average with a $\tilde{x}=1$ and a range from 1 to 16. Pertaining to conference papers published in proceedings, they produced 4,5 on average with a $\tilde{x}=3$ and a range of 1 to 20. Lastly, female ECAs produced 5,3 conference presentations on average with a $\tilde{x}=4$ and a range of 1 to 20.

Table 3: Self-reported research output over the three years preceding the survey

Type of output	Number of cases	Range	Mean ($\bar{x}$)	Median ($\tilde{x}$)
Articles in peer-reviewed academic journals	271	1–20	5,9	5
Books	42	1–6	1,4	1
Book chapters	111	1–16	2,0	1
Conference papers published in proceedings	167	1–20	4,5	3
Conference presentations	236	1–20	5,3	4

It should be noted that the number of female ECAs who answered the question on research outputs in the questionnaire varied greatly across the output types. For instance, 271 female ECAs responded that they had produced articles in peer-reviewed academic journals, whereas only 42 of them responded that they had produced books. I assumed that those female ECAs who reported

that they had no research output of a particular type may have indicated the number as 0, or may have left the question blank, and therefore I excluded both those respondents coded as "0" and "missing" from this analysis.

4.2.5   Research funding

A total of 293 female ECAs responded to a questionnaire item on whether they had received any research funding during the three years prior to the survey. Only half of those reported having received such research funding. As illustrated in Figure 8, further analysis of those 147 female ECAs revealed that almost half (46%) were the primary recipient or grant holder of the funding, while a quarter were not, and the remaining 29% indicated that they were both.
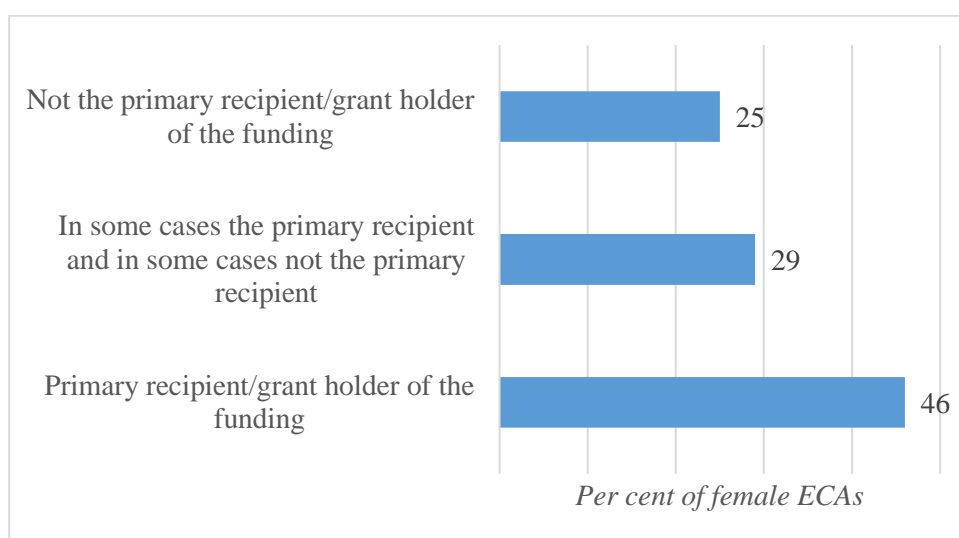
Figure 8: Female ECAs' status as recipients of research funding over the three years preceding the survey (n=147)

Personal interviews conducted with female academics revealed numerous reasons why some of them had not received research funding. The qualitative data also revealed that the challenge of lack of research funding is not only limited to public HEIs, but extends to private HEIs. This was disclosed by a 35-year-old interviewee from South Africa who stated that "it's even more difficult getting access to funding" than "for people in the public universities", and yet they "don't have so much access to funding". She does acknowledge, however, that it "depend[s] on the private university you're in". I have presented the qualitative results that explain and illustrate the various reasons for a lack of research funding according to four categories. These are, namely, category 1 – personal reasons of female academics; category 2 – grant eligibility criteria; category 3 – grant

administrative processes; and category 4 – general reasons. The subsection then ends with a discussion of strategies employed by female academics to manage their research with no funding.

4.2.5.1 *Lack of funding-personal reasons*

- **"I haven't got experience in applying for funding": unfamiliarity with fundraising**

Lack of knowledge on funding sources was the reason one 36-year-old interviewee from South Africa did not have research funding. "I don't really know how to access funding. I haven't been that involved… in terms of research funding. I haven't got experience in applying for funding" she stated.

- **"I don't really know where to start": lack of grant writing skills**

The interviewee that was unacquainted with fundraising, further revealed that she lacked key skills such as those needed to write funding proposals and would need the assistance of her superior to raise research funds.

> I don't really know where to start, and I know there are some workshops offered, like on how to write or apply for grants and that kind of thing, but I haven't attended any of them yet. I suppose I would rely on a supervisor to help me with that. (36-year-old female from South Africa)

Female academics such as this one first need to know where to find opportunities to apply for research grants. Thereafter, they need to acquire proposal writing skills either through attending training or incrementally applying for grants. These steps would enable female academics to gain the confidence to apply for funding and even increase the chances of success of their applications.

- **"Because you're busy, you don't have time to explore": Lack of time to review research funding opportunities**

Lack of research funding could also be due to the lack of time to review available research funding opportunities. One 59-year-old interviewee from South Africa stated that the time limitation was further aggravated by the absence of a dedicated research assistant and the presence of an unhelpful grants administrator.

> The university […] let[s] us know of all the opportunities that they know of […] in terms of funding for research. We're very busy, so they send out lists… – on the server or on …the intranet – of all these opportunities, but when you go into some of them, and obviously, because you're busy, you don't have time to explore all of them, and you try to sift out which ones are not really appropriate. In our faculty, at the moment, we don't have a dedicated

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research person for us. We have to do all of that on our own. If you approach our research office, they have a grants administrator, but she just tells you to look at the website. So, I don't find it easy to access funding.

Provision of support in the form of human resources is important in aiding female academics to apply for and access funds, especially taking into consideration that female academics are already burdened with a heavy workload.

4.2.5.2   *Lack of funding – grant eligibility criteria*

- **"When you are over 45, it's like you're too old": chronological age**

Fundraising efforts by female academics are further restricted by eligibility requirements of grants, which are linked to chronological age. This obstacle was experienced by a number of interviewees as age-related discrimination. One interviewee explained how it not only left her feeling despondent, but it also complicated her situation further, as she was unable to fund prospective postgraduate students.

> I'm an emerging researcher. Things like [a funding instrument] allows you to apply up to the age of 40, and I'm 45. So, I feel a bit discriminated [against]… immediately you look at who is eligible, and they said 40 years of age; you lose power, you feel you don't fit anymore. And now, I'm getting a lot of students… but […] what can I say? I always tell them: I don't have enough [funding] to take them through. (45-year-old female from South Africa)

Grant eligibility conditions such as chronological age prohibit female academics from accessing funding opportunities. Such preconditions are perceived as unreasonable and they also set in motion a process of cumulative disadvantage (see section 2 of chapter 2 for a discussion on this). Another interviewee seemed to have given up on applying for research grants, because of funders' preference for applicants of a certain age.

> When the grant is put out there, they'll always say: people up to this age – usually 40, 45, 35 –that can apply for this grant […] if you are over 40, do not bother. I'm over 40. So, there is no way. And if you ask me, I think it's discrimination. It's ageism. Because all the people can still contribute a lot in the field, in the development of the country. (55-year-old female from South Africa)

Preconditions of research grants that are related to chronological age foster inequity in academia by not giving due consideration to the reasons why some female academics are chronologically older than what is considered the "norm" for different career stages in academics.

According to a 51-year-old interviewee from South Africa, it is possible that funders predict a higher return on their research investments if they provide grants to chronologically younger academics, compared to their older (and often female) counterparts.

> There is an age bracket. When you are over 45, it's like you're too old. Maybe you're close to pension. But when you are younger, funders are more interested in working with you, or investing in you. So, I thought, when I'm in my 50s, like 51 […] people maybe they think it's already too late for you now, at this age, to think that you are an emerging [researcher]. You should have been an emerging researcher maybe in your 30s.

In the current context of a dwindling pool of research funding, research funders who prevent female academics from applying for funds because of their more advanced chronological age are – according to one of the interviewees above – "ageist", and do not nurture inclusion in research. The exclusion, by funders, of some female academics of a chronologically advanced age from applying for research grants is likely to have a negative impact on the research contributions those female academics are able to make, and in turn, on their career development.

- **"I'm not a South African citizen": nationality**

Ineligibility to apply for research funding due to nationality, was highlighted by a 59-year-old interviewee from South Africa as a factor that hindered her from accessing research funding.

> When it comes to getting funding for maybe something to do with your research, sometimes it's not easy. And, really, coming from [an] independent resident of South Africa; I'm not a South African citizen. Sometimes that also is a barrier on my behalf, as they may not consider my application, as compared to an application by a South African. So that's something that also was a severe barrier for me to do research.

- **"I'm a white woman": race**

Eligibility criteria for research funding that are based on race classification meant that one 59-year-old interviewee from South Africa whose racial group was not targeted, had to identify a partner from the targeted racial groups with whom she could apply.

> I'm a 59-year-old white woman who's coming towards the end of my career, so then I have to be innovative with trying to see how, if [I] want to apply for funding, how can [I] apply for that if I could find a young black researcher and, because of my [race], who can come into the project with me in terms of the PI, so that we can get funding because [of …] the designated [race] groups and things like that.

Such race-based criteria for research funding may further marginalise certain female academics in terms of their ability to undertake research.

- **"You have to be a seasoned researcher": career stage**

Another 40-year-old interviewee from South Africa lacked research funding because she was ineligible to apply for available research equipment grants due to eligibility requirements that favoured experienced applicants who were clearly beyond the early-career stage.

> If it's big equipment, we could apply at the Research Director's office, and then, of course, there are the grants that come around […]. But normally, you have to be a seasoned researcher to be able to apply for those grants, that kind of funding […] so, it's difficult to access that funding.

Making funding available for research equipment is important but ensuring that the funding is inclusive and that it fosters the participation of academics across different academic-career stages is even more vital.

- **"I wasn't on a permanent contract": employment status**

The employment status of female academics is another eligibility barrier to accessing research grants. This was according to the experience of an interviewee who was employed on contract.

> I have been teaching for about 15 years in tertiary education, but most of that time – for at least […] 11 years of that period – it was on a contract basis, which meant that research opportunities weren't necessarily available to me in terms of research funding, because I wasn't on a permanent contract. (41-year-old female from South Africa)

Female academics who are not employed on a permanent basis may be ineligible for research grants, regardless of how long they have held an academic position. Subsequently, this restricts their ability to undertake research.

- **"Applicants should have received their PhD": level of academic qualification**

The level of academic qualification was disclosed by an interviewee as the reason why she did not have – and was not eligible for – research funding from external organisations.

> I'm doing my PhD, so when you get funding calls, then you see the funding call and it's precisely in your area […]. When you get to the eligibility section and, oh no, the [checklist] has credits: [applicants] should have received their PhD. (32-year-old female from South Africa)

Female academics face a jeopardy in accessing access research funding when they lack the required educational qualifications. Consequently, they may experience stagnation in their careers until such a time when they can meet these funding eligibility requirements.

At times, HEIs do have research funds available, but again, certain preconditions must be met by the academics who want to access the funding. According to the experience of a 40-year-old-interviewee from South Africa, registration for doctoral studies was one type of prerequisite at her institution, without which she was unable to access research funding.

> Once I am registered [for a PhD], I can apply for funding, and then I will be able to get lecture replacement and things like that. So, […] there are structures and mechanisms within the institution that you can source funding to reduce the burden on yourself, so that you can be productive. So, I think, because of the stage that I am at, that funding isn't really available to me. So, once I am registered and I can access that funding, then some of those issues might not really be such big issues.

Unless female academics are able to fulfil eligibility criteria, such as undertaking doctoral studies, it will not be possible for them to obtain research funding from sources such as their own HEIs.

- **"Publish a journal article and you will get research funds": track record of research**

Lack of an established research track record was the explanation provided by one 32-year-old interviewee from South Africa for not having research funding. The interviewee described the disappointment she felt as she was reviewing a call for funding which she was interested in, because the eligibility criteria stated, "[applicants] should have done research for at least five years, or something like that; and then your heart just sinks".

Another 41-year-old-interviewee from South Africa described a similar output-related precondition that is imposed by HEIs on those that want to access research funding. She was exasperated that "[f]unding is just non-existent. If you ask for funding to assist you with attending a conference, they say to you, publish a journal article and you will get research funds". Preconditions that require an individual to first publish an article in a peer-reviewed journal before qualifying for research funding are unhelpful. This is because the funding may be the critical resource that female academics are lacking in order to undertake research-related activities, such as purchasing reagents for laboratory experiments or attending conferences that could lead to publication in journals.

A 45-year-old interviewee from South Africa suggested that, although diverse sources of research funding were available, the best way of increasing one's chance of securing more research funds was to publish scholarly articles and build a research track record.

> The only way you can get research money allocated to you is either if you applied to [a research foundation], or if you publish and you get a small pot of money given to you for graduating students. Not much. You actually get a lot more for publishing and articles. So, that's where your money comes in.

In South Africa, HEIs receive a subsidy from the national Department of Higher Education and Training (DHET), for each of the scholarly articles that their academics publish. A portion of this subsidy is then allocated by the HEI to the respective author(s). The subsidy initiative based on the publication of scholarly articles may be helpful in nurturing research production, but at the same time, it is not a viable means of raising research funding for some female academics. This is because, unfortunately, some research activities cannot be undertaken without first having funding, and without research results, it could be difficult to write a scholarly article.

4.2.5.3   Lack of funding-grant administrative procedures

- **"You're awarded money and you can't access it": bureaucratic and misaligned procedures**

Although some interviewees' applications for research grants had been successful, they still technically lacked the funding because they were unable to access it. Bureaucratic procedures at the HEIs of female academics, misalignment in administrative processes between the funder and the grantee's HEI or even rigid funder's conditions were to blame. A 43-year-old interviewee from South Africa lamented that "you're awarded money and you can't access it", as she clarified further:

> [The research funds] go to the institution and then it's very difficult to get it out of the institution, but on the other hand, [the funders] put timelines in place and they don't have regard for the fact that your institution has different timelines, and the institution is not going to adjust its timelines to meet the [funder's timelines], and the [the funder] also doesn't adjust.

For one 31-year-old interviewee from South Africa, administrative procedures at her HEI became an obstacle as she was unable to access funding to pay for a research-related service.

> I can also talk about some of the, like, less helpful administrative processes where, if I want to employ someone to do my [research] transcriptions, it's a huge process to get some of that money out to pay somebody back. And that's a resource that's so needed.

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One 43-year-old interviewee from South Africa voiced her frustration over the lack of funding for research equipment. Her attempts to access research funding were unsuccessful due to a combination of her institution's administrative processes (which led to non-compliance with the funder's requirements) and inflexibility of that funder.

> I have [a …] scholarship at the moment, which I'm really battling to access, because [the funders] are very rigid with regards to the deadlines and there are some factors in my institution that do not facilitate meeting those deadlines.

Consequently, the interviewee lost some of the funding that she had already secured.

> I've now missed two deadlines, and as a result, I've lost out on R50,000, which is a lot of money, if you think what I could have done with that. [E]ven the monies that have been paid out, I still haven't been able to access since April this year.

It is quite ironic that female academics have to endure onerous grant application processes and then succeed, only to be faced with another procedural hurdle in utilising the funding. Administrative procedures whether on the side of the funder or the grantee's HEI should facilitate an effective working environment instead of becoming a barrier that should first be overcome before actual work can commence.

- **"You can't put on the line item that you're buying the computer": restrictions on expenditure**

In some instances, funders restrict grantees from spending grant money on the purchase of infrastructure, since they assume that grantees already possess research equipment.

> Most donors […] refuse to […] have a line item for infrastructure. They don't develop, they don't improve on infrastructure. You can't put on the line item that you're buying the computer. They expect that you have those things. You run the computer that has been running for eight years. You need the licensing; they do not agree to having licensing. That kind of infrastructure. (55-year-old female from South Africa)

The experience of this interviewee is another illustration of the way in which grant conditions that do not consider the individual context of a grantee may constrain rather than facilitate the research that funders intend to support.

Although specialised grants for research equipment may at times be available, applicants may be unsuccessful, and this possibly discourages them from applying again. One 32-year-old interviewee from South Africa found it difficult to obtain funding for "the appropriate instruments" and "correct statistical programmes". Even though she recognised that an applicant is "not always

eligible", she expressed her frustration at having to "go again through this long process, and you are not always successful".

4.2.5.4   Lack of funding-general reasons

- **"Here you start with zero funding": lack of seed grants**

The unavailability of research funding for academics, in the form of seed grants was flagged by a 35-year-old interviewee from South Africa. Based on her experience, the practice of providing seed funding was not the norm at the HEI where she is employed.

> A lot of people are saying, "I used to work at [an HEI] and when I rocked up at [that HEI], I got given R40 000 to start my research entities. And from that I was given two years to produce one article". If you are employed here, your entity starts with zero in our faculty. There's no funding given to you whatsoever.

Similarly, another 44-year-old interviewee also from South Africa noted how the absence of seed funding at her HEI contrasted with the experience of her peers based in the USA. In that country, the practice of providing such seed funding to academics is the norm.

> I studied in the US, so some of my comparators are friends of mine who graduated with me and went on to research careers in US universities. They would have start-up funding of hundreds of thousands of dollars…, whereas here you start with zero funding. (44-year-old female from South Africa)

Seed funding can serve as a key catalyst of research activities by female academics, thereby enabling them to be research productive, which positively impacts their career.

- **"The things to him or her is entertainment, and yet to you, you are going to do research with them": dearth of understanding of field-specific research needs**

Lack of understanding of the equipment needs of certain academic disciplines, such as the creative arts, makes it difficult to access funding for research equipment. This was according to a 41-year-old interviewee from South Africa who described her ordeal in detail:

> I think it's with the misunderstanding [of] our own fields, like for mine: I'm in music. Now, if I need to analyse my music, I need to buy those CDs and I need to have an iPod to store that music, I need to have a docking station… somebody else who's not familiar with [the] field will say, "that's entertainment", then you can't have [that equipment]. And yet, it's something that I'm working with. If I'm saying I need a specific type of laptop, I can't work with a normal laptop, because I've got lots of music and lots of videos. [The university] will allocate you that

money, that is your money. But then you are not able to access that money to do your research, because the person just does not understand your area of research. So, the things to him or her is entertainment, and yet to you, you are going to do research with them.

This female academic's experience highlights a general misperception among administrative personnel that certain fields such as the humanities do not require as much funding for research equipment as other fields.

- **"If there is money to be spent, it usually goes to teaching and learning": prioritization of funding for teaching**

In HEIs that are not research-intensive, teaching is prioritised over research, hence any available funding is first used to cater for needs related to teaching.

Our budgets are so strict here in terms of what we can buy, and in terms of assets and things, and we don't get much money […] teaching and learning is prioritised over research budgets. So, if there is money to be spent, it usually goes to teaching and learning, which is obviously our primary business, so it's not a bad thing, but that often leaves little money […] to build research infrastructure or equipment that could benefit research. (40-year-old female from South Africa).

- **"Sometimes you only have just one grant": number of grants**

Among the female academics who had received research funding, one interviewee shared her disappointment that the funds were insufficient to cater to all her research-related needs.

Sometimes you only have just one grant and you've got quite a number of students […] and you want to have good projects and you want to expose your students to different trainings. So, you also need money to attend these conferences as well. So, you've got to do what you can do […] to continue and expose your students, and also yourself, to different groups, different universities, because you also need to collaborate as well. (33-year-old female from South Africa)

Some female academics have been able to successfully raise funds for their research activities. However, securing a grant(s) that can sufficiently cater for all research-related needs is a different drawback altogether that is experienced by female academics. It just seems like there is no winning, whichever way you look at the challenge of research funding.

4.2.5.5 *Strategies employed to manage research without funding*

Female academics employ different strategies to ensure that they undertake research, even if funding is lacking. These strategies include using personal funds for research activities, borrowing research equipment, personally creating laboratory space, modifying research projects, and manually collecting research data.

- **"I do my research out of pocket": using personal funds to undertake research**

A lack of research funding compelled two interviewees from Nigeria to pay for their research activities out of their own, personal funds, to ensure that their research and career development was sustained.

> I had to send my samples out and it increased the financial burden… So, I still have to fund by myself. I couldn't get any funding, anybody to fund the research. So, I had to generate, I had to source funding by myself. (35-year-old female from Nigeria)

> Sometimes you have to apply for grants which you do and don't get; and you want to do research, so you use your own money to do the research. The problem [at my institution] is, if you wait for the institution to fund your research, you might not get the funds. I do my research out of pocket. (40-year-old female from Nigeria)

The fact that some female academics in countries such as Nigeria have no choice but to fund their research activities with their personal money could be a mitigation strategy against the risk of being unproductive, which can later hinder career advancement. This strategy was well described by a 40-year-old female interviewee from Nigeria who stated, "it's either you publish or you perish so, most of us here, we go ahead and use our salary to do this research, so we are paying".

- **So, I had to start from day one, making sure that I get a space to work in and also get equipment": borrowing equipment and creating laboratory space**

Another 29-year-old interviewee from South Africa was compelled to borrow research equipment until such a time when funding would become available. She explained, "[s]o, currently what my students are doing [is] borrowing equipment from other labs. So, until I get proper funding, then, unfortunately, that's what we'll have to keep doing". She indicated that without funding, research infrastructure cannot be procured and yet she was expected to conduct research in a context where her HEI did not provide the necessary infrastructure. Ultimately, she had to take the initiative of creating a laboratory space.

> You take a lecturing job that comes also with undertaking, and committing yourself to, research, but then there isn't any form of assistance in trying to make sure that you have a laboratory space for you to undertake that research. So, I had to start from day one, making sure that I get a space to work in and also get equipment.

It would be helpful if HEIs could facilitate or provide research infrastructure such as laboratory space. Such assistance would take some pressure off female academics, who could then focus their energy on actually conducting the research.

- **At the end of the day you end up altering your research": modifying research projects**

Due to lack of research equipment, a 39-year-old interviewee from South Africa had to modify her research and travel to other locations to source the equipment because without it, her research would stall.

> I can say we lack some of the equipment and that at the end of the day you end up altering your research. Because now, we have to travel or drive for a distance to go and get some of the equipment. We need [the] infrastructure and equipment so that we can work.

Time is a valuable resource, and so, if female academics are forced to spend their already constrained time on finding research equipment, it means that they have even less spare time to conduct the actual research.

- **"We spend six months manually collecting some data on 300 companies for one year": collecting data physically**

HEIs do not subscribe to some databases, because they are very costly. Consequently, a 52-year-old South African interviewee described how she was forced to manually collect the data she needed – a time-consuming exercise – due to lack of funding to pay for individual subscriptions.

> In our field, we use databases, or we should use databases of financial data, and there are huge databases available overseas of share trading data, company data, directors' details, analysts' forecasts, etc. There's no university in Africa that subscribes to any of those databases, because a basic subscription costs something like R600 000 – that's once off for one year. So, we never get funding to access these international databases. We spend six months manually collecting some data on 300 companies for one year.

Subscriptions to specialised databases pose a dilemma to both academics and HEIs. Since many HEIs are faced with a decline in funding, subscriptions to such databases may not be a priority for

them. On the other hand, female ECAs are unlikely to afford individual subscriptions to such specialised databases.

4.2.6   International mobility

In the questionnaire, respondents were asked whether they had studied or worked abroad (i.e., in a country other than what they would consider their home country) in the three years preceding the survey. Analysis of the data revealed that almost three quarters (72%) of the 295 female ECAs who responded to this question, reported having never done so. In addition, Figure 9 below shows that, of the 84 female ECAs who indicated that they had studied or worked abroad, the majority rated such international mobility as either essential (44%) or very important (40%) for their career development. Only 11% and 5% of female ECAs rated it as important and somewhat important, respectively.
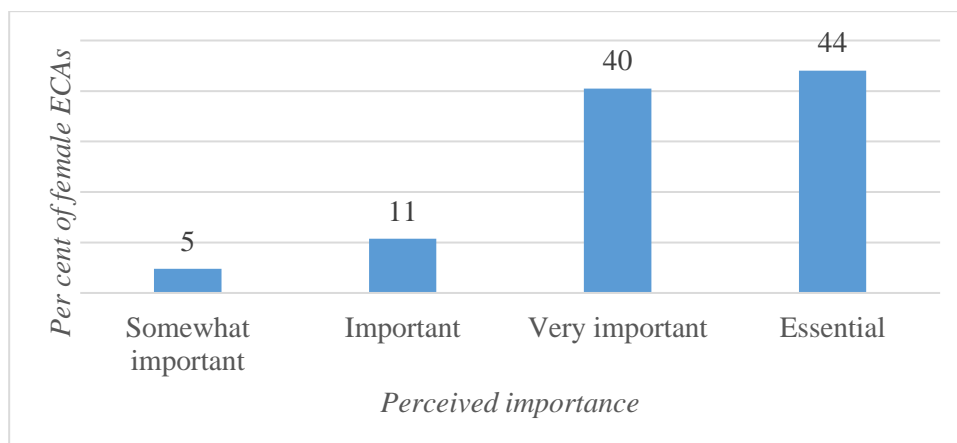
Figure 9: Perceived importance of studying or working abroad for female ECAs' own career development (n=84)

4.2.7   Collaboration

Survey results on the extent to which female ECAs engage in four different types of collaboration with other researchers are presented in Table 4 below.

Table 4: Percentages of female ECAs engaging to various extents in four types of collaboration with other researchers

Type of collaboration	Number of cases	Never or very rarely (%)	Rarely (%)	Sometimes (%)	Often (%)	Very often/ always (%)
Intra-institutional	295	5	13	24	27	31
International	291	23	15	25	19	17
Inter-institutional	289	19	19	34	17	11
Inter-African	285	60	16	13	6	4

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Almost a third (31%) of female ECAs collaborate very often/always with researchers at their own institution (intra-institutional collaboration), and this percentage is much higher than for the other types of collaboration.

The extent to which female ECAs engage in two of the other three types of collaboration – that is, with researchers at institutions outside of Africa (international collaboration) and at other institutions in their own (African) country (inter-institutional collaboration) – is similar. Most respondents reported engaging only sometimes, very rarely or never, and rarely in international collaboration (63%), or in inter-institutional collaboration (72%). Interestingly, among female ECAs the least frequent type of collaboration is the one that involves researchers at institutions in other African countries (inter-African), as more than half (60%) of female ECAs reported that they never, or very rarely, engaged in this type of collaboration, while only 10% did so often, very often, or always.

4.2.8   Working time spent on different tasks

The questionnaire also queried respondents on the percentage of their working time that they spent on each of the seven tasks in a typical year. As respondents were instructed to ensure that the percentages they provided added to 100%, some indicated that they spent 0% on a task by not providing an answer at all. Thus, both these missing responses and the "0%" responses were coded as missing and excluded from the analysis. The percentage of remaining female ECAs (those who provided a percentage above 0%) for a task provides the first indication of how female ECAs spend their working time. The second indication derives from comparing the tasks in terms of the average (mean and median) percentages reported by those "valid" respondents.

The results presented in

Table 5 below show that the second-lowest percentage (66%) of female ECAs reported that they spend time on consultancy, but those that did, spend a very high percentage ($\bar{x}$=49%; the highest mean reported for any of the tasks) of their working time on that task. However, the distribution is skewed by a few high values, as indicated by the lower $\tilde{x}$ =20%. For the other tasks, the mean and median are better aligned. An interesting result is that the lowest percentage of female respondents (63%) indicated that they spend time on raising funds or grants for research, and if they do so, the average percentage of time they allocate to this task is the lowest reported for any of the tasks ($\bar{x}$=8%; $\tilde{x}$=5%).

Table 5: Percentage of female ECAs working time spent on various tasks

Task	Number of cases	%	Mean ($\overline{x}$)	Median ($\tilde{x}$)
Consultancy	197	66	49	20
Undergraduate and postgraduate teaching	279	94	36	34
Research	297	100	28	20
Training or supervising postgraduate students	273	92	20	20
Administration and management	253	85	16	10
Service	227	76	9	5
Raising funds or grants for research	187	63	8	5

The second-highest percentage (94%) of female ECAs are involved in undergraduate and postgraduate teaching, but on average spend only slightly more than a third ($\overline{x}=36\%$; $\tilde{x}=34\%$) of their working time on this task. The highest percentage (100%) of female ECAs spend at least some of their working time on research, but on average ($\overline{x}=28\%$; $\tilde{x}=20\%$) less than on teaching.

Lower percentages of female ECAs spend a percentage of their working time on the remaining three tasks, namely training or supervising postgraduate students (92%); administration and management (85%); and service (76%), and the average time spent on these three tasks is also relatively low. Training or supervising students takes up a fifth ($\overline{x}=20\%$; $\tilde{x}=20\%$) of their working time, on average, while even less time is spent on administration and management ($\overline{x}=16\%$; $\tilde{x}=10$) and on service ($\overline{x}=9\%$; $\tilde{x}=5\%$).

4.3   Summary of the results

This first results chapter sought to describe the African female ECAs that are the focus of this study. Their background information was presented according to eight categories, based primarily on a quantitative analysis of the survey data, but also including some qualitative data, where relevant. The first category was the demographic background of the female ECAs, which was examined according to five features: chronological age, nationality, country of work or residence, dependents, and distribution of care work and general housework.

The chronological age of a female ECA in Africa ranges from 27 to 68 years, with a mean age of 40 years. The female ECAs' nationalities span across 25 countries, although three nationalities dominate, with the highest percentage of female ECAs being South Africans, followed by Algerians and then Nigerians. This pattern of nationality is similar to the one found for the countries in which the female ECAs work or reside, with the majority of female ECAs working in South Africa, followed by Algeria in second place, and Nigeria in third place.

A consideration of female ECAs' children or other dependents according to three age categories (zero to five years, six to 18 years, and 19 years or older) showed that, in all three

categories, those female ECAs that have children or dependents have two on average. More than half of female ECAs do not have children or dependents aged zero to five, but more than half have either children or dependents aged six to 18, or dependents aged 19 or older, including elderly dependents.

Even though the female ECAs have few dependents, they undertake a significant amount of more than half (59%) of care work and general housework in their family, relationship or household. On the contrary, the female ECAs partners undertake only 23%, and other individuals such as extended family or hired help undertake 28% of the care work and general housework.

The second category according to which female ECAs are characterised was the field of specialisation, which is measured as the one in which they attained their PhD. The results indicate that the highest percentage of female ECAs hold a PhD in the social sciences, followed by those with a PhD in the natural and agricultural sciences. In third place are female ECAs in possession of a doctorate in the health sciences, while those with a doctorate in the engineering and applied technologies have the lowest percentage.

The third category according to which female ECAs were described is employment. Results revealed that for employment status, female ECAs are predominantly employed on a permanent basis. With regard to employment rank, the highest percentage of female ECAs are in the rank of senior lecturer, closely followed by those in the rank of lecturer, while the minority are those in the rank of professor.

The fourth classification category was research output. Over the three years preceding the survey, the results indicate that female ECAs were productive in various forms of research output. The female ECAs reported that they produced on average close to six articles in peer-reviewed academic journals, 0,3 books, 1,1 book chapters, 3,3 conference-proceedings papers, and 5,0 conference presentations.

Research funding was the fifth category, and the results showed that half of the female ECAs had not received such funding. Of the 50% that had received research funding, close to half were the primary recipient or grant holder of the funding, a quarter were not, while the rest indicated that they were both.

Results from analysis of the qualitative data revealed that female ECAs had not received research funding because of diverse reasons. Under the category of personal reasons, female ECAs had not received research funding due to unfamiliarity with fundraising; lack of proposal writing skills; and lack of time to review research funding opportunities by female ECAs. Reasons for lack of research funding that were explicitly related to grant eligibility criteria included chronological

age, nationality, race, level of academic qualification, career stage, employment status, and research track record.

Reasons related to grant administrative processes were also mentioned by female ECAs, including bureaucracy at HEIs and other external funders; misalignment of processes between the funder and the grantees HEIs; and grant conditions that allow expenditure only on specific research items. Lastly, lack of seed grants, prioritisation of research funding for teaching-related needs by HEIs; lack of understanding by HEIs administrative personnel of the research needs of certain disciplines; and number of grants were also cited as general reasons. From the qualitative data, several strategies were uncovered that female ECAs employed to manage their research when funding was lacking. These tactics comprised using personal funds for research activities, borrowing research equipment, personally creating laboratory space, modifying research projects and manually collecting research data.

Results on the sixth category, international mobility, indicated that the majority of female ECAs had never studied or worked abroad. Of those who had been mobile, a high percentage (84%) rated international mobility as at least very important, or even essential, for their career development.

Results on the seventh category, collaboration, showed that female ECAs are most likely to have collaborated intra-institutionally. Female ECAs are less likely to have collaborated internationally and inter-institutionally, and they very rarely engaged in inter-African collaboration, which is not surprising considering that most of them had never studied or worked abroad.

The last category on tasks occupying working time examined the percentage of working time that female ECAs spent on different tasks in a typical year. The results revealed that female ECAs spent varied amounts of their working time on undertaking different tasks. The second-lowest percentage (66%) of female ECAs reported that they spent time on consultancy, but those that did, on average spent a very high percentage (49%). The lowest percentage of female ECAs (63%) indicated that on average, they spent 8% of their time on raising funds or grants for research, which is the lowest reported for any of the tasks. The second-highest percentage (94%) of female ECAs, on average spent only slightly more than a third (36%) of their working time on undergraduate and postgraduate teaching. The highest percentage (100%) of female ECAs, on average spent over a quarter (28%) of their working time on research, but less than on teaching.

Lower percentages of female ECAs spent a percentage of their working time on the remaining three tasks, namely training or supervising postgraduate students (92%); administration and

management (85%); and service (76%), and the average time spent on these three tasks was also relatively low. The third-highest percentage (92%) of female ECAs, on average, spent a fifth of their working time on training or supervision of students. With regard to administration and management, 85% of female ECAs spent 16% of their working time on this task, while 76% of female ECAs spent even less time (9%) on service, on average. The following chapter presents the results from the data analysis with a focus on the extent to which various challenges have, according to female ECAs, negatively impacted their careers.

Chapter 5: Challenges impacting on the careers of female early-career academics in Africa

5.1   Introduction

In this results chapter, I provide a quantitative description of the extent to which female ECAs perceived a set of challenges (predetermined by the questionnaire designers) as having had a negative impact on their careers. The questionnaire listed 10 challenges: lack of mentoring; lack of research funding; lack of mobility opportunities; lack of training opportunities to develop professional skills; balancing work and family demands; lack of funding for research equipment; job insecurity; lack of access to a library and/or information sources; limitation of academic freedom; and political instability or war. Of these 10 challenges, only the first six were selected for analysis, as they are related to the subject of the study. I integrate the qualitative results, as they provide explanations for why female ECAs experienced some challenges, such as lack of mentoring and lack of funding for research equipment, and they also describe how these challenges negatively impacted their careers. Furthermore, qualitative results have been incorporated, as they contextualise the quantitative results that were obtained specifically with regard to the challenge of balancing work and family demands by demonstrating precisely how this challenge negatively impacted the careers of female ECAs. Lastly, the qualitative results provide an illustration for the findings on lack of training opportunities to develop professional skills and lack of mobility opportunities.

The first challenge, lack of mentoring, is directly relevant to the main focus of this study, which considers how mentoring may positively influence female ECAs' careers. The other three challenges – a lack of research funding, mobility opportunities, and training opportunities to develop professional skills – are indirectly related to mentoring. These challenges are associated with the hypothesised outcomes of mentoring of female ECAs on various aspects of their careers. These aspects, which are considered in the next chapter, are obtaining research funding, being mobile, and being professionally skilled. In other words, these three challenges could possibly be addressed by receiving mentoring in aspects that are related to each. The last two challenges – balancing work and family demands and lack of funding for research equipment – are included because they are cited in the literature as having a negative influence on the research production and careers of female ECAs. The perceived extent of the negative impact of the six challenges on female ECAs careers was compared across fields in which the female ECAs received their

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doctorates. Because mentoring is the central focus of this dissertation, results on female ECAs' perception of the negative effect that a lack of mentoring may have had on their careers are provided first, followed by the results on the other five challenges in descending order of extent.

5.2   Career challenges

5.2.1   Lack of mentoring

Figure 10 below shows that a majority of female ECAs reported that a lack of mentoring had negatively impacted their career either to some extent (42%), or to a large extent (33%). Only a quarter (25%) of female ECAs believed that a lack of mentoring had no negative effect at all on their academic careers[9]. Thus, three quarters (75%) of the female ECAs perceived that lack of mentoring had negatively impacted their career to at least some extent.
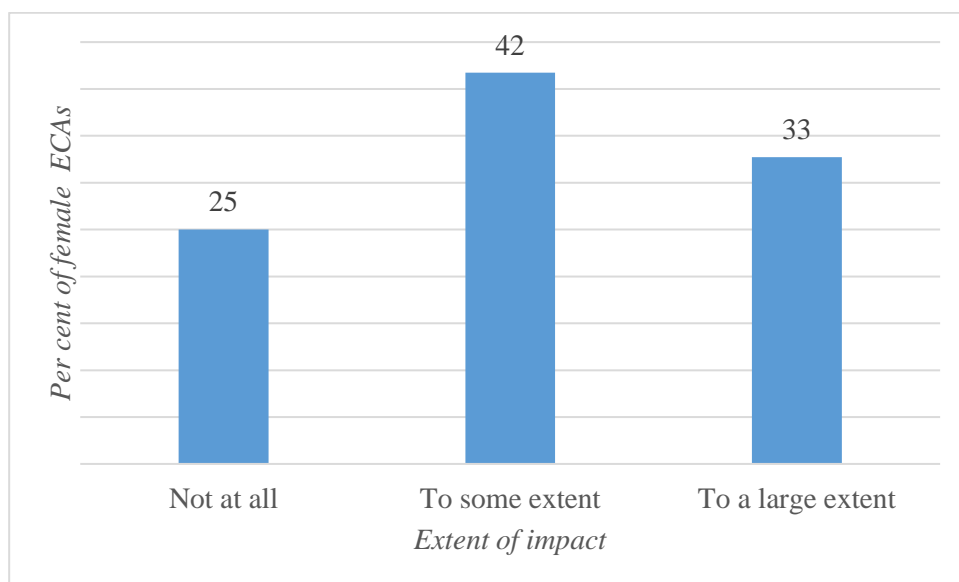

Figure 10: Perceived extent of negative impact of a lack of mentoring on female ECAs' careers (n=278)

In order to determine whether the perceived extent of the impact of lack of mentoring on female ECAs' careers differs across fields, a cross-tabulation between the perception and the field of female ECAs was conducted, which yielded the results presented in Figure 11.

A majority of female ECAs in all four fields perceived that lack of mentoring had negatively impacted their careers at least to some extent. However, a much higher percentage (91%) of female

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[9] This 25% of respondents may be signalling that they had received mentoring and thus, it points to the challenge of undertaking secondary analysis of existing data (which I discussed in section 2.2 of Chapter 3), where I had to work with the available data.

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ECAs in the engineering and applied technologies, than those in the other fields, perceived that this challenge had impacted their careers at least to some extent. Among those female ECAs in the natural and agricultural sciences and in the social sciences, the percentages are not as high, but still substantial (79% and 71%, respectively). The lowest percentage of female ECAs who reported that this challenge had impacted their careers are in the health sciences (65%).
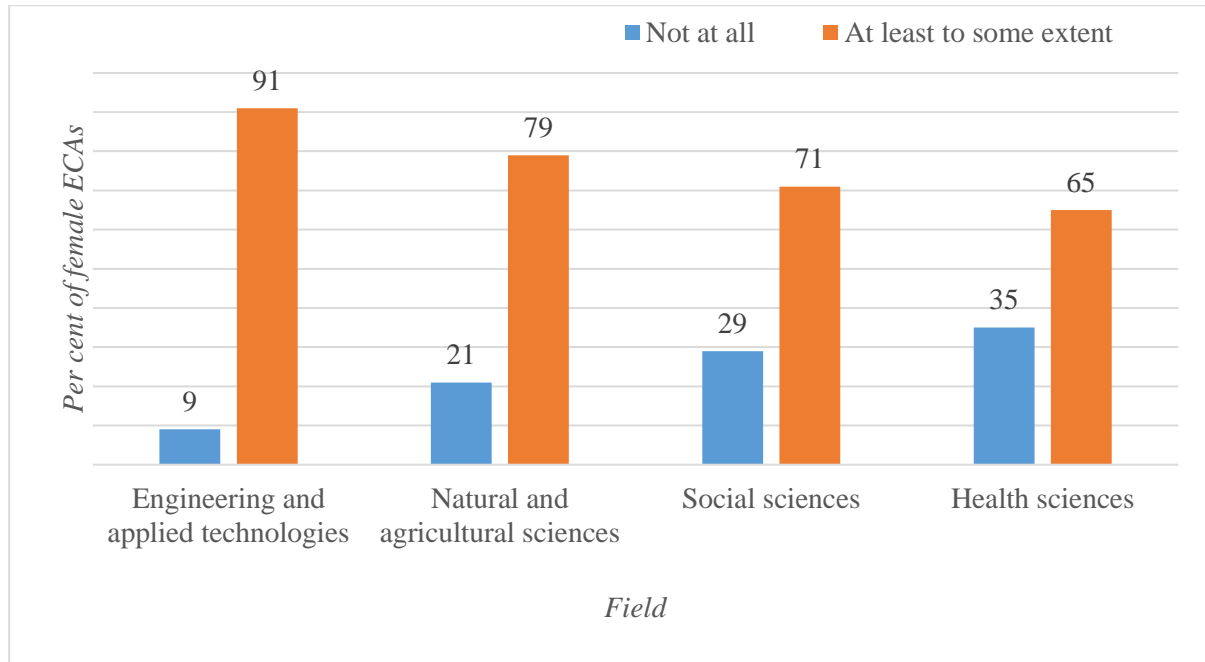

Figure 11: Perceived negative impact of a lack of mentoring on female ECAs' careers, by their field (n=278)

An analysis of the qualitative data from the interviews provided more insight on the provision of mentoring, including reasons that contributed to a lack of mentoring, from the perspective of female academics, some of whom had received mentoring, while others had not.

5.2.1.1   "We don't have such a thing. It is unheard of": non-existence of mentoring

A number of interviewees from the group that had not received mentoring revealed that mentoring is rare or non-existent at their HEIs. A 34-year-old interviewee from South Africa lamented the "major lack of mentorship" in her HEI. In fact, she had not experienced any mentorship "in the ten years that [she had] been in [that] institution". Another interviewee – a 38-year-old also from South Africa – stated that her institution "has not provided [her] with a mentor at all". Therefore, whatever she has accomplished, she did so by herself. A third interviewee (a 44-year-old from South Africa) concurred that at her institution, "[w]e don't have such a thing. It is unheard of".

"Only now", she says, she and her colleagues "are starting to speak up, we're now starting to engage management about us having mentors".

According to the experience of one 40-year-old interviewee from Nigeria, she felt that there was an assumption within academia that an individual who has earned a doctorate did not require mentoring and so "you are practically on your own". Frustratingly, her repeated efforts to find a mentor were fruitless and distracted her from focusing on her academic duties. She lamented,

> You would have to push yourself for [mentoring], to your most senior colleagues, for them to understand that you still want them to mentor you. Sometimes you push and you don't get anything, and you tell yourself: if I continue to push, I might not do the work I'm supposed to do. So, there is a complete lack of any formal mentorship program that can assist you in developing as an academic.

Ultimately, she left her situation in the hands of fate in the hope that "[m]aybe somebody somewhere will see what you are doing, and that person will now say: let's get in touch with this person and see how we can assist".

The lack of mentors was viewed by a 33-year-old South African interviewee as a significant obstacle to the fulfilment of all the responsibilities expected of an academic. Similar to the 40-year-old Nigerian interviewee, she decried the perception by senior colleagues that, because she had a doctorate, she had the ability to manage and balance the competing demands of her academic responsibilities.

> [The lack of mentors] is a huge barrier, because […] after your PhD, it's almost like you're entering this post – I like to call it a post-PhD vacuum, because I find myself now [where] your colleagues think you've got the PhD, you should just be able to establish yourself nationally and internationally, and you should just roll out or churn out publications. But the support isn't given, because you've got this pressure of teaching in undergraduate programmes, because you're appointed at a lecturer level.

Nothing could have been further from the truth, as she expounded:

> So, if you've got to manage 400 students in an undergraduate programme from year one to year four without anyone teaching you or helping you learn the ropes, it's kind of difficult to manage research, and teaching and learning, and social impact.

Senior academics that are potential mentors may hold this belief that ECAs do not require any career support in the form of mentoring, and so, prospective mentors who have been identified by a female ECA may be unwilling to provide mentoring. The perceived assumption that the earning

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of a PhD signifies that one can manage all of the obligations expected of ECAs, could be a hindrance to the provision of mentoring to female ECAs. In this instance, provision of mentoring by senior academics, plays a critical career function, as it impacts on the mentee's career through the human capital path. Therefore, formal mentoring is seen as a viable institutionalised intervention to assist ECAs in acquiring mentors.

Another 35-year-old South African interviewee who had not received mentoring disclosed that she did not know how to identify potential mentors. She "[thought she] could approach someone and ask them to mentor [her]…but [she didn't] really know who to approach". In addition, she specifically preferred a mentor who was not her superior at work as she stated:

> I'd really like to have a mentor; someone who is not my boss […] that can guide a person…talk to about the plan and what is a good idea and what is not a good idea; and I don't think there really is that available to me.

Preference for mentors who are individuals outside of one's own institution or even country, coupled with a lack of information on who those potential mentors are, may therefore also contribute to the lack of mentoring of female ECAs. There also seems to be preference by female academics for a mentor who can play a psychosocial function of counselling.

Understaffing in some departments in HEIs was revealed by an interviewee as the reason why either there are no mentors, or the few available mentors are already committed to many mentees.

> I'm studying in a department that has got three staff members. There are just not enough people in order to approach… to be a mentor... And those that are already in that position and that are qualified to do that, are not necessarily able to help you, because they are already committed to…mentoring other people. (35-year-old female academic from South Africa)

The failure to appoint enough staff in HEIs is a chronic problem in South Africa that has been sustained by a decline in funding to HEIs from governments. Consequently, there are few academics available to provide mentoring to all ECAs who require it.

In instances where senior colleagues with extensive experience were at hand, and viewed as prospective mentors by interviewees, or even when interviewees were specifically informed that the retired academics from their departments were their mentors, mentoring still did not happen.

> What I find is that when we are still new and coming into academia, these experienced professors and these experienced people, they have established themselves, they know everything. They need to really mentor. Sometimes you have […] retired people in the department and they've not published with anyone who is young and up-and-coming. But we are told that they are here to mentor us. (48-year-old female academic from South Africa)

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It is evident from this interviewee's experience that the presence of actual or potential mentors within the work environment of female ECAs does not automatically translate to mentoring.

5.2.1.2 *"Some of the people, they look busy": lack of time to mentor by senior academics*

Senior academics' lack of time to dedicate to mentoring was mentioned by various interviewees as the reason why they had not been mentored. A 51-year-old South African interviewee expressed awareness that her colleagues who could be mentors, did not have time to spare for mentoring:

> The thing is, we do talk about mentoring – the need for mentoring emerging researchers, and so on – but still, everybody is busy. People are busy with their own projects. And I don't blame anyone. Nobody owes me anything in terms of mentoring.

She yearned to be mentored, "even if it's once a month, or once in two months' time, someone who will say: What are you doing now? What are you interested in? Let me help you". Although the role of mentoring is discussed at HEIs, and the need to mentor ECAs is acknowledged, the receipt of mentoring by female ECAs still does not transpire due to perceived time constraints on the side of prospective mentors. A 39-year-old interviewee from Zimbabwe found it challenging to find a mentor, as the academics whom she had identified, "look busy" and "when you're going, asking for help, it's a bit difficult", in other words, they appeared not to have time to engage with junior academics.

This perception of lack of time to mentor by senior academics was further underscored by a 32-year-old South African interviewee who had transitioned from the private sector to academia and could therefore, provide a comparative perspective. The female academic narrated:

> The focus [in academia] is so much different [from the private sector], you actually need a bit of a mentor to guide you. It's not always the case, because your more senior academics, they have their own research to worry about and they are being pressured and pushed to publish stuff, so they don't always have the time to try and help somebody who isn't used to this environment to find their feet.

For female ECAs, venturing into academia from a non-academic sector creates the additional challenge of "finding your feet" – in the words of one interviewee – that is, having much to learn and become accustomed to.

Similarly, a 41-year-old South African interviewee expected that senior academics approaching retirement, or their replacements, would be her mentors. She explained, "[c]urrently in my work environment, I would have assumed [that] every time we got a new HoD, depending

on somebody retiring, that that person would automatically fill that role of mentor". However, she recounted that mentoring did not materialise since these academics' time was dedicated to – and consumed by – their individual careers:

> Sadly, again, I realised that wasn't the case. I think most of the senior academics are focused on their own careers, and…they are close to retirement in some instances, where they are focusing on their swan song or their contribution, that they don't necessarily create time for mentorship.

In some HEIs, there could be untapped mentorship opportunities in the form of senior academics who are otherwise too busy building their own careers. These senior academics are a human resource that is essential in building the next generation of female ECAs by sharing their personal experiences and lessons in the journey of academia.

5.2.1.3 *"There's no one directly in my field who knows more about the field than me": specialisation as an obstacle to finding mentors*

The lack of mentoring that female ECAs experience could be compounded by specialisation in an emerging interdisciplinary field. This dilemma was explained in detail by a 28-year-old South African interviewee as follows:

> [T]he project and my research area [are] interdisciplinary, and so, while I have a supervisor in the one field and a supervisor in the other field, there's no one at [my institution], and also really in South Africa, who I've met who is in my field and could be a mentor to me in my field. So, I mean, I've got mentors who I look up to as […] good scientists and things like that, but there's no one directly in my field who knows more about the field than me, really. Because it's interdisciplinary and it's an emerging field, it's very difficult to […] not have someone to learn from in your field, if that makes sense.

Specialisation in a niche research field may render the process of finding a mentor in a similar field, who can play the psychosocial function of role modelling, particularly difficult. This is because the pool of experts that a female ECA can tap into is significantly reduced. The limited number of experts in a new niche research field was well articulated by another 52-year-old interviewee, also from South Africa. This interviewee highlighted that this challenge was further heightened when one has to search for a mentor outside of one's own country or if peers in the same field have different research interests.

> [I]n the…sciences, in the whole of South Africa […] I think there are 50 PhDs. So, […] there are very few other people that are on the same level as you to talk to, and most of us have our

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own unique field of interest. So, it's very difficult to get somebody locally that's doing the same type of research as yourself.

There seems to be a preference among female academics – albeit implied rather than explicitly stated by them – for mentors who are in the same geographical location or whose mentoring can play a psychosocial function.

5.2.1.4   *"We've lost 150 senior academic staff": high turnover in higher education institutions complicates mentoring*

As discussed in chapter 2, the higher turnover of senior academics in African HEIs has left a vacuum of academics among senior ranks that could provide mentoring. One 41-year-old interviewee from South Africa explained:

> If you look at the last 15 years at this university, we've lost 150 senior academic staff, so that's professor to associate professor level. I came in as a brand-new person to this university and I came in at the highest point in my department. That should never have happened: there should have been a professor or an associate professor above me.

Consequently, this interviewee wondered "where [she was] supposed to get academic mentoring from, in that context" when senior academics continued to exit from her HEI and yet she still needed support in her new academic position. Furthermore, she was very concerned that there was a "knowledge gap that's starting to exist in the university, where you've got newer scientists coming through and they've got no institutional knowledge, they've got no support structures from up above". The departure of senior academics from HEIs not only leads to a loss of highly skilled personnel, but also leaves theoe HEIs with very few or no experienced academics to provide mentoring that can fulfil functions, such as coaching, which facilitate career development through the human capital path.

Closely related to the critical role those senior academics play in passing down institutional knowledge to their junior colleagues, the importance of having a mentor because of the presence of unwritten rules in HEIs and the need to familiarise oneself with these was voiced by one 30-year-old female interviewee from South Africa. She asserted that "there are many procedures that you need to follow in an academic career, and nobody actually tells you".

5.2.1.5   *"One of the things that stands out the most, is that they had a mentor": the value of mentoring in building a career in academia*

The transcripts also reflect a strong awareness among the interviewees that mentors are crucial in building a fruitful career in academia. As a 44-year-old South African interviewee who had not received mentoring explained in more detail,

> [w]hen one looks at men and women… who are successful in their research endeavours, when one looks at their track record – or even get a chance, maybe during the conference, you bump into one of them, and then maybe have a little chat with them – one of the things…that stands out the most, is that they had a mentor. They were not alone throughout their research trajectory.

Female ECAs are further aware of the negative effect that a lack of mentoring has had on their own careers. A 38-year-old interviewee from South Africa felt that if she had had a mentor "earlier in [her] career" she "would have probably progressed further". The reason for her statement is implied in her view that a mentor "is somebody who would direct me in my academic career, and research" – in other words, an individual that can provide both career-related and psychosocial mentoring functions.

A different but equally salient view of the value of mentors was recognised by a 29-year-old South African interviewee who had not received mentoring. She shared that "[m]entors are really important. Just someone to be able to go and talk to, just to be open enough and collegial enough to guide you". Moreover, she detailed how she struggled with the challenge of striking a balance between her duties as a PhD student and as an academic.

> It is very difficult to separate the PhD from your actual work, because [I am] expected to do the PhD when I go and see my supervisor. But then I'm also expected to do my work when I go see the HoD, and it was just getting really stressful to try balance it, so one would always fall out. And so, even though I wanted to go and chat with my supervisor on certain issues, she would kind of be insisting that I should still do the work.

Mentoring is understood to be a critical mitigation mechanism for female ECAs who are pursuing their postgraduate studies while concurrently undertaking their duties as academic staff members. In this case, a mentor would have been useful in providing the psychosocial functions of counselling and friendship, which could possibly have assisted the female ECAs in coping with these dual roles and demands.

Mentors "stop you from basically doing something stupid early on that could impact on your career" was expressed by a 30-year-old interviewee from South Africa. She provided scholarly

publication, which I discussed in chapter 2, as having a significant bearing on an academic's career, as an example of a key topic that mentors are knowledgeable and can provide guidance on "because they have the experience [and] they know how long it takes to actually get something published". She further elucidated,

> So, once you get appointed, nobody tells you […]: this is how you find a journal, or this is how you go for a conference, or for me, like, the biggest mind-opener was the thing of [predatory] journals. I didn't know it was a "thing", because you g*et al*l these emails and they are like: "publish in our journal", "submit your paper and you will get published".

Likewise, a 41-year-old South African interviewee conveyed her wish to receive mentoring support from her HEI in the form of practical guidance and tacit knowledge on scholarly publishing.

> You could get attached to a senior staff member who could help you to do joint publication, so that you can see… what's required in terms of a joint publication. Just assistance. How do senior lecturers get to publish so much and junior lecturers not as much? Obviously, if they can share their experiences or guide us along the process, I'm sure more people would be able to publish.

A 38-year-old interviewee from South Africa also verbalised her wish to receive mentoring in scholarly publication. She described a mentor as "[s]omebody [who] would […] show [her] how to improve, somebody [who] would assist [her] with the publishing, with directing [her] to good journals, all of those things". These quotes demonstrate a persistent desire by female ECAs to receive mentoring that would facilitate their careers by assisting them in undertaking challenging tasks. In addition, the mentoring can impact their career through the human capital path, by imparting critical skills for scholarly publication, which is a key determinant for progressing in an academic career.

The 30-year-old South African interviewee mentioned earlier additionally raised the topic of salaries as the second example which female ECAs need guidance from mentors, to avoid being exploited by their HEIs.

> Even something as simple as salaries, I didn't know that there were actual scales for salaries, and so, I actually found out now that I am getting underpaid. And I think if you have a mentor, the mentor tells you: look at the salary scales for university; if you are appointed on this level, this is what you should be getting.

Information that is valuable in an academic career – such as how to publish in a journal, how to identify a credible journal, or what salary is commensurate with a certain rank – may not be obvious or readily accessible to female ECAs. Consequently, mentors are critical in bridging this information gap for female academics, by offering mentoring that plays a psychosocial function of counselling.

Of those 79 female academics who had participated in personal interviews, four had received at least some mentoring. One of these interviewees, a 39-year-old from Nigeria shared that the mentoring she received had a positive impact on her, as it "helped in moulding and making [her] know a lot of things which some of [her] colleagues did not know about". She described how the mentoring which gave her a head start in her career and an advantage over her peers was undertaken.

> I happened to have a supervisor…during my undergraduate to my postgraduate…he was my mentor. […]. What they do in mentoring there is: …most of [the mentors'…] academic work, the mentee does; they teach their courses, you mark their scripts…So you end up teaching for your mentor; you teach your courses, you mark their scripts, you do some academic chores, and all that, and you also carry out your research.

Mentoring of female ECAs can take the form of "job shadowing" a senior academic, where a female ECA assists the mentor with his/her tasks, while also undertaking all the other responsibilities expected of her. This type of mentoring develops the mentee's career through the human capital path, since specific skills are learnt or improved in the process.

The knowledge gained through mentoring also places a female ECA in an advantageous position compared to colleagues who do not have mentors. This is according to the second interviewee, a 43-year-old from South Africa.

> I'm glad to have the experiences from outside, because I'm learning things that are different from how some of my colleagues do things…and therefore I think mentoring is a good thing, because I think that mentoring in that respect helps you to understand what is important and what's not important and how to make things easier not only for yourself, but also for your students.

Mentoring offers female ECAs the chance to learn different ways of working and prioritising their responsibilities from an informed perspective, aspects that are crucial for career development.

Among the interviewees who had been mentored, the third was a 36-year-old from South Africa who expressed her desire for "more kind of mentorship, individual support, on how to

incorporate and manage to fit everything in". The interviewee explained what she had experienced in her institution up to that point:

> Something that I have been lacking in is mentorship; so, since I have come here, I have got one or two colleagues that I can speak to, but it is only from being on courses and being exposed to people from other departments where I have actually received mentorship in terms of how to structure my week, my hours, to be able to incorporate all these priorities and to have time for research.

Female ECAs would benefit from mentoring that plays a career function of coaching, and develops their career through the human capital path, since they can learn how to fulfil all their academic responsibilities. This is particularly considering that female ECAs do tend to spend more time on teaching and service than on research as already discussed in Chapter 1.

The fourth and final interviewee was a 40-year-old from Nigeria, who stated that mentoring had been provided to her as part of a fellowship awarded by an international research institution some years back. Although she was mentored many years ago, the skills she acquired remained useful for her career development, years later.

> The only mentoring I can say I ever got was the fellowship I got from […] almost ten years ago now. That's the only place I can say I was able to get some mentoring, at least that has pushed me this far.

However, from her statement it was not possible to establish which mentoring function or path had contributed to her career development.

5.2.1.6   *"It's something that universities need to look into": the responsibility of higher education institutions in providing mentoring*

The quotes in subsection 5.2.1.1 further imply a belief among these female ECAs that it is the responsibility of HEIs to provide mentoring, or at least find mentors for them. This belief is expressed more directly by a 27-year-old interviewee from South Africa, even though she did not receive mentoring.

> It's very important that universities […] assign mentors to early-career researchers like myself, because you can learn a lot from someone who's senior to you, and someone who already knows the ropes; and they can guide you through [academia]. So, it's important to have mentorship, according to myself, I think, and it's something that universities need to look into.

Similarly, another 44-year-old South African interviewee who also did not have a mentor advocated for the provision of support to ECAs by suggesting that, "if [universities] can pair [ECAs] maybe with some kind of mentoring system would be nice […] to pair the younger researchers with the more established ones". The statements of the two female academics indicate a strong belief that mentoring offers career and psychosocial functions, particularly coaching and role modelling.

The next sections present the results on the female ECAs' perceptions of the negative effects that five other challenges may have had on their careers: (1) balancing work and family demands; (2) lack of research funding; (3) lack of funding for research equipment; (4) lack of training opportunities to develop professional skills; and (5) lack of mobility opportunities. The challenges are ordered from the highest to the lowest percentage of survey respondents who perceived a challenge as having had a negative impact on their careers, and are again illustrated with relevant qualitative data.

5.2.2   Balancing work and family demands

Figure 12 below illustrates that close to half (45%) of female ECAs perceived that balancing work and family demands had, to some extent, a negative impact on their career. In addition, slightly more than a third perceived that this challenge had a negative impact on their career to a large extent, while only 18% of the female ECAs perceived that this challenge had not negatively impacted their career at all. Thus, a large majority (82%) of female ECAs perceived that balancing work and family demands had negatively impacted their career to at least some extent. These results make sense, considering the results reported in section 4.2.1 of chapter 4, namely that female ECAs on average have two dependents and that they also undertake the bulk of care work and general housework in their family, relationship or household.
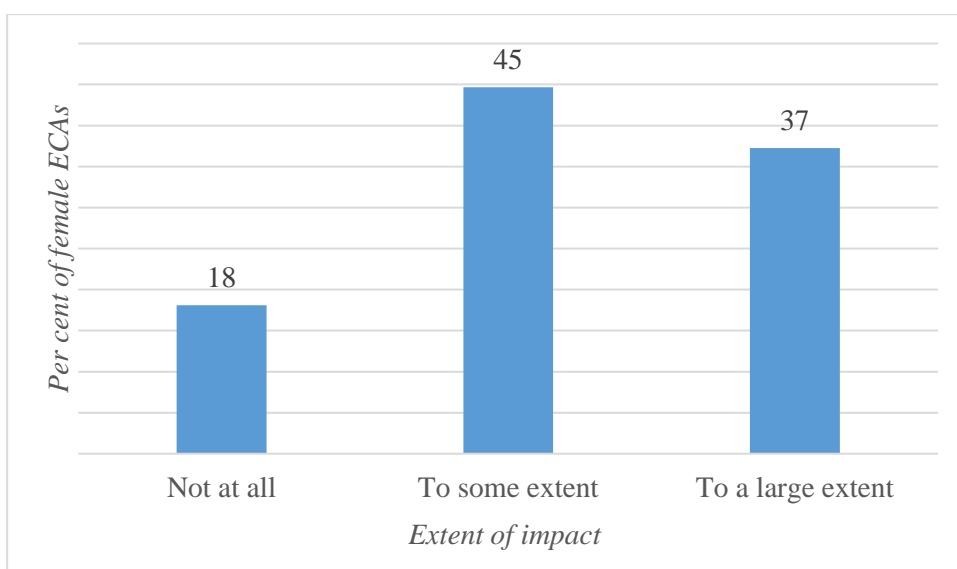
Figure 12: Perceived negative impact of balancing work and family demands on female ECAs' careers (n=271)

A cross-tabulation between the perceived extent of the impact of balancing work and family demands and the field of female ECAs was conducted, which yielded the results presented in Figure 13 below.
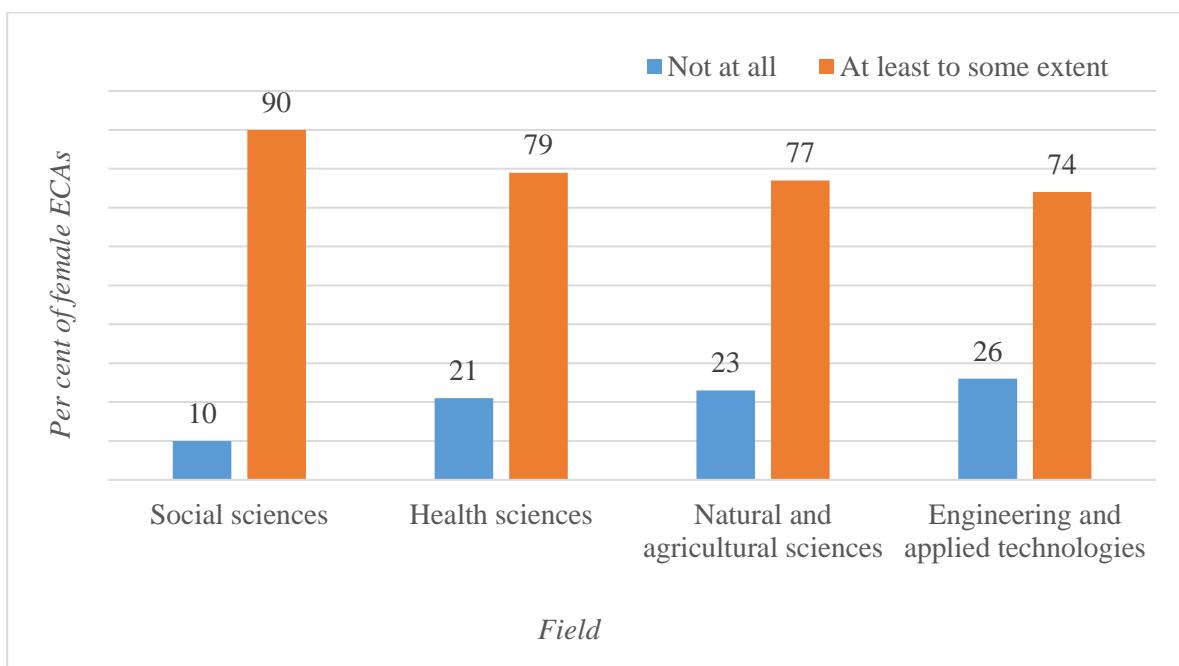

Figure 13: Perceived negative impact of balancing work and family demands on female ECAs' careers, by their field (n=271)

A majority of female ECAs in all four fields perceived that balancing work and family demands had negatively impacted their careers at least to some extent. However, a much higher percentage (90%) of female ECAs in the social sciences, than those in the other fields, perceived that this

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challenge had impacted their careers at least to some extent. Among those female ECAs in the health sciences, natural and agricultural sciences, and engineering and applied technologies, the percentages are not as high but still substantial (79%, 77% and 74%, respectively). Female academics who participated in the interviews disclosed in more detail their struggles of developing their careers while concurrently raising children and maintaining their personal lives.

5.2.2.1 *"Being a mother, being a spouse and at the workplace, you know being an academic it's very hard": the role strain between motherhood and academia*

A 39-year-old interviewee from Nigeria was a vivid example of the tension that female ECAs experience while simultaneously fulfilling the roles of academic and mother. She described the agony of "trying to handle the home front, the children, and all that family pressure here and there". She concluded, "[i]t's not really an easy thing; it is not really easy for a mum".

Another 38-year-old South African interviewee described her fear of falling behind in her career development, because of her absence from work due to being on maternity leave. Although she tried to stay abreast of her research, she found it challenging, because besides caring for the baby, she also had three other toddlers to raise.

> The thing with academia is that it does require some continuity, particularly on the research side. It's very difficult to continue those engagements when you're not present. And [with a] newborn, it's very difficult. Even with two-, even with three-, and nearly five-year-olds now, it's very difficult.

Cultural traditions, especially in patriarchal societies, exacerbate the strain of balancing female ECAs' professional and personal lives. One 30-year-old interviewee from South Africa stated that "it [was] very difficult" prioritising her academic work because it did not align with the norms in those societies. She explained:

> I have two kids: I have a six-year-old and […] my daughter is almost four years old. So, once I get home, there is no way I can work on research or any of my teaching work, and I am from a very conservative, traditional Muslim family, so women are basically meant to be the homemaker and the parent, and not necessarily be working and studying.

Consequently, the misalignment in roles reduced the support that this interviewee received both at home and in the broader community.

> [T]here is no actual support once I get home. And then from a societal point of view, because people have that patriarchal mindset […], they will actually comment to you, "oh, but aren't you neglecting your kids?" […], by being a working mother and also wanting to study.

For one 34-year-old South African interviewee, the "different phases" in her life course – as an academic, a mother and a spouse – were very demanding. She narrated:

> Being a mother, being a spouse and at the workplace, […] being an academic: it's very hard, because there are so many different things that you have to do. If you want to go the research route and you want to move up, then there's a lot more that you have to do...And […] certainly when you are pregnant, it's hard: you get tired; when the child comes, it's another story: you're on maternity leave. You have to catch up and, yes, even through the different phases, it can be quite demanding and, ultimately, […] that is an important aspect of one's life of course: you don't want to neglect your kids.

Even in instances where paid help was available and a partner was supportive, the strain of balancing family and work roles was still felt acutely by a 40-year-old interviewee from South Africa. She explained that she could not neglect some duties nor fully delegate her parenting responsibilities.

> Obviously, there is strain […]: I have got a seven-year-old child, my husband works long hours, and my maid leaves at four; so, if I am not at home, who is going to look after my child? My husband would support anything that I want to do, but how do you manage it, because he needs to be at his work, I need to be at my work, my child needs a mom and a dad. So, I think it's juggling the family responsibilities.

It is clear from the interview data that female academics have to manage various different demands on their time, energy and skills, as they attempt to play a part in society as an academic, spouse, parent, and friend. Attempting to balance these demands, however, may compromise the well-being of female ECAs, because it exerts significant pressure on their physical and mental health.

The interviews not only describe the difficulties of role strain – fulfilling the dual responsibilities of a mother and academic – but also the strategies that female academics follow or desire to have in order to manage it. A 40-year-old interviewee from South Africa mentioned that "[they] have to publish". Therefore, she "get[s] up at three in the morning", because she needs to "still be a mother". Even so, she concluded by stating, "there's just no time". A different strategy would be to report to work very early in the morning, according to another 40-year-old interviewee also from South Africa. However, she still reckoned that this would be disadvantageous to her family.

> So, as much as you might want to come here at four in the morning and spend three hours before university opens, working on your PhD, you can't, because your family needs you, and rightfully so: you are an integral part of their set up; you can't just be off doing your own thing

all the time. And then, like some of the people that work in the faculty will say, "Well, just come to work at whatever time, and that's fine, you can just come to work two hours early", but it's also important to sit with your child and have breakfast with them before they go to school.

For one 48-year-old South African interviewee, the presence of extended family members close by could alleviate the pressure. Her own parents lived in a different city; thus, they were unable to provide support such as "drop and fetch the kids", for example, which she felt would have freed up time for her to undertake research. A 34-year-old interviewee from South Africa felt that "it could have really helped a lot" if her HEI had supported her career development by providing childcare facilities. She stated that "it would have been so nice if the universities would have had crèches or day-cares on campus".

5.2.2.2 *"You cannot only do academic work 100%, you need to be a person": the clash between personal and professional life*

In addition to family responsibilities, female ECAs' also need (and want to) play a role in their communities. The dilemma of "balancing" or "juggling" that aspect of her personal life with her role as a mother and academic was described as follows by a 45-year-old female academic from South Africa:

> I have to balance my kids, I have to balance my social life […] we have got funerals over the weekend, we have got parties. We have got all those things that […] needs family and friends, because I'm a person; you cannot only do academic work 100%, you need to be a person, you need to be you. That's the sort of social life that I have to juggle in between.

The pursuit of balance in life by concurrently participating in community activities actively, parenting and undertaking an academic profession is strenuous. However, a strategy that is sustainable and suitable for the different contexts of female ECAs is yet to be discovered.

5.2.3 Lack of research funding

As shown in Figure 14 below, almost half (46%) of female ECAs perceived that lack of research funding had negatively impacted their career to a large extent and a further one third (33%) of female ECAs indicated that this challenge had negatively impacted their career to some extent. Thus, a majority (79%) of the female ECAs perceived that lack of research funding had negatively impacted their career to at least some extent. This result is not surprising considering that in section 4.2.5 of chapter 4, 50% of the female ECAs reported that they had not received research funding

in the three years prior to the survey, and in section 2.6 of chapter 4, 63% of the female ECAs reported that they on average spent only 8% of their working time on raising funds or grants for research. On the contrary, less than a quarter (21%) did not perceive a lack of research funding as an issue.
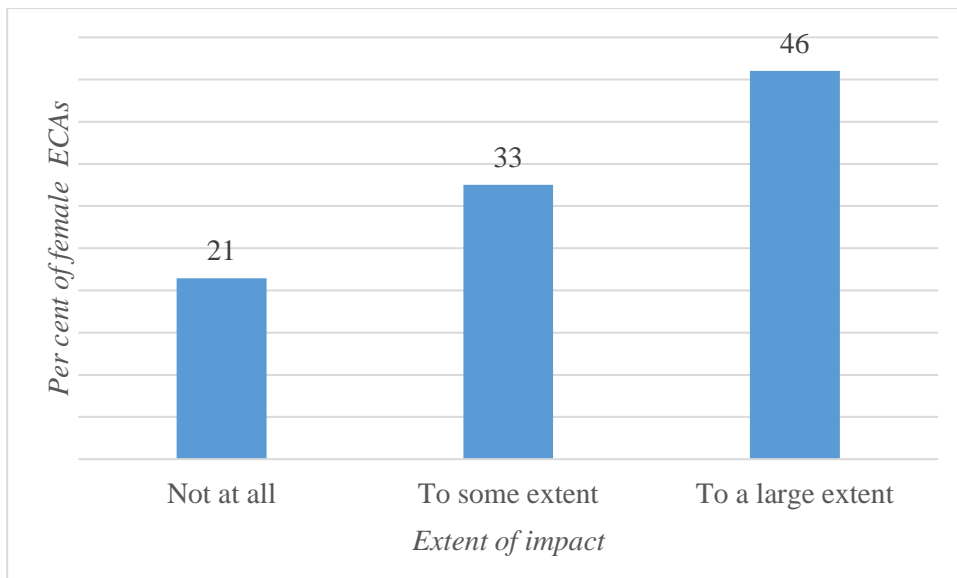

Figure 14: Perceived negative impact of a lack of research funding on female ECAs' careers (n=289)

Figure 15Figure 13 below presents the results of a cross-tabulation conducted between the perceived extent of impact of lack of research funding and the field of female ECAs.
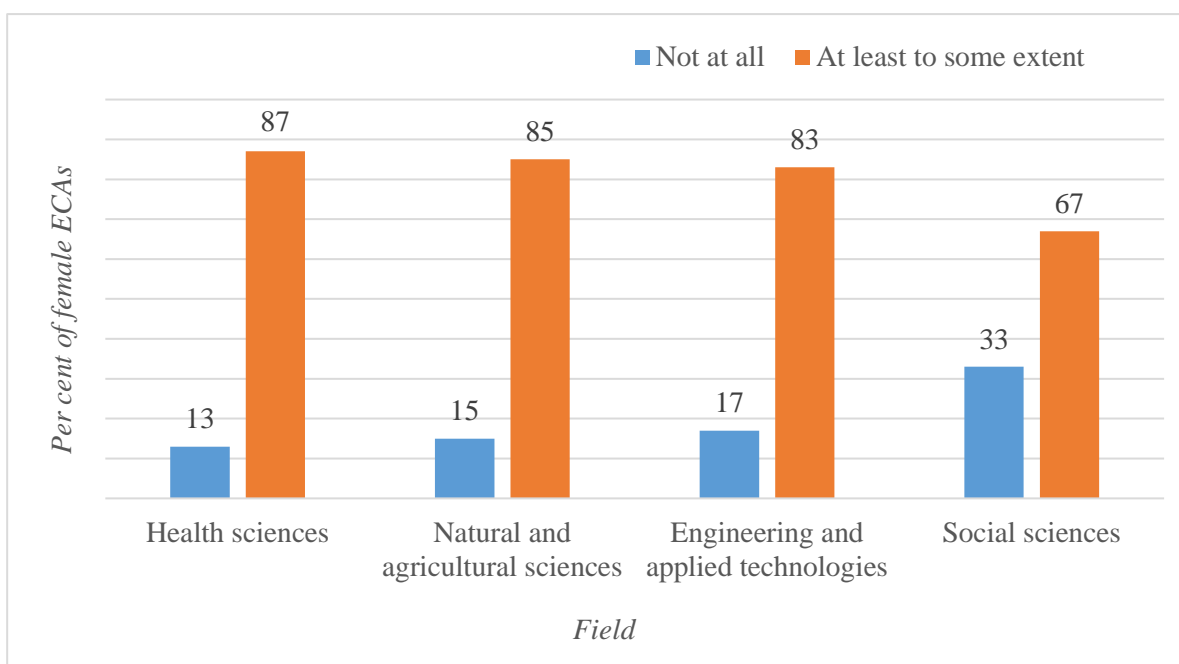

Figure 15: Perceived negative impact of a lack of research funding on female ECAs' careers, by

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their field (n=289)

A majority of female ECAs in all four fields perceived that lack of research funding had negatively impacted their careers, at least to some extent. However, a large majority of female ECAs in the health sciences, natural and agricultural sciences, and engineering and applied technologies, perceived that this challenge had impacted their careers at least to some extent. The highest percentage (87%) of female ECAs that reported that perception is in the health sciences, whereas slightly lower percentages (85% and 83%) of female ECAs are in the natural and agricultural sciences and in the engineering and applied technologies, respectively. The lowest percentage (two-thirds) of female ECAs that reported that perception are in the social sciences (67%).

Various views and experiences regarding lack of research funding and its impact on careers were expressed by female academics during the personal interviews. A 38-year-old interviewee from South Africa drew attention to this challenge as she could "see how junior researchers or emerging researchers cannot get ahead because they don't have access to funding to bring other people on board". She further emphasised that "you can't do it all yourself, especially if you're teaching". The heavy workload, especially in terms of teaching, that is carried by female ECAs, has been confirmed in the literature (as discussed in subsection 1.3 of chapter 1). Research funding is therefore an essential resource that enables female ECAs to acquire additional human resources to which they could assign tasks, in order to free time for themselves to conduct research and eventually grow in their careers.

A 28-year-old interviewee from South Africa elucidated how the lack of research funding was part of a vicious cycle that had negatively impacted her career. She was not able to complete her doctorate studies because she had no funding. However, to secure funding from her HEI, she needed to be permanently employed, but possession of a doctorate was a mandatory requirement for such an appointment.

> For me, the funding has been my major [career] obstacle. I need the support […] mainly funding, to fulfil my PhD, but I can't get that funding or access that funding until I become permanent, but I need my PhD to become [a] permanent [employee].

In contrast to the above interviewee, who had not managed to secure research funding, for one 27-year-old interviewee from South Africa, "being in a place where [she] can apply, [she] can qualify for applying for funding […] as a South African, [and] that has enabled [her] to be where [she is], in terms of research". This interviewee also affirmed the fact that, "[t]he main thing that one needs in order to have research going, you need funds in order to conduct research".

5.2.4 Lack of funding for research equipment

In addition to the questionnaire item asking respondents about the potential negative effect of a lack of research funding in general, another item questioned them about the impact of a lack of such funding for research equipment in particular. Figure 16 below shows that 41% of female ECAs perceived that this challenge had negatively impacted their career to a large extent, while slightly more than a quarter (28%) perceived that it had done so to some extent. In comparison, almost a third (31%) perceived that a lack of funding for research equipment had not negatively impacted their career at all. Thus, a majority (69%) of the female ECAs perceived that lack of funding for research equipment had negatively impacted their career to at least some extent.
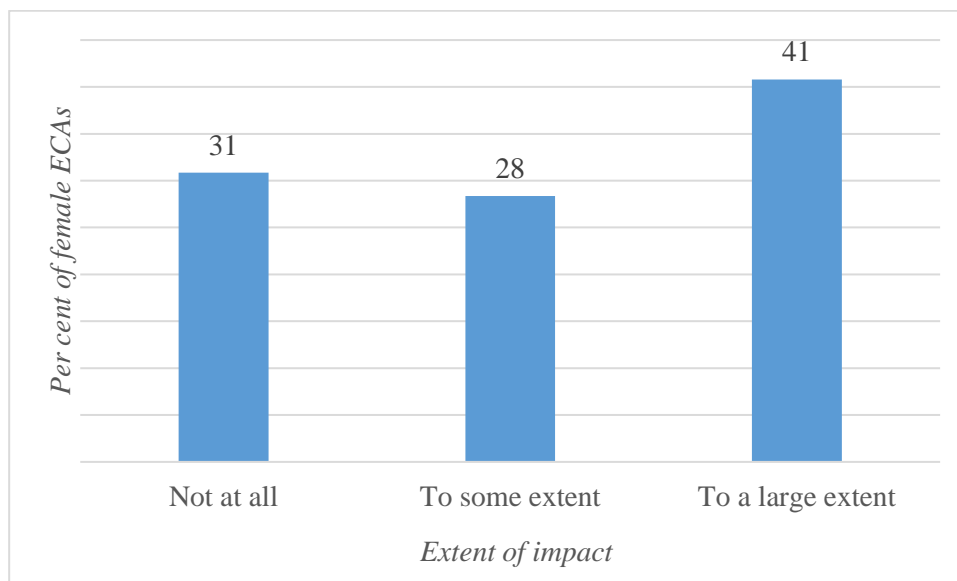

Figure 16: Perceived negative impact of a lack of funding for research equipment on female ECAs' careers (n=282)

Fields differ quite extensively in terms of the funding needed for research equipment. For example, the social sciences generally require less or sometimes no research equipment, compared with fields such as engineering and applied technologies. I therefore cross-tabulated the perceived extent of the impact of lack of funding for research equipment on female ECAs careers, with their field. The analysis yielded the results presented in Figure 17 below.
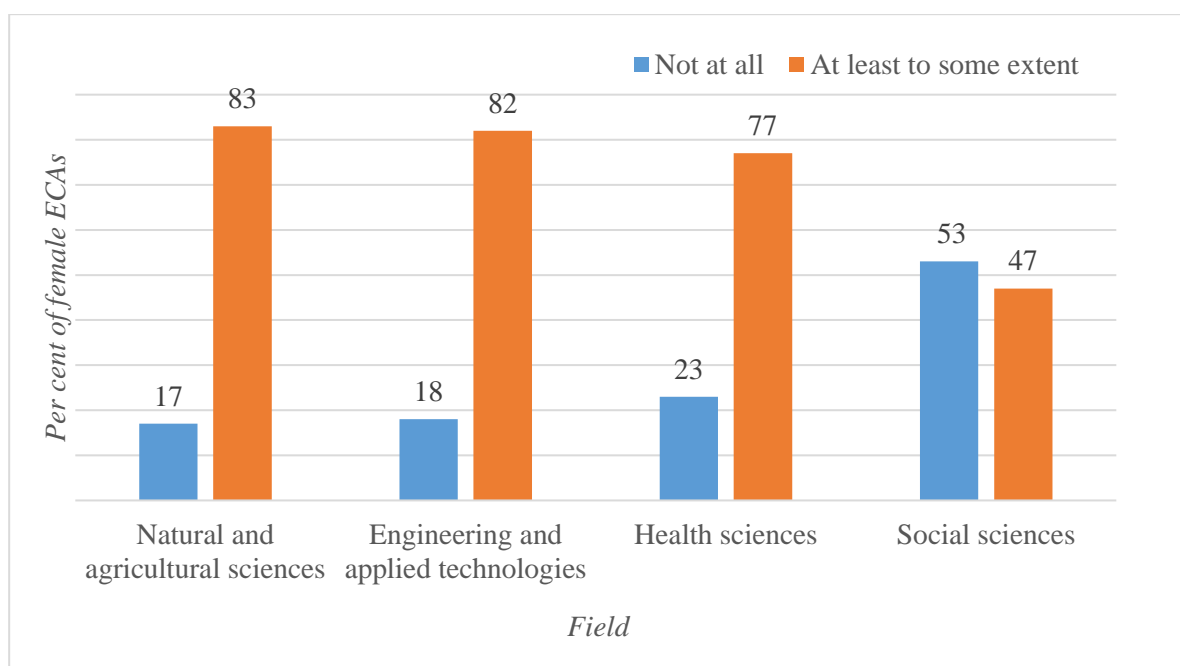
Figure 17: Perceived negative impact of a lack of funding for research equipment on female ECAs' careers, by their field (n=282)

A large majority (more than three quarters) of female ECAs in three of the fields – the natural and agricultural sciences, engineering and applied technologies, and health sciences – perceived that lack of funding for research equipment had negatively impacted their careers at least to some extent. In contrast, less than half (47%) of female ECAs in the social sciences perceived that this challenge had negatively impacted their careers, at least to some extent.

Two interviewees narrated how a lack of funding for research equipment had negatively affected their research. For one 43-year-old interviewee from South Africa, the failure to access her research funding led to the disruption of her research project because "[she couldn't] buy the software that [she] need[ed] in order to do [her] research". According to the second interviewee, a 52-year-old from South Africa, lack of funding by HEIs to pay for subscriptions for some research databases that are prohibitively expensive, places female ECAs who need data from those specific databases at a disadvantage. For her, it meant that she "[couldn't] compete and publish in international journals, because [she didn't] have access to the data [and yet] that research [from the database] extracts within five minutes". Hence, databases should be recognised as equally important tools in the undertaking of research, in the same way, physical research equipment is considered essential.

5.2.5 Lack of training opportunities to develop professional skills

below shows that about a third (32%) of female ECAs reported that a lack of training opportunities to develop professional skills had negatively impacted their career to a large extent. A further 35% of female ECAs perceived that a lack of such opportunities had negatively impacted on their career to some extent, while a third of them did not perceive that a lack of training opportunities had negatively impacted their career. Thus, two thirds (67%) of the female ECAs perceived that a lack of training opportunities to develop professional skills had negatively impacted their career to at least some extent.
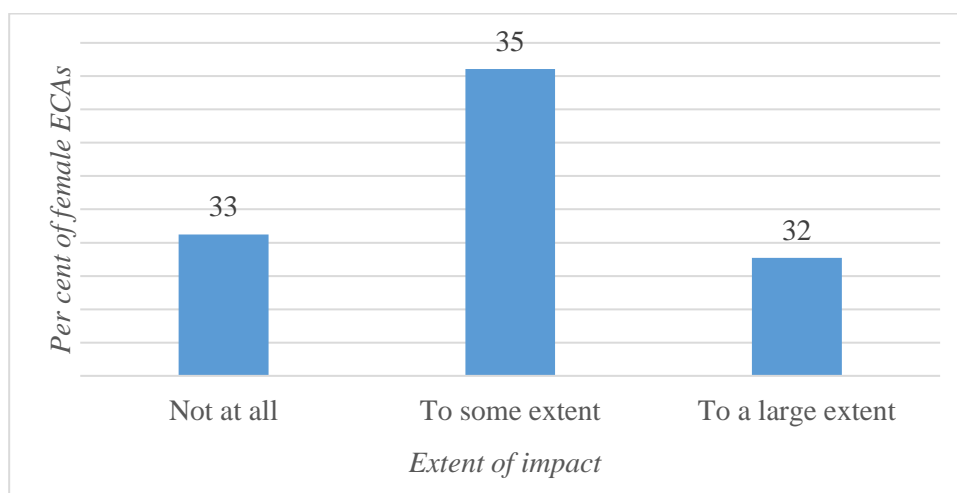

Figure 18: Perceived negative impact of a lack of training opportunities to develop professional skills on female ECAs' careers (n=282)

A cross-tabulation was performed between the perceived extent of impact of this challenge and the field of female ECAs, and it produced the results presented in Figure 19Figure 13 below. The results show that most female ECAs in all four fields perceived that lack of training opportunities to develop professional skills had negatively impacted their careers at least to some extent. However, a large majority (83%) of female ECAs in the natural and agricultural sciences, than those in the other fields, perceived that this challenge had impacted their careers at least to some extent. Among female ECAs in the engineering and applied technologies, more than two-thirds (70%) reported that perception. In contrast, the percentages were much lower for female ECAs in the health sciences and social sciences (61% and 57%, respectively).
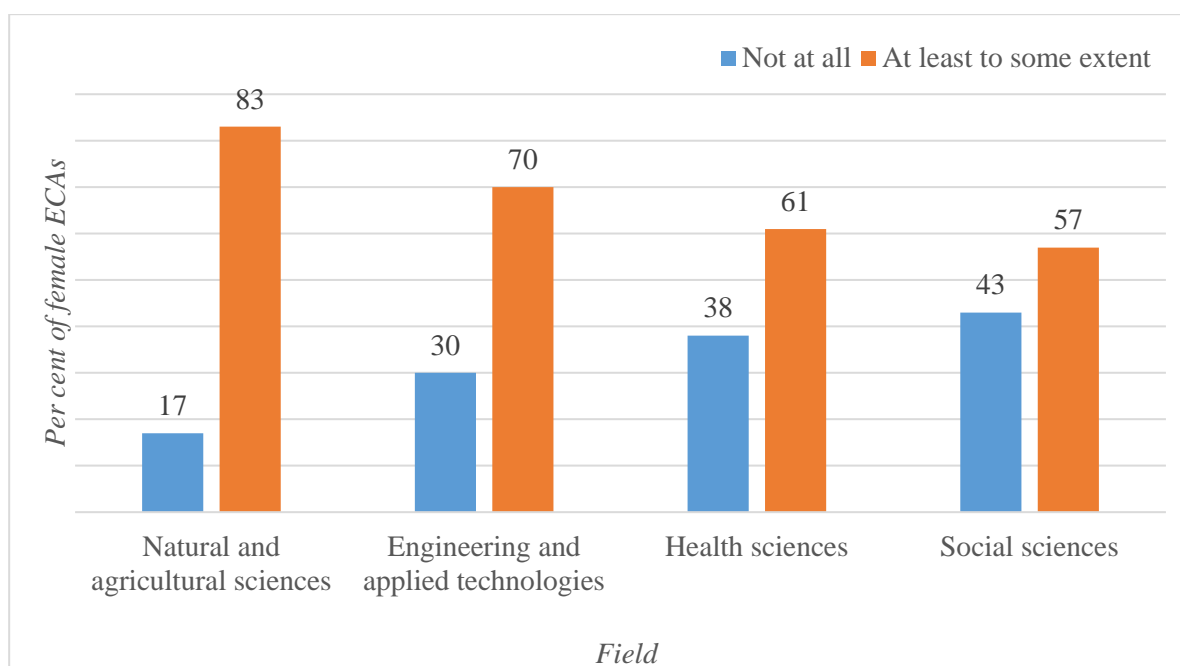
Figure 19: Perceived negative impact of a lack of training opportunities to develop professional skills on female ECAs' careers, by their field (n=282)

In comparison to the other challenges, the interview data on this issue are scant. Only one interviewee, a 40-year-old Nigerian, conveyed a desire for training in "methodological skills", specifically in computer software packages used in her field, so that she could "improve [her] capacity". As expressed by this interviewee, female ECAs need to possess and continuously improve on different skills in research so that they can conduct their research effectively.

5.2.6   Lack of mobility opportunities

The last of the challenges considered is lack of mobility opportunities. Figure 20 below shows that just under a third (30%) of female ECAs reported that this challenge had negatively impacted their career to a large extent, and an additional 37% reported that this challenge had negatively impacted their career to some extent. On the other hand, a third (33%) of female ECAs reported that a lack of mobility opportunities had not had any negative impact on their career. Therefore, two thirds (67%) of the female ECAs perceived a lack of mobility opportunities to have been an obstacle to their career to at least some extent. These results align well with those reported in subsection 4.2.6 of chapter 4, which indicate that a majority of the female ECAs had never studied or worked abroad, while at the same time, 84% of the few female ECAs that had been internationally mobile rated it as essential or very important to their career.
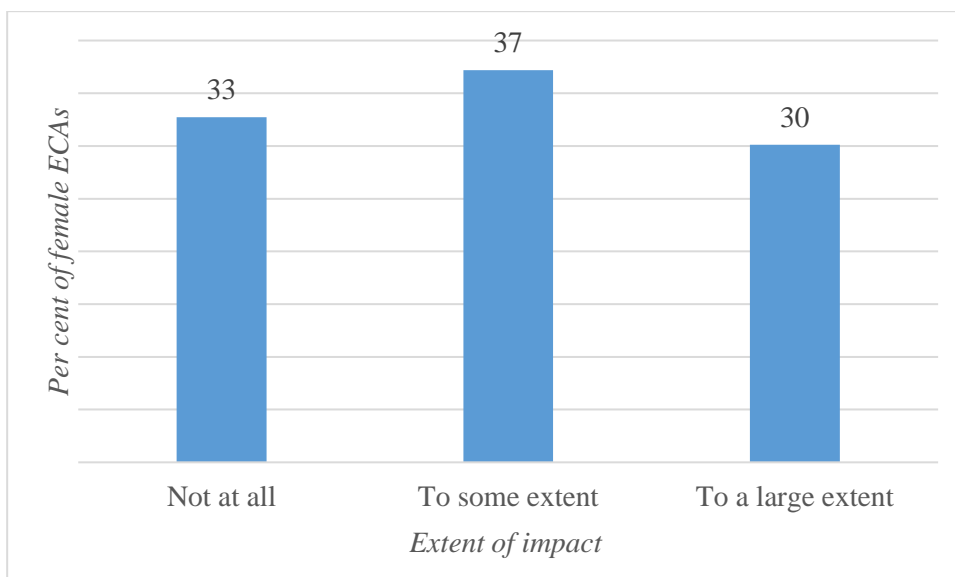
Figure 20: Perceived negative impact of a lack of mobility opportunities on female ECAs' careers (n=269)

Figure 21Figure 13 below illustrates the results of a cross-tabulation conducted between the perceived extent of the impact of lack of mobility opportunities and the field of female ECAs.

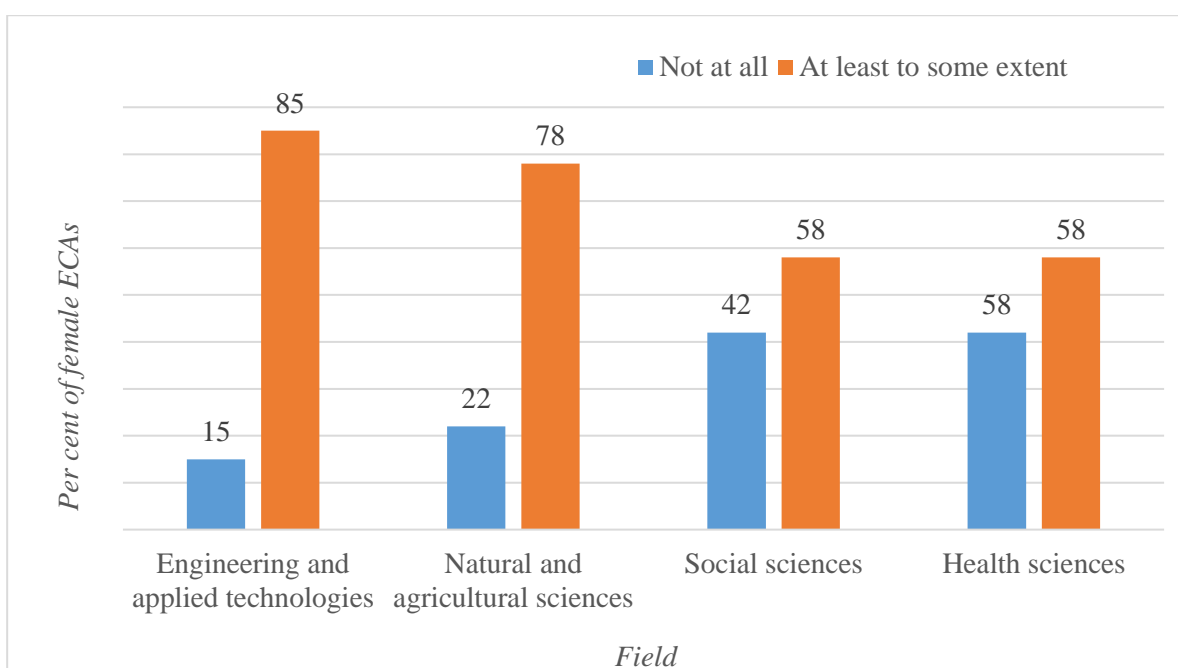**Figure 21: Perceived negative impact of a lack of mobility opportunities on female ECAs' careers, by their field (n=269)**

A majority of female ECAs in all four fields perceived that a lack of mobility opportunities had negatively impacted their careers, at least to some extent. However, a much higher percentage (85%) of female ECAs in the engineering and applied technologies than those in the other fields

perceived that this challenge had impacted their careers at least to some extent. Among female ECAs in the natural and agricultural sciences, the percentage is lower at slightly over three quarters (78%), but still substantial. The lowest percentage (58%) of female ECAs that reported that perception is in the social sciences and health sciences.

Again, qualitative data on this issue is lacking. The only interviewee, a 35-year-old from Nigeria mentioned that "there are times when you would want to visit maybe other countries, mainly to carry out […] research, and then of course, having access to libraries". The data (as discussed in subsection 3.2 of chapter 2) do suggest that one advantage of mobility lies in the female ECA's exposure to superior research facilities in other countries.

5.3   Summary of the main results

This second results chapter determined the extent to which female ECAs perceived six challenges as having negatively impacted on their career. These challenges are as follows: lack of mentoring; balancing work and family demands; lack of research funding; lack of funding for research equipment; lack of training opportunities to develop professional skills; and lack of mobility opportunities.

With regard to the challenge that is directly relevant to the main focus of this study, lack of mentoring, I observed that three quarters of female ECAs perceived it as having negatively impacted their career to at least some extent. An analysis by the field of female ECAs revealed that those in the engineering and applied technologies were most likely to perceive that this challenge had a negative impact on their career, while those in the health sciences were least likely to do so.

The qualitative data revealed that a variety of reasons contributed to female academics not receiving mentoring. What may be categorised as individual-level reasons included the female academics' lack of knowledge on how to identify potential mentors, their preference for a mentor who was not their superior at their HEI, and their specialisation in a niche research field where mentors are rare. Institutional-level reasons relate to the HEIs of the female academics, that is, a lack of initiative taken by HEIs to provide mentors to ECAs; understaffing at HEIs, such that no mentors were available, or the few that were, were overcommitted; and a high turnover of senior academics at HEIs, which leads to the loss of (potential) mentors. Another set of reasons for the lack of mentoring applied to contexts where prospective mentors were available. These include the assumption among senior academics that ECAs with doctorates do not require mentoring; and

senior academics' lack of time to provide mentoring, because they were focused on their individual academic responsibilities and the furthering of their own careers.

The qualitative data also revealed a strong awareness by female academics – many of whom had not been mentored – that mentoring plays a vital role in supporting the development of an academic career. According to these data, mentoring assists female academics by reducing or rendering more manageable the hardships that they may encounter at that critical point in time when they are establishing careers in academia. The female academics articulated that, mentors provided guidance in navigating academia; advised them on how to balance competing academic responsibilities; and were confidantes with whom experiences could be candidly shared. Furthermore, mentors advised the female academics on institutional regulations, such as salary scales, and directed them in scholarly publishing and building a research track record.

The few female academics who were fortunate to have received mentoring stated that it was beneficial in terms of moulding their professional identity; acquiring tacit institutional knowledge which was otherwise not easily available; and managing their time in order to fulfil all of their academic duties. It is further clear from the qualitative data that the mentoring received by the female academics had a long-term positive impact on their careers. Finally, several statements from some of the interviewees implied that there was a belief among female academics that it was the responsibility of HEIs to provide mentoring or to at least assist them in identifying mentors.

Lack of mentoring was not, however, perceived by the greatest percentage of female ECAs as a challenge. Results on balancing work and family demands indicate that this percentage is the largest among all the challenges for which this perception was measured, with 82% of the female ECAs perceiving it to have negatively impacted their career to at least some extent. This result was not surprising, however, considering the results presented in the previous chapter, namely that female ECAs had two dependents on average and that they also undertook a significant amount of care work and general housework in their family, relationship or household. An analysis by the field of female ECAs indicated that those in the social sciences were most likely to perceive that this challenge had a negative impact on their career, while those in the engineering and applied technologies were least likely to do so.

In addition, the interviews provided several illustrations of the role strain between motherhood and academe that female academics experienced as a result of juggling an academic career with the bearing and raising of children. To cope with the pressure of simultaneously fulfilling the responsibilities of mother and academic, one female academic utilised the strategy of getting up earlier in the morning to conduct her research. Other female academics suggested that to manage

the pressure, it would be helpful to have extended family members living close by and for HEIs to provide on-site childcare facilities.

Among all the challenges, a lack of research funding was perceived by the second-greatest percentage (79%) of the female ECAs as having impacted their career negatively to at least some extent. These results align with those reported in the previous chapter, which showed that half of the female ECAs had not received research funding in the three years prior to the survey and that close to two-thirds of female ECAs reported that they on average, spend only 8% of their working time on raising funds or grants for research. An analysis by the field of female ECAs indicated that those in the health sciences were most likely to perceive that this challenge had a negative impact on their career, while those in the social sciences were least likely to do so.

The qualitative data provided further insight on how a lack of research funding had negatively impacted – and receipt of funding had positively impacted – the careers of female academics. For one female academic, this challenge had prevented her from completing her doctorate studies and securing a permanent appointment. Another female academic pointed out that, because she had funding, she was able to develop her research record, while another underscored that funding was vital for acquiring human resources to free time to undertake research.

The three remaining challenges were perceived by lower, and relatively similar, percentages of female ECAs as having impacted their career negatively to at least some extent, but they still constitute the majority of female ECAs. These are a lack of funding for research equipment (69%), a lack of training opportunities to develop professional skills (67%), and a lack of mobility opportunities (67%). An analysis of the perceptions regarding the negative impact of the first of these three challenges – a lack of funding for research equipment – by field revealed that this perception is shared by large majorities (77–83%) of female ECAs in all the fields except the social sciences. Less than half of female ECAs in the social sciences report that a lack of funding for research equipment had negatively impacted their career to at least some extent. The qualitative data illustrated that female academics who perceived this as a challenge felt its negative impact on their research projects through, for example, the inability to purchase necessary computer software, or to access data from a relevant database.

Two-thirds of female ECAs perceived that a lack of training opportunities to develop professional skills had negatively impacted their career to at least some extent. An analysis by field of female ECAs indicated that those in the natural and agricultural sciences were most likely to perceive that this challenge had a negative impact on their career, while those in the social sciences were least likely to do so. Unfortunately, very little qualitative data pertained to the

negative impact of a lack of training opportunities to develop professional skills, with only one female academic expressing her wish to be trained on methodology related to computer software in her field.

The result that two-thirds of female ECAs perceived a lack of mobility opportunities as having impacted their career negatively to at least some extent aligns well with the results presented in the previous chapter, which indicated that most of the female ECAs had never studied or worked abroad and that 84% of the few who had travelled internationally rated it as essential or very important to their career. An analysis by the field of female ECAs indicated that those in the engineering and applied sciences were most likely to perceive that this challenge had a negative impact on their career, while those in the health sciences and social sciences were least likely to do so. Similar to the challenge of the lack of training opportunities to develop professional skills, interview data on this challenge was scant. Only a single female academic conveyed her desire to be internationally mobile to conduct research and access libraries.

In summary, three challenges were perceived by the largest percentages of female ECAs as having had, to at least some extent, a negative impact on their career. These are: balancing work and family demands (82%), lack of research funding (79%), and the focus of this study, namely a lack of mentoring (75%). Lower percentages of the female ECAs, but still two-thirds or slightly more, perceived that lack of funding for research equipment, lack of training opportunities to develop professional skills, and a lack of mobility opportunities had negatively impacted their career to at least some extent. A summary of the results of the analysis of various challenges by field is presented in

Table 6 below.

The summary reveals that the fields rank inconsistently across all six challenges. However, female ECAs in two fields were proportionately most or second-most likely than those in other fields to perceive four of the six career challenges as having negatively impacted their careers to at least some extent. First, female ECAs in the natural and agricultural sciences were most likely to perceive that lack of funding for research equipment and lack of training opportunities to develop professional skills had negatively impacted their careers. They were also second-most likely to express this perception regarding lack of mentoring and lack of mobility opportunities. Notably, they were never least likely to perceive any challenge as such.

Table 6: Summary of the percentage of female ECAs perceiving challenges as having had a negative impact on their careers, by field

Field	Challenges in which % of respondents perceived as having had a negative impact on their careers to at least some extent; rank relative to other fields in brackets (1 = highest)					
	Lack of mentoring	Balancing work and family demands	Lack of research funding	Lack of funding for research equipment	Lack of training opportunities to develop professional skills	Lack of mobility opportunities
Natural & agricultural sciences	79 (2)	77 (3)	85 (2)	83 (1)	83 (1)	78 (2)
Engineering & applied technologies	91 (1)	74 (4)	83 (3)	82 (2)	70 (2)	85 (1)
Health sciences	65 (4)	79 (2)	87 (1)	77 (3)	61 (3)	58 (3)
Social sciences	71 (3)	90 (1)	67 (4)	47 (4)	57 (4)	58 (3)

Secondly, female ECAs in the engineering and applied technologies were most likely to express this perception regarding the lack of mentoring and mobility opportunities. They were also second-most likely to express this perception regarding the lack of funding for research equipment and lack of training opportunities to develop professional skills. They were, however, least likely among the female ECAs in the four fields to report that balancing work and family demands had negatively impacted their careers.

Female ECAs in the health sciences seem to be hampered less by the challenges than their peers in the natural and agricultural sciences or engineering and applied technologies. They were proportionately most likely to perceive only one career challenge – lack of research funding – as having negatively impacted their careers, and second-most likely to express this perception regarding balancing work and family demands. They were least likely to have experienced lack of mentoring as having negatively impacted their careers. Lastly, female ECAs in the social sciences were proportionately most likely to perceive that balancing work and family demands had negatively impacted their careers but their proportions rank either second-lowest or lowest on the other challenges. The next chapter presents the final set of results, which focus on whether female ECAs did or did not receive mentoring in seven aspects of an academic career, and whether having received mentoring in five of these aspects is related to various relevant career outcomes.

Chapter 6: Mentoring received by female early-career academics and its relationship with their career outcomes

6.1   Introduction

In this third and last results chapter, I present two sets of results, namely receipt of mentoring by female ECAs and the relationship between receiving mentoring and academic career outcomes. The first set of results describes whether female ECAs had or had not received mentoring in seven aspects of an academic career. These aspects are fundraising, making career decisions, attaining a position/job, being introduced to research networks, presentation of research results, scientific writing, as well as research methodology.

The results of the analysis on whether mentoring was or was not received on each aspect of an academic career are presented in descending order, from highest to lowest percentage of respondents who had not received mentoring on a specific aspect. Additionally, I present the results of the analysis that I conducted to determine whether mentoring that was received or was not received in a specific aspect differs across fields. To achieve this, I undertook a cross-tabulation between receipt of mentoring and the field of female ECAs. Finally, I utilise qualitative data to illustrate the quantitative results on receipt of mentoring by female ECAs in all aspects except two of them. Qualitative data on receipt of mentoring in attaining a position/job and presentation of research results were not available.

The second set of results are from an analysis of the relationship between having been mentored on five of these aspects on the one hand, and a selection of career outcomes in academia, on the other. The five aspects include mentoring through introduction to research networks, as well as mentoring in terms of research methodology, fundraising, scientific writing and, lastly, presentation of research results. Being mentored in these aspects is hypothesised to have positive effects on the production of articles in peer-reviewed journals, international mobility, collaboration, receipt of research funding and presentation of research results at academic conferences. This chapter tests those hypotheses. The aspects on which a female ECA could have been mentored, and the hypothesised career outcomes, are all concerned, to various degrees, with research production, the significance of which in academic careers has been discussed in the second chapter. Although the cross-sectional analyses do not allow me to conclude that one variable causes another, these sets of results are used to infer whether mentoring in each aspect

has had at least a statistically significant relationship with career outcome(s) that it is hypothetically related to. This second set of results is presented in no particular order.

6.2   Receipt of mentoring by female early-career academics

This section has two objectives. First, it describes whether female ECAs received or did not receive mentoring (as per their own reporting) during their career in the seven academic career aspects outlined in the previous section. Secondly, the results of bivariate analyses (cross-tabulations), conducted to determine whether having received or not received mentoring in each aspect differs across the fields of female ECAs, are presented.

6.2.1   Mentoring in fundraising

A majority (66%) of female ECAs reported that they had never or rarely received mentoring in fundraising. This result aligns with the earlier one, reported in section 4.2.5 of chapter 4, that only half of the female ECAs had received research funding in the three years preceding the survey.

Figure 22 depicts the result of a cross-tabulation between field of female ECAs and receipt of mentoring in fundraising indicating that a majority of female ECAs in all fields except the health sciences reported never or rarely having received mentoring in fundraising. A very high percentage (79%) of female ECAs with a PhD in the engineering and applied sciences reported never or rarely having received mentoring in this aspect. Among those with a PhD in the natural and agricultural sciences and social sciences, the percentages are slightly lower (71% and 68%, respectively). On the other hand, only half (50%) of female ECAs in the health sciences had never or rarely received mentoring in fundraising.
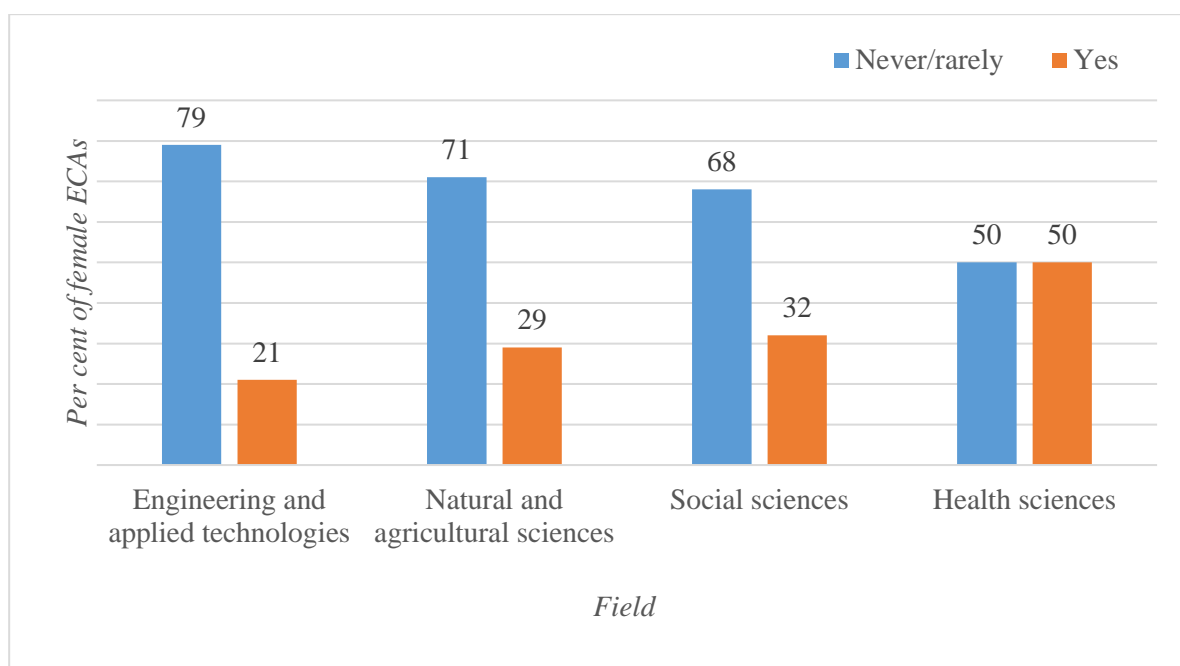
Figure 22: Female ECAs' reported receipt of mentoring in fundraising, by their field (n=283)

Some female academics who participated in the personal interviews expressed a wish to be mentored in fundraising. A 32-year-old interviewee from South Africa described applying for funding or grants as one area in which she required mentoring because the ability "to write these proposals and have them be successful" is "a whole science". Mentors are able to share their useful experience in applying for grants by discussing the various components that comprise a successful proposal and sharing tips. In this way, mentoring plays a career function of coaching, and enhances female ECAs career through the human capital path.

A 40-year-old interviewee from Nigeria suggested that a one-on-one grant-writing practice session with a mentor would help her learn about the key aspects that funders look for in grant applications.

> I would love to be properly mentored on how to write for research grants, and maybe do it practically with the mentors, so that I'm finding out those things that are very pertinent for grant bodies that help them to transform… But […] there is no one to enlighten you on that.

Practical grant-writing sessions with a mentor would be useful to female ECAs, as such session would provide them with an opportunity for direct engagement on the subject. The mentoring that they receive plays the career function of engaging in a challenging task and ultimately, a female ECA's career is advanced through the human capital path.

6.2.2   Mentoring in career decisions

A majority (62%) of female ECAs reported that they had never, or rarely, received mentoring regarding making career decisions. The result of a cross-tabulation presented in Figure 23, between the receipt of mentoring in career decisions and fields, indicates that a very high percentage (83%) of female ECAs in the engineering and applied technologies reported never or rarely having received mentoring in this aspect. Two-thirds of female ECAs with a PhD in the natural and agricultural sciences, and over half (59%) of those with a PhD in the social sciences, reported never or rarely having received mentoring in career decisions. In contrast, a majority (53%) of female ECAs in the health sciences had received mentoring in this aspect.
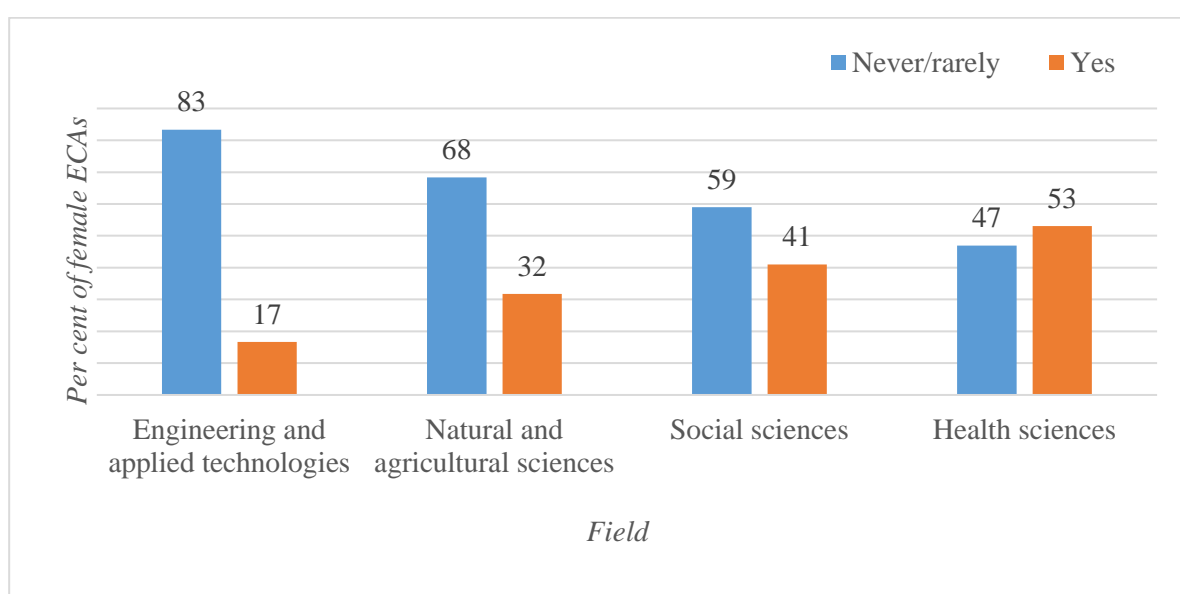
Figure 23: Female ECAs' reported receipt of mentoring in career decisions, by their field (n=278)

Among the female academics who were interviewed, one 32-year-old from South Africa that had not received mentoring in making career decisions stated that she needed mentoring specifically on how to build her career. She voiced her disappointment about not having a mentor, although colleagues were available in her department.

> So, if, I think, [I would like] to find a mentor that in general can give advice on things to work with and a way to structure your career… It's a sad comment on how we work in silos, because I'm working in a department surrounded by 15 other academics, but yet I'm talking to a stranger about [needing] mentorship.

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A collegial work environment makes it possible for female academics to find mentors among their own colleagues or, alternatively, be able to share challenges and advice on career-related issues with them. Such mentoring plays a psychosocial function of counselling.

On the other hand, a 40-year-old interviewee from Nigeria who had been mentored in career decisions indicated that she had been assisted by mentors in decision-making when she was at a career crossroads:

> Oftentimes at crossroads in my career, I've been able to reach out to [my mentors], explain the difficulties or the challenges that I was having, and then they were able to advise, based on their experiences, on what was the best path to follow.

Mentoring in career decisions is beneficial to female academics, as it saves them from making poor career decisions that their mentors may have made in the past. Thus, female academics are able to learn from their mentors on how to navigate challenges that those mentors had similarly experienced. Mentoring of this kind plays the psychosocial functions of not only counselling, but also friendship.

6.2.3   Mentoring in attaining a position/job

A majority (56%) of female ECAs indicated that they had received mentoring in attaining a position or job. The result of a cross-tabulation presented in Figure 24 between the receipt of mentoring in attaining a position/job and field indicates that a majority of female ECAs in all fields except the health sciences reported never or rarely having received mentoring in this aspect. Among female ECAs with a PhD in the engineering and applied technologies, more than two thirds (71%) reported a lack of such mentoring, whereas, among those with a PhD in the natural and agricultural sciences and social sciences, the percentages are lower but still over half (60% and 57% respectively). On the other hand, more than half (56%) of female ECAs in the health sciences had received mentoring in this aspect.

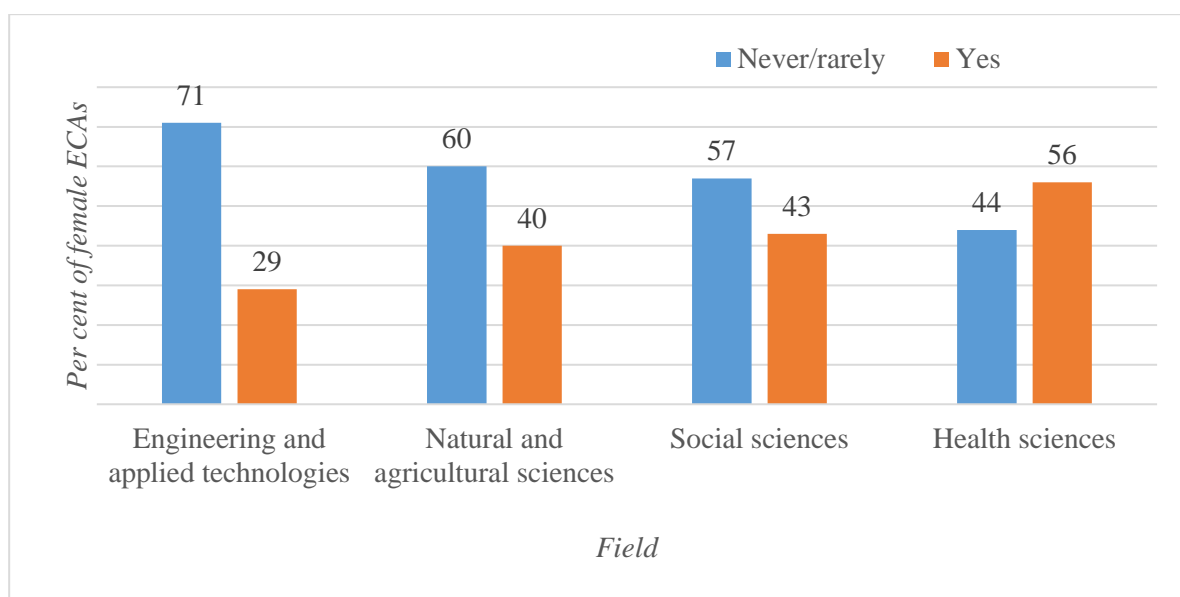**Figure 24: Female ECAs' reported receipt of mentoring in attaining a position/job, by their field (n=278)**

6.2.4   Mentoring in introduction to research networks

Over half (57%) of female ECAs indicated that they had received mentoring in the form of introduction to research networks. Figure 25 illustrates the result of a cross-tabulation between female ECAs' fields and receipt of mentoring in the form of introduction to research networks. More than half (61%) of female ECAs in the engineering and applied sciences reported never or rarely having received mentoring in this aspect. On the contrary, a majority of female ECAs in natural and agricultural sciences, social sciences and health sciences reported having received mentoring in the form of introduction to research networks. Notably, over two thirds (71%) of female ECAs with a PhD in the health sciences reported having received mentoring in this aspect and among female ECAs in the natural and agricultural sciences and social sciences, the percentages are lower at slightly more than half, and almost equivalent, at 54% and 55%, respectively.
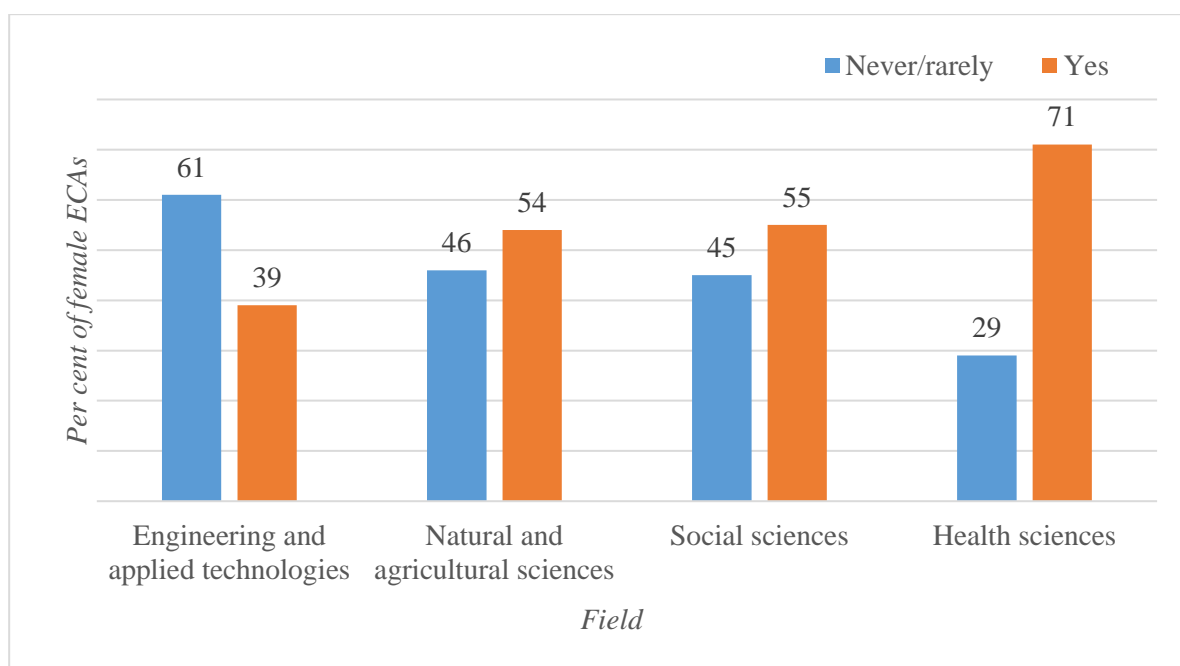
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Figure 25: Female ECAs' reported receipt of mentoring in introduction to research networks, by their field (n=283)

Of those female academics that were interviewed, three of them indicated that they had received mentoring in the form of introduction to research networks. A 39-year-old interviewee from Nigeria stated that her supervisor, whom she also "just saw as a mentor", "helped [her] a lot" in terms of "introductions to research networks". Another 29-year-old interviewee from South Africa also described how her relationship with her doctoral supervisor progressed into a mentor-mentee relationship, through which she was introduced to other senior colleagues.

> My supervisor, after I'd finished my PhD, he kind of took on the role of a postdoc mentor who really would [introduce me] to other senior researchers to extend [my] network and develop contacts and things like that. I think that's been one of the most significant advantages that I've had from, in developing my early research career.

Mentoring is useful to female academics, because mentors already have established networks that they can introduce their mentees to. The last interviewee, a 52-year-old from South Africa, emphasised that such networks, although they are "out there", and are "very hard to access", the assistance provided by a mentor in that regard was invaluable.

> Those networks I think one has to show a lot of initiative, but one can only do that especially when you've just come in from the outside, you have to be mentored on it, because it's something totally new to you.

The early-career stage is a period during which female ECAs have to learn how to network, and mentoring is one avenue that facilitates this learning.

A 33-year-old interviewee from South Africa that had not received such mentoring expressed her appreciation of the value of a mentor in accessing and establishing research networks because she realised that "it's just so difficult to establish a network if you don't have someone who can introduce you to people, who can help you connect to certain people". From her perspective:

> Research networks, […] is about your colleagues at national and international level who you can tap into to get ideas from, who you can work collaboratively with for research projects, etcetera, […] knowledgeable others who can advise you and who can work with you. […] if you've got a mentor in your field working with you, guiding you, steering you in a direction of success, that guidance helps you to tap into certain networks and helps you to establish networks.

The importance of mentors in terms of the mentees' research networking is two-fold: they facilitate access to existing networks and assist the mentee in establishing her own networks. In that way, as a 29-year-old interviewee from South Africa explained, mentors save the mentee a significant amount of time and effort. Because she did not have a mentor, she "spent a long time learning" what she refers to as "the networking stuff", which is "really important"; whereas if she had had mentors, she "could ask them how to do this". Similar to mentoring received in career decisions, mentoring through introduction to research networks prevents a female ECA from learning something which she has no knowledge of, in this case, networking all on her own. This is because she is able to learn from her mentor's experience. The narrations of all the interviewees reveal that mentoring also plays a crucial career function of exposure to other academics, projects and institutions, and enhances female academics' careers through the social capital path.

6.2.5 Mentoring in presentation of research results

A majority (67%) of female ECAs reported that they had received mentoring in the presentation of research results. Figure 26 presents the result of a cross-tabulation between the receipt of mentoring in the presentation of research results and fields of female ECAs. It indicates that a very high percentage (87%) of female ECAs in the health sciences had received such mentoring. Among those with a PhD in the natural and agricultural sciences (64%), social sciences (60%), and engineering and applied technologies (53%), the percentages are lower, but still constitute the majority.

Figure 26: Female ECAs' reported receipt of mentoring in presentation of research results, by their field (n=288)

6.2.6   Mentoring in scientific writing

The descriptive analysis showed that a majority (75%) of female ECAs had received mentoring in scientific writing. The result of a cross-tabulation illustrated in Figure 27, between the receipt of mentoring in scientific writing and fields of female ECAs, shows that a very high percentage (91%) of female ECAs with a PhD in the health sciences received mentoring in scientific writing. Among those with a PhD in the social sciences (73%), natural and agricultural sciences (69%), and engineering and applied technologies (65%), the percentages are lower, but still constitute the majority of respondents in those fields who had received such mentoring.
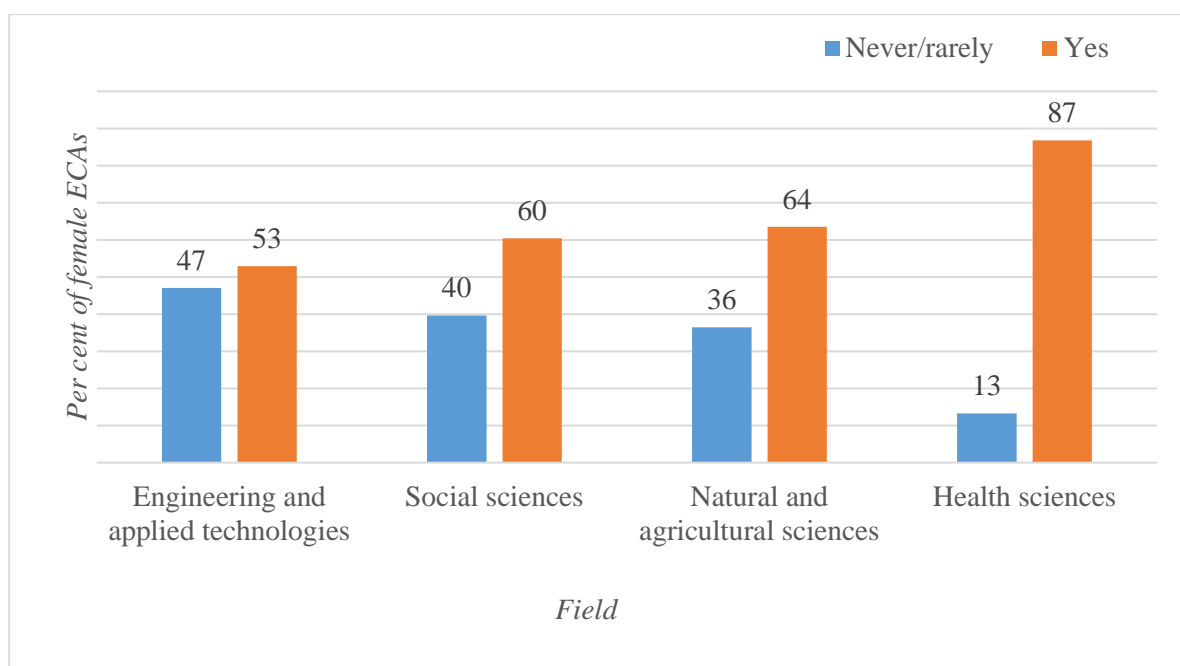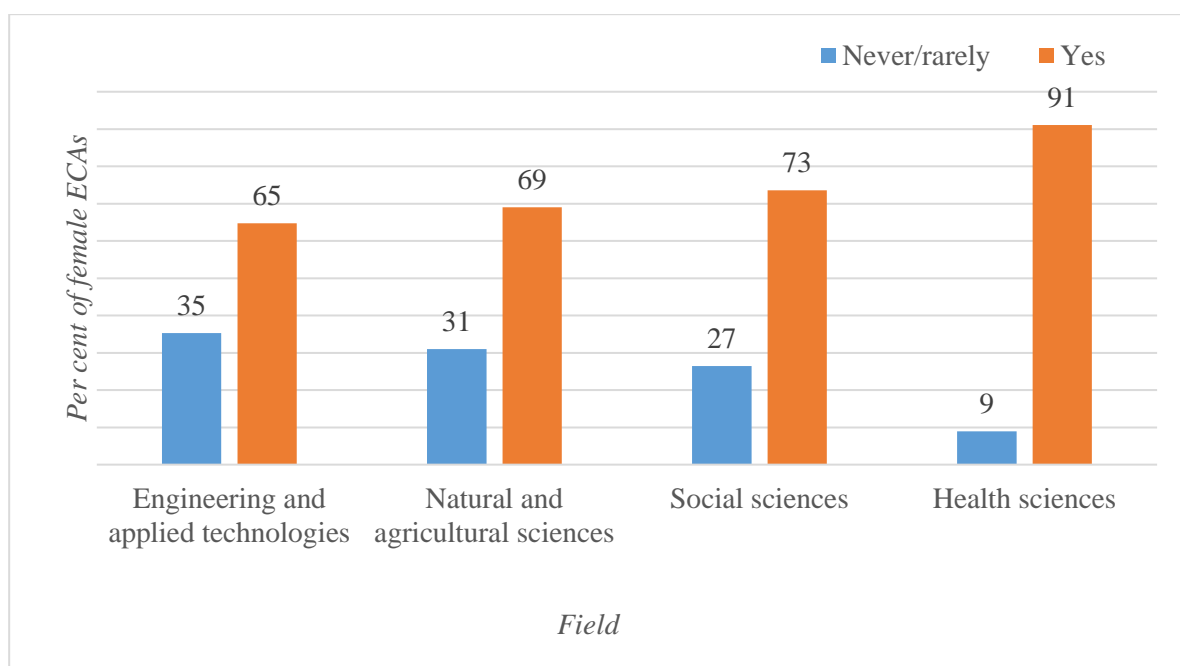
Figure 27: Female ECAs' reported receipt of mentoring in scientific writing by their field (n=287)

The few female academics who had received mentoring in scientific writing shared their experiences of having good mentors. A 39-year-old interviewee from Nigeria stated that her "supervisor has been a very good mentor", because "[e]ven in my write-ups and my publication, she actually helped me and mentored me on how to write papers that would be accepted in international [journals]". The doctoral supervisor of a 55-year-old interviewee from South Africa similarly played the role of a very good or "marvellous" mentor, training the interviewee by assigning her to write portions of a manuscript and co-publishing with her.

> I was in a privileged position to have a supervisor who was a good mentor, and even at the beginning of my PhD studies, published with me and she assisted me to learn how to write articles. If I look back at what she did, and I always tell her that she was marvellous, because she asked me to just write a relatively small portion of an article which I could handle, and I was knowledgeable about, and that boosted me.

Female academics consider a mentor as very good when the mentor can provide practical training in scholarly writing to a mentee, to a level where a draft manuscript is accepted for publication by a peer-reviewed journal. A doctoral supervisor who is also a good mentor is a privilege for a female ECA to have, as she can simultaneously acquire – and benefit from – a number of skills from a single individual.

A 32-year-old interviewee from South Africa also described her master's degree supervisor in glowing terms as "a really great mentor". The interviewee based her assessment of him on two

things. His insistence that she publish scholarly articles from her master's thesis, and his guidance through conceiving ideas and reviewing her manuscripts, which trained her in scholarly writing.

> He's always been really good about highlighting how important it is to get papers out of a master's thesis […] the initial thing was a big push from him, and saying, "Come on, you've got your [master's] now, let's turn it into papers". And so, two of my papers are from my master's thesis, which my supervisor and colleague helped conceptualise and get into a publishable form.

Mentoring in scientific writing could also extend to training in science communication. A very "supportive" mentor in the USA trained a 59-year-old interviewee from South Africa during her doctoral studies by assigning the writing of draft manuscripts to her. The mentor would then rewrite in a style suitable for popular articles.

> I have a mentor in the States, and so, she kind of guides me and encourages me and helps me to develop…in terms of my PhD research. She's a well-published author, right, and she's better, but she's much more supportive, so she gets me to write the article and then she kind of cuts it into something that's more public […], that's suitable for the sort of thrust.

Among female academics who were interviewed, there was one who reported that she had not received mentoring in scientific writing. The 38-year-old interviewee from South Africa revealed that she had not received such mentoring stating that "[a]s I'm sitting in front of my computer now, if I had to have a first draft of a paper, I don't even know where to go to, to submit it, […] basic things like that". However, she was quite clear on how a mentor would have helped her improve her scientific writing skills, as well as other publication-related competences.

> I need someone to sit with me and read and tell me what I'm doing wrong…that one-to-one mentorship. Writing, identifying a journal, submitting your paper to a journal. Reading, even if it means reading two paragraphs. Giving me feedback – "okay, this is a problem with your writing, you're writing long sentences".

As with grant writing, one-on-one practical sessions with a mentor are suggested as a useful way of receiving mentoring in scientific writing. It is evident from the experiences and views of all the interviewees that mentoring plays the career functions of offering challenging tasks and coaching, and since skills are acquired, contributes to career development through the human capital path.

6.2.7 Mentoring in research methodology

A majority (79%) of female ECAs reported having received mentoring in research methodology. Figure 28 illustrates the result of a cross-tabulation between field of female ECAs and receipt of mentoring in research methodology. The results indicate that a majority of female ECAs with a PhD in all four fields received mentoring in research methodology. However, a very high percentage of female ECAs with a PhD in the health sciences and social sciences (88% and 85%, respectively) received mentoring in research methodology. Among those with a PhD in the natural and agricultural sciences (72%) and engineering and applied technologies (60%) the percentages are lower, but still constitute the majority who had received such mentoring.
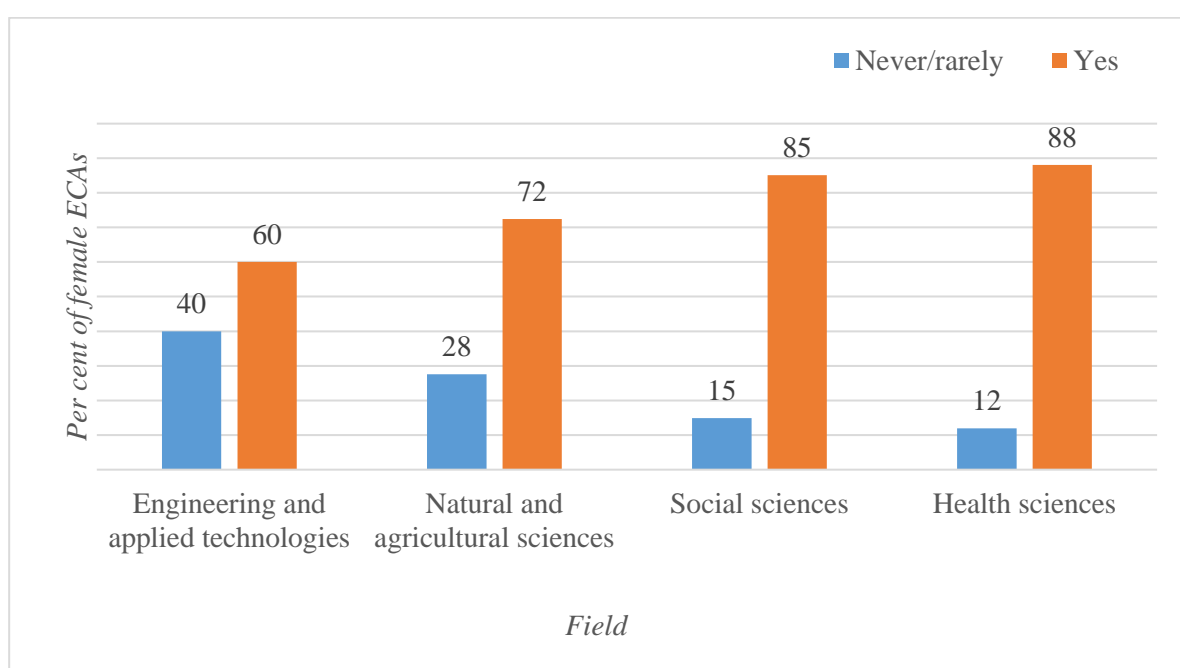
Figure 28: Female ECAs' reported receipt of mentoring in research methodology, by their field (n=290)

Interview data on receipt of mentoring in this aspect was limited, as only two interviewees could be found. A 39-year-old interviewee from Nigeria stated that her supervisor, who is also her mentor, "helped [her] a lot" in methodology. The interviewee described with admiration that her mentor, whom she also considered a role model "is a professor of microbiology and she's very good in microbiology". The interviewee further explained that her mentor provided mentoring on "how to do your research, and eventually maybe [become] a professor like her". The type of mentoring received by the interviewee played a psychosocial function of role modelling, which likely impacted her career positively, through the human capital path.

The other interviewee was a 38-year-old South African who revealed that she did not have access to a mentor. The interviewee explained that had she received mentoring in research methodology, it would have enhanced the quality of her research output and enabled her to publish in highly ranked journals.

> I feel that we are really under-resourced with access to methodological experts […]. I find like we're very limited in high-level method courses, because that's what – to a large extent – often prevents us from getting the research into better journals: that the methodology's weak, the design of the study is weak.

Mentoring in research methodology plays the career functions of coaching and undertaking challenging tasks, and consequently, enhances an academic career through the human capital path. The next section presents the results of bivariate analyses conducted between receipt of mentoring in five aspects related to research production and their associated career outcomes.

6.3   Relationship between mentoring and academic career outcomes

This section presents the results of bivariate analyses (comparison of means and cross-tabulations) conducted between five mentoring aspects and career outcomes that are directly related to research production. These aspects are research methodology, fundraising, scientific writing, presentation of research results and introduction to research networks. The analyses were conducted to establish whether having received mentoring in a career aspect is related to one or more career outcomes that one could reasonably expect would be associated with that aspect. For cross-tabulations, the statistical significance of observed relationships was determined using the probability (p) value, as generated by a Chi-square test. For comparison of means, the statistical significance of observed relationships was determined using the f-statistic and the p-value, as generated by the one-way ANOVA test.

6.3.1   Mentoring in research methodology

It may be assumed that mentoring in research methodology, if successful, would have a positive outcome in terms of research output, such as articles published in peer-reviewed journals. As discussed in the literature review chapter, scholarly articles are widely used as a benchmark across many academic disciplines to determine whether an academic should advance in his/her career. This informed the decision to use the number of articles in peer-reviewed journals as the only type of research output in the analysis presented in this and subsequent subsections.

The mean number of articles published in peer-reviewed journals by female ECAs who had never or rarely received mentoring in research methodology was therefore compared with those who had received such mentoring to establish whether the latter had produced a higher number. The analysis revealed that the mean number of articles produced by female ECAs that had not received mentoring was 5,46, whereas it was 5,92 for those who had received mentoring. A one-way ANOVA test produced an f-statistic of 0,571 and a p-value of 0,451, indicating there is no significant difference among these two means. Therefore, I conclude that there is no relationship between receipt of mentoring in research methodology and number of articles published in peer-reviewed journals.

6.3.2   Mentoring in scientific writing

To assess whether mentoring in scientific writing is related to research output, female ECAs that had and had not received such mentoring were compared in terms of the mean number of articles they had published in peer-reviewed journals. The bivariate analysis revealed that the mean number of articles published by female ECAs who had not received mentoring in scientific writing was 5.15, whereas for those who had received such mentoring it was higher, at 6,11. A one-way ANOVA test produced an f-statistic of 2,703 and a p-value of 0,101, which implies that the observed difference between the two means is not significant. Hence, I conclude that there is no relationship between receipt of mentoring in scientific writing and number of articles published in peer-reviewed journals.

6.3.3   Mentoring in presentation of research results

Female ECAs that had and had not received mentoring in the presentation of research results were compared in terms of the mean number of presentations at conferences that they had delivered. The aim of this bivariate analysis was to establish whether receiving mentoring in presentation of research results is related to the volume of presentations delivered at conferences. The results showed that the mean number of conference presentations produced by female ECAs who had not received mentoring in the presentation of research results was 4,95, whereas it was 5,08 for those who had received such mentoring. The 0,061 f-statistic and 0,805 p-value generated by the one-way ANOVA test indicate that there is no significant difference between the means. Hence, I conclude that there is no relationship between receipt of mentoring in the presentation of research results and number of presentations delivered at conferences.

6.3.4   Mentoring in fundraising

A cross-tabulation between receipt of research funding by female ECAs and receiving mentoring in fundraising was undertaken to establish whether there is a relationship between the variables. The results, as displayed in Figure 29, show that among female ECAs who never or rarely received mentoring in fundraising, 57% had not received funding, whereas, among female ECAs who had received such mentoring, 67% had received research funding. A p-value of 0 was obtained from the Chi-square test, which implies that the results are statistically significant. Consequently, I conclude that there is a relationship between receiving mentoring in fundraising and receipt of research funding.
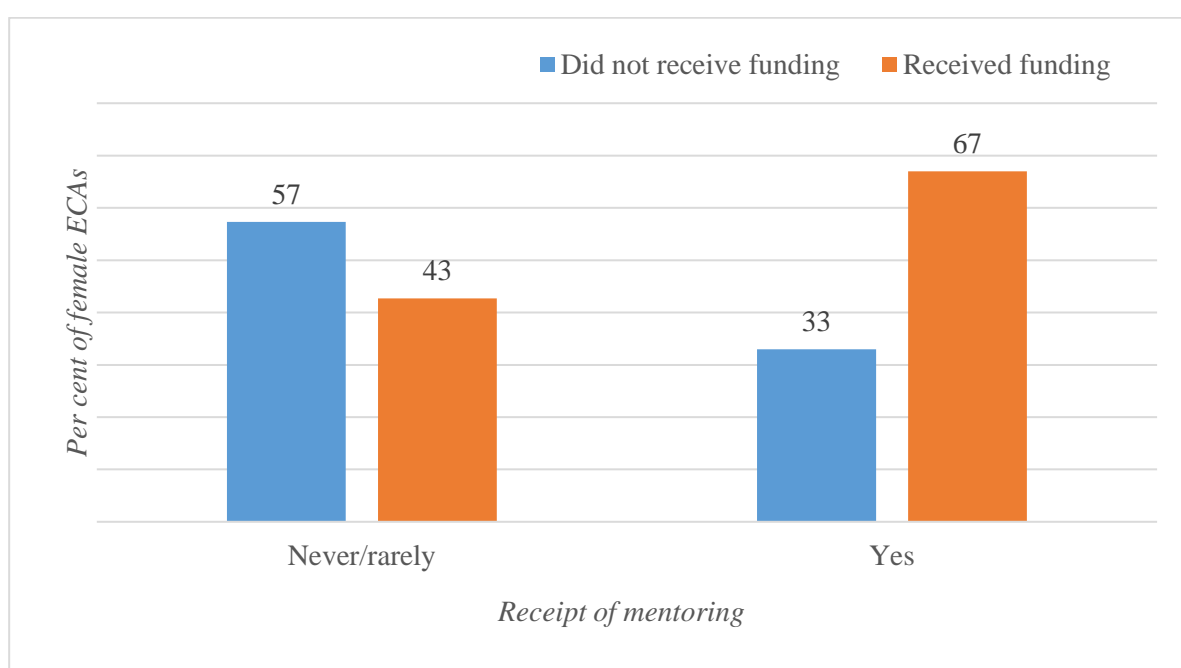
Figure 29: Receipt of research funding by receipt of mentoring in fundraising (n=279)

6.3.5   Mentoring in introduction to research networks

Mentoring in the form of introduction to research networks may be related to three career outcomes of female ECAs, namely research output, international mobility and collaboration. To determine the relationship between such mentoring and research output, a comparison of the mean of the number of articles published in peer-reviewed journals by female ECAs who had and had not received such mentoring was drawn. The mean number of articles produced by female ECAs who had not received mentoring in the form of introduction to research networks was 5,09, whereas for those who had received such mentoring, it was 6,51. A one-way ANOVA test resulted in an f-

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statistic of 7,784 and a p-value of 0,006, which indicates that there is a significant difference between the means. Consequently, I conclude that there is a relationship between receipt of mentoring in the form of introduction to research networks, and number of articles published in peer-reviewed journals.

A cross-tabulation was performed to determine whether there is a relationship between receipt of mentoring in the form of introduction to research networks and international mobility (that is, studying or working abroad). Results, as illustrated in Figure 30, show that among female ECAs who never or rarely received such mentoring, 76% had not studied or worked abroad, while only 24% had done so. On the other hand, among female ECAs who had received such mentoring, 33% had studied or worked abroad, while 67% had not done so. A p-value of 0.101 was produced by the Chi-square test, which means that the results are not statistically significant. Hence, I conclude that there is no relationship between receipt of mentoring in the form of introduction to research networks and international mobility.

Figure 30: Study or work abroad by receipt of mentoring in introduction to research networks (n=281)

Likewise, a cross-tabulation was undertaken to determine whether there is a relationship between receipt of mentoring in the form of introduction to research networks and frequency of research collaboration by female ECAs. Four types of collaboration were considered in the analysis – namely intra-institutional, national, inter-African and international collaboration – and results are presented in more detail in the subsequent paragraphs.

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Regarding intra-institutional collaboration, Figure 31 illustrates that an equal percentage (50%) of female ECAs who never or rarely received mentoring in the form of introduction to research networks collaborated less than often and often or very often. On the other hand, of those who received such mentoring, 64% collaborated often or very often, while 36% collaborated less than often. A Chi-square test yielded a p-value of 0,014, which indicates that the results are statistically significant. Consequently, I conclude that there is a relationship between receipt of mento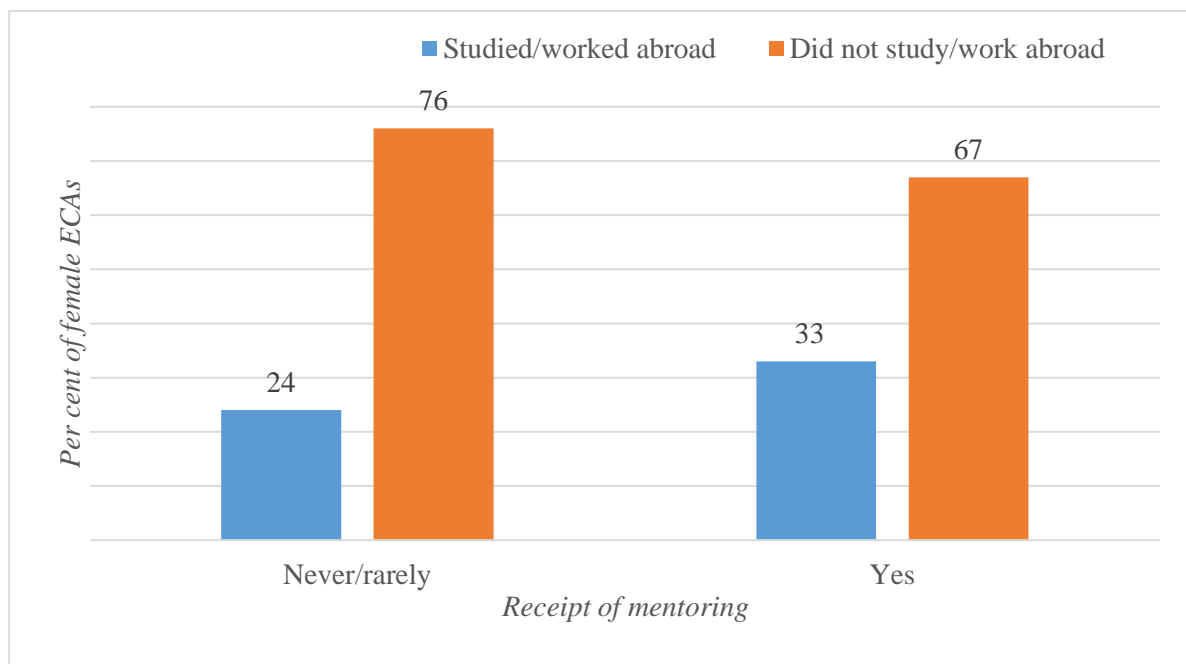ring in the form of introduction to research networks and frequency of intra-institutional collaboration. This type of relationship is expected, as those who have received mentoring in the form of introduction to research networks are proportionately more likely to collaborate intra-institutionally and vice versa.

Figure 31: Frequency of intra-institutional collaboration by receipt of mentoring in introduction to research networks (n=282)

Concerning inter-institutional (national) collaboration, Figure 32 shows that 79% of female ECAs who never or rarely received mentoring collaborated less than often, whereas 21% collaborated often or very often. Of those who received mentoring in the form of introduction to research networks, 64% collaborated less than often, whereas 36% collaborated often or very often with researchers at other institutions in their own country. A p-value of 0,006 was generated from the Chi-square test, which signifies that the results are statistically significant. Therefore, I conclude that there is a relationship between receipt of mentoring in the form of introduction to research networks and frequency of inter-institutional collaboration.
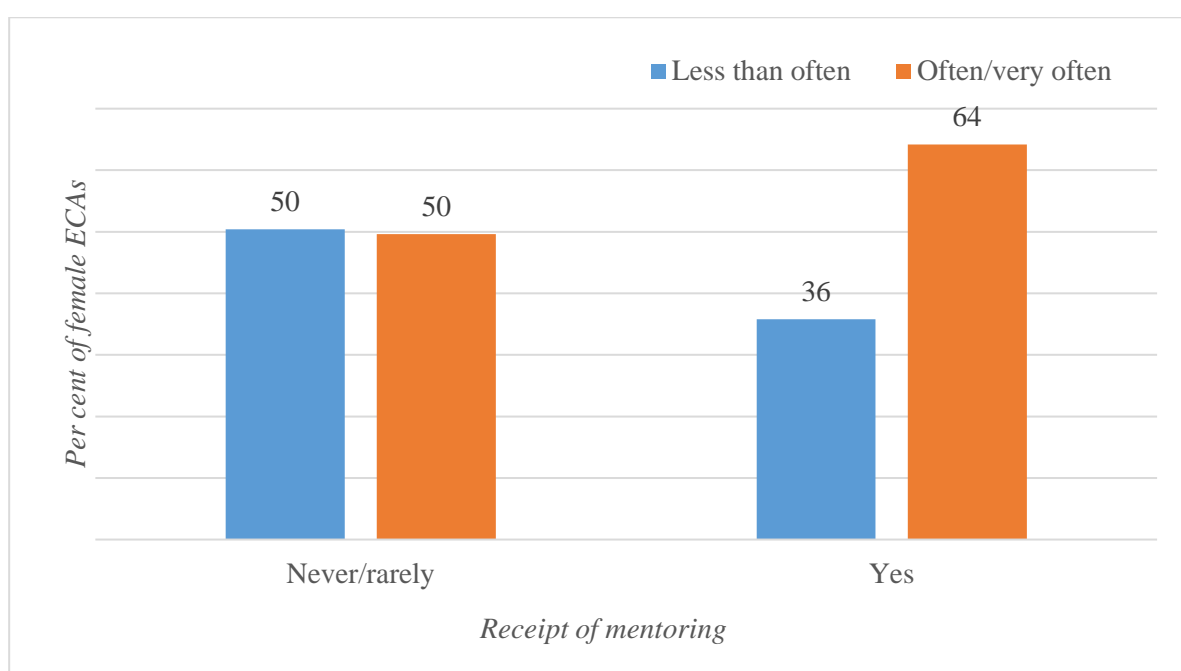
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Figure 32: Frequency of inter-institutional collaboration by receipt of mentoring in introduction to research networks (n=278)

Pertaining to collaboration of female ECAs with researchers at institutions in other African countries, Figure 33 illustrates that 93% of those who never/rarely received mentoring collaborated less than often, whereas 7% collaborated often/very often. Among those who received mentoring in the form of introduction to research networks, 87% collaborated less than often, whereas 13% collaborated often/very often. A Chi-square test produced a p-value of 0,152, which implies that the results are not statistically significant. Thus, I conclude that there is no relationship between receipt of mentoring in the form of introduction to research networks and frequency of inter-African collaboration.

Figure 33: Frequency of inter-African collaboration by receipt of mentoring in introduction to research networks (n=278)

With regards to international collaboration, Figure 34 illustrates that 66% of female ECAs who never or rarely received mentoring collaborated less than often, whereas 34% collaborated often/very often. Of those female ECAs who received mentoring in the form of introduction to research networks, 62% collaborated less than often, and 38% collaborated often/very often. A p-value of 0,411 was produced by the Chi-square test, which suggests that the results are not statistically significant. Accordingly, I conclude that there is no relationship between receipt of mentoring in the form of introduction to research networks and frequency of international collaboration.

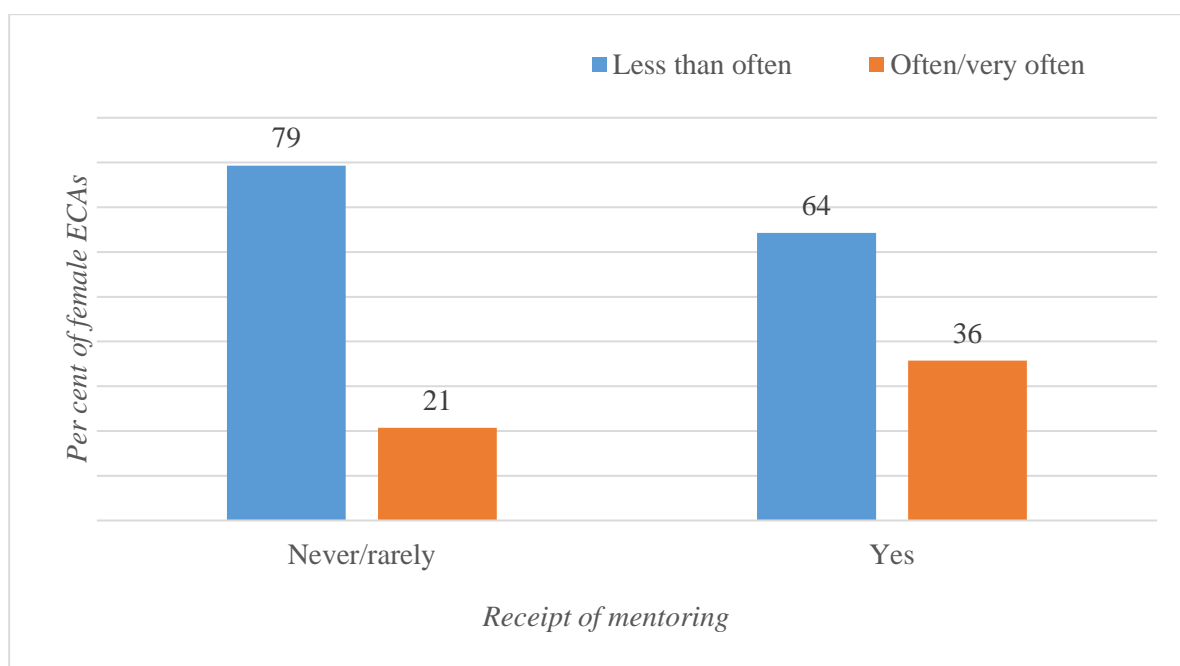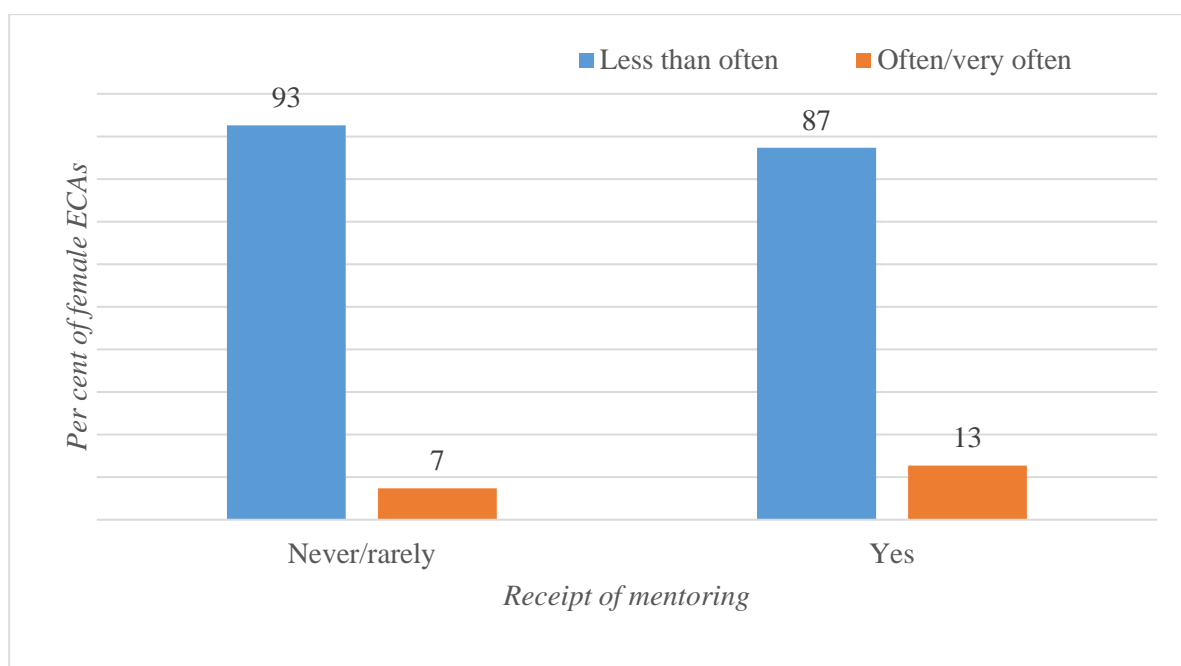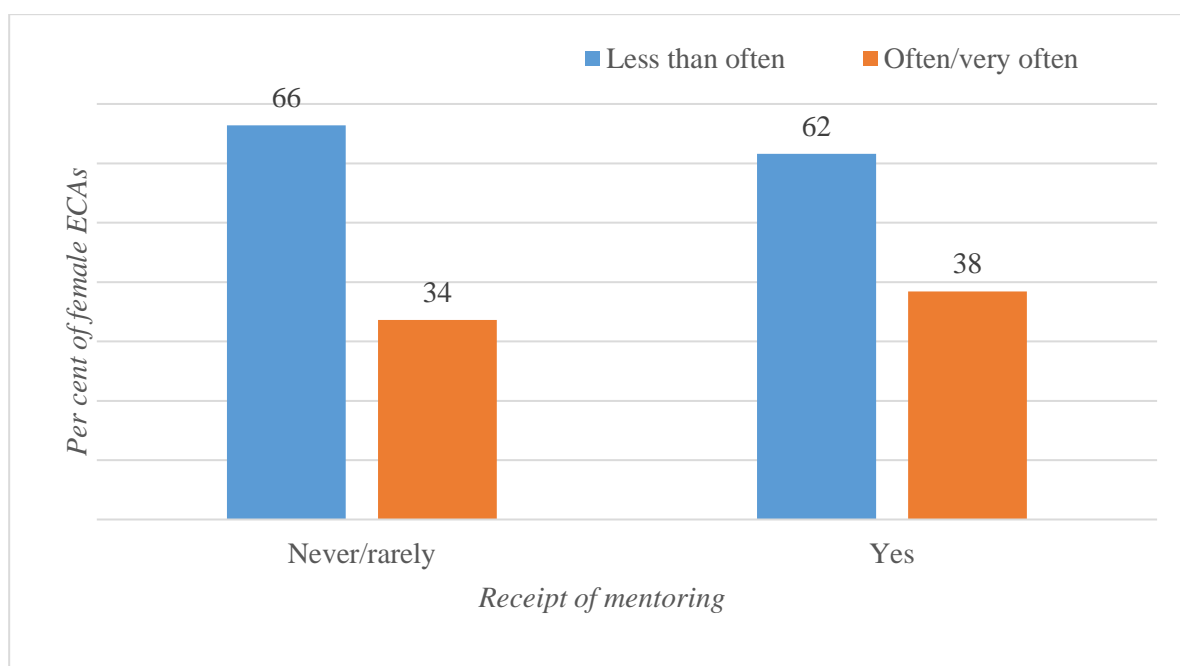**Figure 34: Frequency of international collaboration by receipt of mentoring in introduction to research networks (n=281)**

6.4   Summary of the main results and conclusions

This chapter presented two sets of results: the first set describes whether female ECAs had or had not received mentoring in seven aspects. A majority of female ECAs indicated that they had received mentoring in five aspects: attaining a position/job, being introduced to research networks, presentation of research results, scientific writing, and research methodology. In contrast, a majority of female ECAs reported never or rarely having received mentoring in two aspects, namely fundraising and making career decisions.

Just over half of female ECAs indicated that they had received mentoring by being introduced to research networks. Interviewees who had received such mentoring stated that these mentors introduced them to their networks which in turn assisted them to establish their own networks. One interviewee who did not receive mentoring acknowledged that such endeavours are difficult without the help of a mentor, while another interviewee asserted that mentors save the mentee a significant amount of time and effort in accessing and building research networks.

Three quarters of female ECAs reported that they had received mentoring in scientific writing. Interviewees who had received mentoring in this particular aspect shared that their mentors were good because they trained the female academics in scholarly writing, encouraged them to publish articles in journals, and even co-published journal articles with the female academics. An interviewee who did not receive such mentoring expressed her wish to have a mentor as she was

cognisant of how the mentor would assist her to improve her scientific writing skills as well as other related competencies such as identification of a suitable journal and submission of a manuscript.

Nearly four-fifths of female ECAs reported having received mentoring in research methodology. An interviewee shared that her supervisor, whom she also considered a role model, had mentored her in research methodology. Another interviewee highlighted that had she received mentoring in research methodology, it would have enhanced the quality of her research output and enabled her to publish in highly ranked journals. Finally, just over half of female ECAs indicated that they had received mentoring in attaining a position or job, whereas two-thirds of female ECAs reported that they had received mentoring in presentation of research results. Unfortunately, qualitative data on these two aspects were unavailable.

On the other hand, approximately two-thirds of female ECAs indicated that they had never or rarely received mentoring in fundraising, and interviewees expressed a desire to be mentored in writing grant proposals. Slightly more than three-fifths of female ECAs indicated that they had never, or rarely, received mentoring in making career decisions. An interviewee that did not have a mentor wished to receive mentoring on how to build her career, while another who had mentors stated that they assisted her to make decisions when she was at career crossroads.

Furthermore, results of an analysis of receipt of mentoring in each of the seven aspects by field allowed me to rank the fields from highest to lowest proportional likelihood that female ECAs had received mentoring on all seven aspects. A summary of the results of the analysis by field is presented in Table 7 below.

Table 7: Summary of the percentage of female ECAs receipt of mentoring on seven aspects, by field

Field	Aspects of mentoring in which % of respondents had received mentoring; rank relative to other fields in brackets (1 = highest)						
	Fundraising	Career decisions	Attaining a position/job	Introduction to research networks	Presentation of research results	Scientific writing	Research methodology
Health sciences	50 (1)	53 (1)	56 (1)	71 (1)	87 (1)	91 (1)	88 (1)
Social sciences	32 (2)	41 (2)	43 (2)	55 (2)	64 (2)	73 (2)	85 (2)
Natural & agricultural sciences	29 (3)	32 (3)	40 (3)	54 (3)	60 (3)	69 (3)	72 (3)
Engineering & applied technologies	21 (4)	17 (4)	29 (4)	39 (4)	53 (4)	65 (4)	60 (4)

Across all seven aspects, the ranking was consistent, with female ECAs in the health sciences proportionately most likely to report having received mentoring, followed by those in the social sciences, who were proportionately second-most likely to do so than those in the natural and agricultural sciences. Female ECAs in the engineering and applied technologies were proportionately least likely to report having received mentoring on all seven aspects. It may also be noted that a majority of female ECAs in the health sciences received mentoring in all seven aspects, whereas a majority of female ECAs in the social sciences and natural and agricultural sciences received mentoring in four aspects, namely introduction to research networks, presentation of research results, scientific writing and research methodology. Lastly, a majority of female ECAs in the engineering and applied technologies received mentoring in only three aspects, namely presentation of research results, scientific writing and research methodology. These results therefore show that the likelihood to receive mentoring differs clearly and systematically across the four main fields.

The second set of results presented in this chapter was produced by analyses conducted to determine whether receipt of mentoring in five specific aspects is related to various career outcomes. From the results, I conclude that there is a relationship between receipt of mentoring in introduction to research networks on the one hand, and research output (production of scholarly articles) on the other. One may reasonably assume that, in an academic career, mentoring in this aspect precedes the publication of articles. One may therefore infer, with at least some degree of confidence, that receipt of mentoring in the form of introduction to research networks, has a positive effect on this measure of publication output.

The publication output of female ECAs who had never or rarely been mentored on research methodology is on average slightly lower than for those who had been mentored, but the difference is not statistically significant, indicating no relationship between receipt of mentoring in research methodology and number of articles published in peer-reviewed journals. Similarly, the publication output of female ECAs who had never or rarely been mentored in scientific writing is lower than for those who had received such mentoring, but again, the difference is not statistically significant, leading me to conclude that no relationship exists between receipt of mentoring in scientific writing and number of articles published in peer-reviewed journals.

Concerning the relationship between receiving mentoring in presentation of research results and the mean number of presentations delivered at conferences, female ECAs who had never or rarely been mentored made, on average, a lower number of presentations than those who had been mentored, but the difference is relatively small and not statistically significant. Thus, I conclude that there is no relationship between these two variables.

A cross-tabulation of having received mentoring in fundraising and receipt of research funding showed that among female ECAs that had never or rarely been mentored, the minority (less than half) had received funding while among female ECAs who had been mentored, the opposite applied, namely the majority (two thirds) had received funding. The differences are statistically significant and consequently, I conclude that there is a relationship between receiving mentoring in fundraising and receipt of research funding.

Next, the relationships between mentoring in the form of introduction to research networks and three career outcomes, namely research output, international mobility and collaboration were examined. Firstly, female ECAs who had never or rarely received mentoring produced, on average, a lower research output than those who had received mentoring by being introduced to research networks. The difference between the means is statistically significant; thus, I conclude that there is a relationship between these two variables. Secondly, a cross-tabulation between receipt of this

mentoring showed that the minority of female ECAs had been internationally mobile, regardless of whether they had or had not been introduced to research networks. Although this proportion was smaller (a quarter) among female ECAs who had never or rarely received such mentoring than among those who did (a third), the results are not statistically significant. Hence, I conclude that there is no relationship between receipt of mentoring in the form of introduction to research networks and international mobility.

Thirdly, receipt of mentoring in the form of introduction to research networks was cross-tabulated with the frequency with which female ECAs engaged in four types of collaboration: intra-institutional, inter-institutional (national), African and international. The results revealed that, while only half of female ECAs who had never or rarely received such mentoring collaborated often or very often in intra-institutional collaboration, close to two-thirds of those who had been introduced to research networks, did so often or very often. As the results are statistically significant, I conclude that there is a relationship between receipt of mentoring in the form of introduction to research networks, and frequency of intra-institutional collaboration.

Similar results were produced for inter-institutional (national) collaboration: only approximately one-fifth of female ECAs who had never or rarely received mentoring by being introduced to research networks collaborated often or very often in this manner, while more than a third of those who had received mentoring, did so often or very often. Again, the results are statistically significant, indicating a relationship between these two variables. With regard to the remaining two types of collaboration – inter-African and international – the results show that, in each case, a lower percentage of those female ECAs who had never or rarely received such mentoring than those who did, engaged in these types of collaboration. However, the results were not statistically significant, leading to the conclusion that there is no relationship between female ECAs' receipt of mentoring in the form of introduction to research networks, and the frequency with which they engage in these two forms of collaboration.

In the next chapter, the final one of this dissertation, these and the other results presented in the preceding two chapters will be interpreted in more detail to produce research findings and to provide recommendations in terms of the mentoring of female ECAs, especially in Africa.

Chapter 7: Conclusions and recommendations

7.1　Introduction

This study principally sought to establish the role that mentoring of female ECAs plays in their career outcomes, particularly those outcomes that are related to research production. The specific research objectives were to: (1) create a profile of female ECAs in Africa in terms of both demographic and work-related characteristics; (2) establish the extent to which various challenges have negatively impacted the careers of female ECAs; (3) determine whether female ECAs have or have not received mentoring in seven aspects of an academic career, namely career decisions, attaining a position or job, introduction to research networks, research methodology, fundraising, scientific writing and presentation of research results; and (4) establish whether there is a relationship between receipt of mentoring in five select academic-career aspects and relevant career outcomes of those female ECAs. In relation to the aforementioned research objectives, this chapter will present a summary of the findings of the research conducted (they are ordered according to the research objectives), and offer interpretations and conclusions based on those findings. Thereafter, it will stipulate the contributions of the study to our knowledge on mentoring of female ECAs, followed by an outline of the limitations of the research. The chapter will then conclude with recommendations to improve the mentoring of female ECAs, and suggestions for further research to advance this knowledge further.

7.2　Summary of findings, interpretations and conclusions

7.2.1　Profile of an African female early-career academic

In chapter one, the importance of ECAs to the academic enterprise was discussed. Thus, it is against this background that I sought to first characterise female ECAs in Africa, as per the data collected from survey respondents, before conducting further analysis to answer the other research questions. To reiterate, in chapter three, I defined an ECA as an academic whose highest qualification is a doctorate or equivalent degree that was awarded in the five years preceding the survey and who was employed in an academic rank in the higher education sector at the time of the survey. In this study, I only considered ECAs that are female and that I described according to various characteristics. These are namely demographics (age, nationality, country of work or residence), number of children or dependents, and distribution of care work and general

housework); employment (status and rank); field of specialisation; research output; research funding; international mobility; collaboration with other researchers; and tasks occupying the working time of female ECAs.

In terms of chronological age, African female ECAs were on average 40 years of age, but their ages ranged from 27 years to 68 years – the latter being unusual, because it is past the customary retirement age of 65 years. That said, half of the female ECAs were 39 years or younger, while the other half were 40 years or older. The high average chronological age and extremely high maximum age of survey respondents that fit my definition of female ECAs indicate that these female ECAs obtain their PhD degree later in life. This finding is consistent with a previous study on doctoral education in South Africa by Cloete, Mouton and Sheppard (2015:79), which found that it was rare for individuals to successively pursue their postgraduate studies immediately after attaining an undergraduate degree and that students (both female and male) enrolled for their doctorate studies at an average age of 35 and graduated at "an older-than-average" age of 41. The completion at an older age is because, typically, doctoral students in South Africa lack funding to study full-time, which then leads them to study part-time and work simultaneously. As a result, these part-time doctoral students experience frequent disruption of their studies because of causes related to their jobs. In contrast, the minority (40%) of students undertaking full-time doctoral studies complete their studies within a significantly shorter time period (Cloete *et al.*, 2015).

Particularly for half of these female ECAs (those aged 40 and above), it seems that their careers did not progress linearly, since their early-career stage does not overlap with their early-life stage. This "misalignment" between career age and chronological age was also reported by LaPan *et al.* (2013), Neale and White (2014), Penney *et al.* (2015), Tomlinson *et al.* (2017), and Kelly and McCann (2019). The misalignment may be attributed to career breaks and disruptions that are generally experienced by female academics, as established in studies by Quinlan (1999), Bagilhole and Goode (2001), Monroe *et al.* (2008), Wolfinger *et al.* (2009), Obers (2014), Gasser and Shaffer (2014), and Tomlinson *et al.* (2017). In fact, the careers of female academics are described as "non-standard" by Van den Brink and Benschop (2011:518) and "problematic" by Hewlett and Luce (2005), Wyatt-Nichol (2014), Winslow and Davis (2016), and Parker *et al.* (2018).

Bearing in mind the relatively advanced chronological age of the average female ECA, it makes sense that the majority did not have very young children or dependents (aged zero to five). Rather, the female ECAs who had children or dependents indicated those to be older (six to 18 years). Although female ECAs had, on average, only two children or dependents, they undertook

the majority of care work and general housework in their family, relationship or household. These findings are consistent with those of previous studies by Tamale and Oloka-Onyango (1997), Van Staden *et al.* (2001), Mama (2003), Moultrie and De la Rey (2003), Mabokela and Mawila (2004), Oloruntoba and Ajayi (2006), Thanacoody *et al.* (2006), Gaidzanwa (2007), Tsikata (2007), Anagbogu and Ezeliora (2008), Ukpokolo, (2010), Odhiambo (2011), Ogbogu (2011), Akinsanya (2012), Zulu (2013), Mabokela and Mlambo (2014), Raburu (2015), Callaghan (2016), and Mukhwana *et al.* (2020). This relatively large body of research found that female academics in Africa experience pressure from undertaking domestic chores and caring for children, elderly or sick family members.

From a geographic perspective, the female ECAs were nationals of 25 countries, but the dominant nationalities were South African, Algerian and Nigerian. Based on the similarity between female ECAs' distribution across countries of nationality and countries where they worked or resided, I deduced that it was highly likely that most female ECAs worked or resided in their country of nationality. This observation is supported by the noteworthy finding that a large majority of the female ECAs had never studied or worked abroad (in other words, outside their home country). This is a point of concern, especially since a large proportion of those who had been mobile rated international mobility as essential or very important for their career development. International mobility has also been highlighted by other researchers as a key factor in the development of an academic career. These include Prpić (2000), Lewison (2001), Cao and Suttmeier (2001), Austin (2002), Gaillard (2003), Smolentseva (2003), Kerey and Naef (2005), Cruz-Castro and Sanz-Menéndez (2010), Fritsch (2015), Ryazanova and McNamara (2015), Moore *et al.* (2016), and Toader and Dahinden (2018).

The importance of collaboration as a facilitator of ECAs career progression has also been highlighted by several researchers, namely Etzkowitz *et al.* (1994), McGrail *et al.* (2006), Greene *et al.* (2008), Zyoud *et al.* (2014), and Sugimoto and Larivière (2018). Female ECAs did report collaborating with other researchers, but the minority did so very often or always. If female ECAs did collaborate, they tended to do so with researchers at their own institution. Collaboration with researchers at other institutions in their own country and with those at institutions outside of Africa was rarer, while collaboration with researchers in other African countries was by far the least frequent form of collaboration undertaken by the female ECAs.

Within the higher education sector, the female ECAs were predominantly employed on a permanent basis, with the majority holding the rank of senior lecturer and the minority being professors. All of the female ECAs reported spending, in a typical year, at least some of their

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working time on research, and on average, this task took up more than a quarter (28%) of that time. Almost all female ECAs also spent their working time on undergraduate and postgraduate teaching, but on average, this task took up more (36%) of their working time than research did. Training or supervision of postgraduate students took up a fifth of the working time of the 92% (third-largest majority) of female ECAs who reported this as a task. Lower percentages (but still a majority) of female ECAs spent a percentage of their working time on administration and management and on service. On the former, they spent on average only 16% of their working time, and on the latter even less (9%). Consultancy was a task on which only two-thirds of female ECAs spent any of their working time, but if they did, it comprised a very high percentage (49%) of that time. Notably, the task that the smallest percentage of female ECAs undertook in a typical year was raising funds or grants for research, and on average less than 10% of their working time was consumed by this task.

The result that raising funds or grants for research comprises so little of such a comparatively small proportion of female ECAs' working time aligns with another observation, namely that only half of the female ECAs had received research funding during the past three years. On a positive note, a large proportion of these female ECAs were the primary recipient or grant holder of the funding. Female academics who were interviewed provided insight into diverse reasons for their lack of research funding. Some cited limitations of a personal nature, such as unfamiliarity with fundraising, lack of proposal writing skills, and lack of time to review research-funding opportunities. Other female academics expressed that the reasons for lack of research funding are institutional, such as those related to grant-eligibility criteria, namely chronological age, nationality, race, level of academic qualification, career stage, employment status, and research track record. A number of female academics also reported reasons related to grant administration procedures, specifically bureaucracies of HEIs and of external funders; misalignment of processes between the funder and the grantees' HEIs; a lack of understanding among HEIs' administrative personnel of the research needs of certain disciplines; and grant conditions that limit expenditure to specific research items. A lack of research funding was further attributed to more general institutional factors, namely the tendency of some HEIs' to prioritise, in their allocation of funding, teaching-related needs above research; and the small number of available grants, especially seed grants.

As I am particularly interested in career outcomes that are related to research production, the (self-reported) research output of the female ECAs over the past three years was also investigated. I found that, on average, female ECAs produced 5,8 articles in peer-reviewed academic journals,

0,3 books, 1,1 book chapters, 3,3 conference-proceedings papers and 5,0 conference presentations. Finally, an important feature of female ECAs that was considered in some of my analyses is field of specialisation (in which they obtained their doctorate). The highest percentage of the female ECAs were social scientists, followed by natural and agricultural scientists, and then health scientists, whereas the minority were specialised in the engineering and applied technologies. In conclusion, this profile describes the female ECAs that were studied with respect to the features discussed in the following three sections, and to whom the recommendations that I will make, apply.

7.2.2   Extent of impact of challenges on careers

Female ECAs in Africa face several career challenges, namely lack of mentoring, balancing work and family demands, lack of research funding, lack of funding for research equipment, lack of training opportunities to develop professional skills, and lack of mobility opportunities. As far as the extent of the impact of these challenges on their careers is concerned, the majority of female ECAs perceived that all the six challenges had negatively impacted their career at least to some extent.

Beginning with the focus of this study, namely lack of mentoring, I found that a significant proportion (three quarters and the third-highest) of female ECAs reported that it had negatively impacted their career to at least some extent. Tsikata (2007), Prozesky (2008), Whitworth *et al.* (2008), Tettey (2010), Subbaye and Dhunpath (2016), Pithouse-Morgan *et al.* (2016), as well as Mukhwana *et al.* (2020) also observed that ECAs in Africa face this challenge. My further analysis by field of specialisation revealed that female ECAs in the engineering and applied technologies were most likely to report that lack of mentoring had a negative impact on their career, while those in the health sciences were least likely to do so. A deeper understanding of these and other field differences, through further analysis and/or with reference to literature on mentoring-related field differences (were it to exist), was unfortunately beyond the scope of this study.

A range of individual-level and institutional-level factors were revealed by the qualitative data as having contributed to female academics not receiving mentoring. Reasons at the individual level included female academics lack of knowledge on how to identify potential mentors; preference for a mentor who was not their superior at their HEI; and specialisation in a niche research field where mentors are rare. On the institutional level, female academics identified a lack of initiative taken by HEIs to provide mentors to ECAs. Some female academics strongly expressed the belief that it was the responsibility of HEIs to provide mentoring, or to at least assist them in identifying

mentors. Understaffing at HEIs also played a role, as it meant that mentors were either completely absent, or that the few potential mentors available, were overcommitted. Similarly, a high turnover of senior academics at HEIs led to the loss of (potential) mentors. In contexts where potential mentors were available, the reasons cited for a lack of mentoring were firstly the assumption among senior academics that ECAs with doctorates do not require mentoring. Secondly, senior academics' lacked time to provide mentoring, because they were focused on their own academic responsibilities and the furthering of their own careers. Furthermore, the qualitative data exposed a strong awareness by female academics (a number of whom had not received mentoring) that mentoring is a vital support mechanism in the development of an academic career and that its positive impact is long-term in nature.

As mentioned above, of the career challenges investigated, the negative effect of a lack of mentoring was reported by the third-highest proportion of female ECAs. Balancing work and family demands was perceived by the greatest percentage of female ECAs as a challenge. A striking four-fifths of female ECAs perceived that this challenge had negatively impacted their career to at least some extent, which was unsurprising, considering that female ECAs had two children or dependents on average, but especially since they undertook a significant amount of care work and general housework in their family, relationship or household. Balancing work and family demands was similarly identified in numerous other studies as a challenge experienced not only by female ECAs, but by female academics in general. These studies include a large body conducted in Africa, namely Tamale and Oloka-Onyango (1997), Petersen and Gravett (2000), Van Staden *et al*. (2001), Moultrie and De la Rey (2003), Mabokela and Mawila (2004), Thanacoody *et al*. (2006), Gaidzanwa (2007), Tsikata (2007), Ukpokolo, 2010, Odhiambo (2011), Ogbogu (2011), Riordan and Louw-Potgieter (2011), Akinsanya (2012), Managa (2013), Zulu (2013), Friesenhahn and Beaudry (2014), Raburu (2015), and Mukhwana *et al*. (2020).

An analysis by field indicated that female ECAs in the social sciences were most likely to perceive that balancing work and family demands had had a negative impact on their career, while those in the engineering and applied technologies were least likely to do so. On the contrary, a study by Mlambo and Mabokela (2017) of female academics in the field of engineering at a South African HEI found that balancing work and family demands was a significant challenge that they experienced. The qualitative data that I analysed illustrated the role strain that female academics experienced as they simultaneously juggled motherhood and academic responsibilities. A strategy utilised by some of these female academics to manage the pressure was getting up earlier in the

morning to conduct their research. Others longed to have extended family in close living proximity, or for their HEIs to provide on-site childcare facilities.

Lack of research funding was perceived by the second-greatest percentage (79%) of the female ECAs as having impacted their career negatively to at least some extent – a result that aligns with my other findings that half of the female ECAs had not received research funding in the three years prior to the survey and that fundraising for research comprised very little of the working time of the relatively few female ECAs' who reported on this task. Other research conducted in various countries (Cao & Suttmeier 2001; Bazeley, 2003; Bauer, 2005; Cismaş & Florian, 2005; Lola, 2005; Herlenius *et al.*, 2005; Monastersky, 2007; De Villiers & Steyn, 2009; Bartels *et al.*, 2010; Powell, 2016; McKay & Monk, 2017; Tong *et al.*, 2017) also found a lack of research funding to be a barrier to the career progression of ECAs. An interesting observation made by Bello *et al.* (2021) is that generally, female researchers usually receive lesser research funding than male researchers while Sege, Nykiel-Bub and Selk (2015) also observed that female ECAs receive less seed grants than male ECAs. A possible explanation could be that female academics do not apply for funding as much as male academics do (Beck & Halloin, 2017; Hechtman, Moore, Schulkey, Miklos, Calcagno, Aragon & Greenberg, 2018; Appel-Cresswell, Blanchet, Wysocki & Postuma, 2019; Garcia, Tiano, Contreras, Hildebolt, Horsford & Stewart, 2020).

Additional analysis by field indicated that female ECAs in the health sciences were most likely to perceive that lack of research funding had a negative impact on their career, while those in the social sciences were least likely to do so. This finding is consistent with Cidlinská's (2019) study in the Czech Republic of a mentoring programme for female ECAs, which found that female academics in the natural sciences perceived that their careers were endangered by lack of research grants, unlike those in the social sciences who did not perceive that this challenge posed a threat to their careers. Insights into the negative impact of a lack of research funding and the positive impact of receipt of funding on the careers of female academics were provided by the qualitative data. It illustrated how a lack of research funding had negatively impacted the career of one female academic, by preventing the completion of her doctorate studies and subsequently, her permanent employment at an HEI. For other female academics, the receipt of funding had benefited their careers by enabling them to acquire research personnel assistance and establish a research track record.

The remaining three challenges were perceived by lower (but relatively similar) percentages of female ECAs as having had a negative impact on their career to at least some extent. With regard to the first challenge, a lack of funding for research equipment, 69% of female ECAs

reported this negative perception, and further analysis revealed that this applied to a large majority in all the fields except the social sciences. Less than half of female ECAs in the social sciences reported that this challenge had negatively impacted their career to at least some extent, which is not surprising considering that research in this field tends to require less research equipment, or less costly equipment, if any (Collins, 1994).

Collins (1994) underscores that disciplines differ significantly in terms of the physical equipment that are utilised in research. For example, the natural sciences rely on equipment to produce research discoveries in the form of "physical products" while on the other hand, the social sciences is not a "hardware-driven research field" but instead, "discoveries are laboriously driven by theoretical acumen in where to look for data and in how to package it conceptually" (Collins, 1994:170,171,174). The qualitative data illustrated that this challenge had negatively impacted the careers of female academics through, for instance, the inability to purchase necessary computer software or to access data from relevant databases that required paid subscription.

As for the challenge on lack of training opportunities to develop professional skills, two-thirds of female ECAs perceived that it had negatively impacted their career to at least some extent. Additional analysis by field indicated that female ECAs in the natural and agricultural sciences were most likely to perceive that this challenge had a negative impact on their career, while those in the social sciences were least likely to do so. However, qualitative data pertaining to the impact of this challenge was sparse, with only one female academic expressing her wish to be trained in the use of specific computer software in her field.

Similar to the survey results on the challenge on lack of training opportunities, two-thirds of female ECAs perceived that a lack of mobility opportunities had negatively impacted their career to at least some extent. These results align well with those I reported earlier, namely that a majority of the female ECAs had never studied or worked abroad and that more than four-fifths of those who had done so considered international mobility as essential or at least very important to their career. I posit that the low international mobility among the female ECAs could be attributed to family responsibilities and gendered cultures in many African communities, according to which a woman's designated place is the home (Prozesky & Beaudry, 2019). Hence, a woman leaving behind her family, spouse or children to pursue a work-related opportunity abroad, breaks normative restrictions of those cultures, and thereby becomes a "symbolic threat" (Wade & Ferree, 2019:303, as cited in Prozesky & Beaudry, 2019). In such a context, it makes sense that the default choice of female ECAs would be to collaborate locally.

A few previous studies – conducted in China (Cao & Suttmeier, 2001), Russia (Smolentseva, 2003) and Europe (Prpić, 2000, Lola, 2005; Toader & Dahinden, 2018) – have also demonstrated the advantages of international mobility to the career development of ECAs. Moreover, the analysis by field indicated that female ECAs in the engineering and applied sciences were most likely to perceive that this challenge had a negative impact on their career, while those in the health sciences and social sciences were least likely to do so. The qualitative data that I could analyse on this challenge was, again scant, as only one female academic expressed her wish to travel abroad to undertake research and to access libraries.

In conclusion, these findings show that the three challenges most frequently perceived by female ECAs as having negatively impacted their careers (in order from highest to lowest frequency) are balancing work and family demands, a lack of research funding, and a lack of mentoring. As I have indicated with reference to many other studies, these challenges are not unique to female ECAs in Africa but are also experienced by female ECAs elsewhere in the world. Nevertheless, the finding that a lack of mentoring is one of the three major challenges faced by female ECAs in Africa provides further justification of the importance of studying this aspect in more detail. Hence, the following subsection summarises the results of the analyses I conducted to establish whether female ECAs had or had not received mentoring in seven aspects of an academic career

7.2.3   Receipt of mentoring by female early-career academics

The majority of female ECAs had received mentoring in the form of introduction to research networks, attaining a position/job, research methodology, scientific writing and presentation of research results. In contrast, only a minority of female ECAs had received mentoring in career decisions and fundraising. Additional analysis by the female ECAs' field of specialisation revealed a pattern that is interesting in its consistency. Across all seven aspects, female ECAs in the health sciences were most likely to report having received mentoring, followed by those in the social sciences, then those in the natural and agricultural sciences. Female ECAs in the engineering and applied technologies were proportionately least likely to report having received mentoring on all seven aspects.

The finding that the percentage of female ECAs in the sample as a whole who reported having received mentoring is the lowest for mentoring in fundraising is concerning. This is because various researchers (Adcroft & Taylor, 2013; Garrison & Deschamps, 2014; Browning *et al.*, 2017; Conn *et al.*, 2018; Koelkebeck *et al.*, 2019) highlight the diverse critical functions that

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research funding plays in supporting the career advancement of academics. This finding may also explain, to some extent, my other results that relate to funding. First, raising research funds comprises very little of the working time of the relatively few female ECAs who spend their working time on this task. Secondly, a lack of research funding is one of the three major challenges experienced by female ECAs, and thirdly, only half of the female ECAs reported having received research funding in the recent past.

One may, therefore, hypothesise that the receipt of mentoring in fundraising and the receipt of research funding are related. Research objective 4 involved an investigation of this hypothesis, as well as other, similar hypotheses, by measuring the relationship between having been mentored on five career aspects on the one hand, and research outcomes related to those aspects, on the other.

7.2.4   Relationship between mentoring and academic career outcomes

From the results, I established that the receipt of mentoring in five career aspects is related to one or more relevant career outcomes. As argued in the previous subsection, mentoring in fundraising may be expected to facilitate receipt of funding. My results support this hypothesis: among female ECAs who had not been mentored in fundraising, the majority had not received research funding, while among those female ECAs who had been mentored in fundraising, a large proportion had received research funding. The differences are statistically significant, and therefore I conclude that there is a relationship between receiving mentoring in fundraising and receiving research funding. Prior studies by Ambler *et al.* (2016), Freel *et al.* (2017), Efstathiou *et al.* (2018), and Kirsch *et al.* (2018) corroborate this finding. The achievement of this outcome by a mentee is founded on the career theory perspective (Scandura & Pellegrini, 2007), which posits that mentoring in fundraising fulfilled a critical career function by developing the human capital of the female ECAs (Ramaswami & Dreher, 2007). The results seem to indicate that the female ECAs (mentees) were able to raise research funds at least in part because they gained new skills in fundraising or improved their existing skills in this regard.

Mentoring in research methodology was not found to be statistically related to research output, although the mean number of articles published in peer-reviewed journals by female ECAs who had been mentored in this aspect is higher (albeit only marginally) than for those who had not been mentored in research methodology. This finding is inconsistent with a study conducted in Africa by Gureje *et al.* (2019), in which ECAs published more articles in peer-reviewed journals after having been mentored in research methodology.

Mentoring in scientific writing revealed a similar outcome. This study found that the mean number of articles published in peer-reviewed journals by female ECAs who had been mentored in scientific writing is higher than for those who had not received mentoring, but the difference is not statistically significant. Consequently, I conclude that there is no relationship between female ECAs receipt of mentoring in scientific writing and their research output. This finding is again inconsistent with a previous study, conducted in the USA by Kirsch *et al.* (2018), which found that the mean number of articles published in peer-reviewed journals by ECAs who had been mentored in scholarly writing increased from before to after receipt of such mentoring. In both of the cases of non-statistically significant results, it is possible, however, that the small number of cases that met the selection criteria of female ECAs for this study did not provide the adequate power to detect statistically significant differences (cf. Kretschmer & Kretschmer, 2013).

It was further hypothesised that mentoring in the presentation of research results would be related to research output in the form of conference presentations. However, the difference between the mean number of conference presentations produced by female ECAs that had and had not received such mentoring is relatively small and not statistically significant. Hence, I conclude that there is no relationship between receipt of mentoring in the presentation of research results and number of conference presentations produced. No comparable study that either corroborates or contradicts this finding could be found. Consequently, this study is probably the first that has investigated the relationship between receipt of mentoring in presentation of research results and number of conference presentations produced.

Finally, mentoring in the form of introduction to research networks was examined in relation to three career outcomes, namely research output, international mobility and collaboration. Three sets of results led me to reach three conclusions. First, the mean number of research outputs produced by female ECAs who had received mentoring in the form of introduction to research networks was higher than for those who had not received such mentoring, and the difference is statistically significant. Thus, I conclude that there is a relationship between being introduced, by a mentor, to his/her research networks, on the one hand, and the mentee's research output on the other. Similar findings were reported by Chaiyachati *et al*. (2018), who established that ECAs whose mentors were highly networked produced a higher number of research outputs than ECAs without such mentors. It may thus be inferred that receipt of mentoring, at least in part, developed both the human capital of the female ECAs, by enhancing their skills in scientific writing, and their social capital, by facilitating networking with other researchers and enabling the acquisition

of knowledge, material support and information, as posited by Allen *et al*. (2004), Dougherty and Dreher (2007), Ramaswami and Dreher (2007), and Angervall *et al*. (2018).

The second research outcome in relation to which mentoring in the form of introduction to research networks was examined was mobility. I found that a minority of female ECAs had been internationally mobile, regardless of whether they had or had not received mentoring in the form of introduction to research networks, and the relatively small differences that were observed, were not statistically significant. Accordingly, I conclude that there is no relationship between receipt of mentoring in the form of introduction to research networks and international mobility. Again, it seems that this study is the first to investigate the potential impact that introduction to research networks by a mentor may have on the mentee's international mobility.

Thirdly, mentoring in the form of introduction to research networks was examined in relation to four forms of research collaboration, namely intra-institutional, inter-institutional (national), inter-African and international. Female ECAs' receipt of such mentoring was found to be related only to the frequency with which they engage in intra-institutional and national collaboration. Thus, I infer that this type of mentoring had a positive effect on female ECAs research collaboration, both within their own institutions and country. Mentoring in the form of introduction to research networks at least in part, developed the social capital of female ECAs (Ramaswami & Dreher, 2007), which eventually enhanced their tendency to collaborate intra-institutionally and inter-institutionally, in much the same way that it enhanced their research output. However, being introduced, through mentoring, to research networks is not related to whether female ECAs collaborate outside their own country, that is inter-African and international collaboration. These results on the potential effect of mentoring, in the form of introduction to research networks, on the tendency of the mentee to collaborate, seem to be the first of their kind, as no studies could be found that report comparable results.

In conclusion, these findings suggest that mentoring on specific aspects is related to career outcomes relevant to those aspects. Although I have drawn some cautious inferences on the possible causal effects of mentoring, I recognise that the cross-sectional design that was applied to collect the original data prevents me from drawing any robust causal inferences, as will be discussed in more detail in the section below, on my study's limitations. Nevertheless, when interpreted in the context of the theoretical and empirical literature, it does seem that those female ECAs who had received mentoring tend to report more positive career outcomes than those who had not received mentoring.

Specifically, the findings of this study seem to suggest that mentoring in the form of a mentor introducing a mentee to research networks, is positively related to the production of scholarly articles. In addition, mentoring in fundraising seems to be positively related to a mentee's ability to obtain research funding, and mentoring in the form of introduction to research networks seems to enhance the mentee's research collaboration, particularly within her own institution and country. On the contrary, tests of statistical significance showed that mentoring in research methodology and scientific writing is not related to the production of scholarly articles; mentoring in the presentation of research results is not related to the number of conference presentations that a mentee produces; and a mentor introducing a mentee to research networks is not related to whether the mentee is internationally mobile, or whether she collaborates on an African or international scale.

7.3   Contributions of the study

The thorough literature review that was conducted for this dissertation showed that little is known about female ECAs across Africa. Moreover, even less is known of their mentoring landscape, as evidenced by the paucity of research on the subject. A review of the literature revealed that, in Africa, only a few studies (fewer than 10) have been undertaken to examine the mentoring of ECAs. Half of these studies (Alabi & Abdulai, 2016; Osman & Hornsby, 2016; Ssempebwa *et al.*, 2016; Subbaye & Dhunpath, 2016; Udegbe, 2016) focused on mentoring as a support mechanism for enhancing the teaching skills of ECAs. In addition, a study conducted in Uganda by Nakanjako *et al.* (2011) sought to establish the state and needs of mentoring amongst the mentors (academics and researchers) and mentees (graduate students and junior researchers) at the Makerere University College of Health Sciences, as part of a long-term plan to increase the number of mentors among health professionals in Africa. Another study by Whitworth *et al.* (2008), identified that in Africa, a lack of mentoring of ECAs in HEIs was an obstacle to the strengthening of human resource capacity for research in health.

Only two studies explicitly examined the role that mentorship had played in enhancing the research production of ECAs through mentoring in research methodology and scholarly writing. The first of these, a study by Gureje *et al.* (2019), examined ECAs in Ghana, Kenya, Liberia, Nigeria and South Africa, while the second study conducted by Kwedi Nolna *et al.* (2017) focused on female ECAs in Cameroon. Therefore, the research reported in this dissertation is a valuable addition to the sparse literature on the subject of mentoring of ECAs in Africa, especially as it related to research output.

Based on the literature review, it can be stated with some confidence that my study is the first to: provide a description of female ECAs across 25 African countries; investigate the extent of the impact of varied challenges on their careers; determine whether they had or had not received mentoring in diverse aspects; and to examine whether mentoring on specific aspects is related to relevant outcomes in their careers. This research offers novel insights into the link between, on the one hand, mentoring in research methodology, scientific writing, fundraising and mentoring in the form of introduction to research networks, and, on the other hand, career outcomes which ultimately influence career development.

7.4   Limitations of the study

A number of caveats apply to the conclusions that I drew from my findings, which were arrived at by secondary analysis of existing data and my interpretation of the results thereof within the context of the existing literature of previous research and theoretical perspectives on mentoring. In this regard, it is essential to highlight a number of limitations of this study. First, no definition of mentoring was provided for respondents of the questionnaire. Consequently, it is possible that the interpretation of the term "mentoring" differed among the questionnaire respondents, which then means that it was not reliable. The implication is that the extent to which my results can be accurately compared or contrasted with the results of other studies on mentoring is limited. However, it should be noted that in this study, I reviewed and utilised literature that defined mentoring as a form of guidance provided by an experienced individual to a less experienced individual.

Second, the data that I analysed were self-reported and therefore, the data could have been susceptible to over-reporting or under-reporting. As Daumiller, Siegel and Dresel (2019:243) note, "researchers using self-report questionnaires are dependent on the honesty of their participants". In particular, the survey data on research output may be somewhat unreliable because of over-reporting stemming from "social desirability bias" (Bryman, 2012:228), whereby the female ECAs wanted to "look good" (Babbie, 2010:261) by being perceived as research productive. Even so, it is possible that this drawback of using self-reported data was mitigated against because the questionnaire respondents were assured of anonymity which then could have increased their likelihood of providing honest responses (Daumiller *et al.*, 2019).

Third, the data had also been obtained from only a single source (that is, the female ECAs who were mentees). Mentor perspectives on the subject of the research that could have further enriched the study were not explored because the YSA project was explicitly targeted at mentees.

A related issue is that this study was focused on female ECAs only, in cognisance of the various challenges documented in empirical literature that female academics face and which impede their career development. Consequently, this study cannot be used to understand mentoring from a gender perspective because that was beyond the scope of the study.

A fourth issue concerns external validity. As a secondary analysis of existing data, the definition of the population of African scientists that was used in the YSA project had to be employed. The findings and recommendations of this study therefore only apply to African female ECAs that met that definition. In the YSA project, there was a heavy dependence on the WoS and Scopus to identify potential respondents. Thus, there is a bias towards African scientists who, already before the survey, had (co-)authored publications in the relatively prestigious journals indexed in these databases. Additionally, it is likely that female ECAs in other African countries could have been excluded as potential research participants, since they had published in local journals that are not indexed in the WoS and Scopus.

Also, according to Mongeon and Paul-Hus (2016), these two databases are biased because they heavily represent particular developed countries, English journals, and journals from the natural sciences, engineering and biomedical research fields. These limitations are clearly highlighted by Mongeon and Paul-Hus (2016:224), who in the summary of their article assert that "there is still an over-representation of certain countries and languages to the detriment of others in the WoS journal coverage. Similar biases are found in the coverage of Scopus, despite its much larger journal coverage". Two countries – Zambia and South Africa – are not affected by this issue as much as the other countries, because additional sources were used to identify potential respondents. However, this may have led to an over-representation of these countries' scientists in the data set. In particular, the large percentage of South Africans in the data set seems to indicate that the sample was biased towards this country. Hence, the findings of this study are somewhat limited in terms of external validity, and it is not possible to determine the extent to which the female ECAs analysed in this study are representative of those in Africa.

The fifth limitation is that the number of cases that met the selection criteria of female ECAs for this study was relatively small, and further reduced by non-response to certain questions. The small sample restricted the number of variables (and categories) that could be employed in cross-tabulations, which may have impacted on the results that were obtained from the bivariate analyses that could be performed. It also limited the extent to which I could investigate whether the relationships I found – between, on the one hand, receipt of mentoring on research methodology, scientific writing, fundraising and being introduced to research networks, and relevant career

outcomes on the other – may be spurious[10]. Mentoring is likely to be one of many factors (such as intervening or moderating variables) that have a positive relationship with the relevant career outcomes. Another limitation of the small number of cases in my study is that it did not provide the adequate power to detect statistically significant differences.

Similarly, the positive relationship exhibited between receiving mentoring in specific aspects and relevant career outcomes could have been influenced by a confounding variable (for instance, field of the female ECAs), and which is referred to as the "Simpson's" paradox (Bickel, Hammel & O'Connell, 1975:399). Although a multivariate analysis, that is, "the simultaneous analysis of three or more variables" (Bryman, 2012:345) could have been desirable for the purposes of controlling for these factors and determining the extent to which receipt of mentoring contributed to the outcomes, the small number of cases prevented such further analysis. Another issue, also related to my ability to draw causal inferences, concerns "the possibility that the real pattern of causal direction is the opposite of that which is anticipated" (Bryman, 2012:341). In other words, although my inferences are based on the reasoning (which is informed by theoretical and empirical literature) that mentoring usually precedes the outcomes measured, they can only remain inferences, as the mentoring may have followed the outcomes.

Finally, most of the preceding issues concern the limitations of the survey data. Although the qualitative data provided valuable insights on some of the topics under investigation, the data were not sourced only from interviewees that fit the definition of an ECA, as applied to the survey data. In the absence of data on the interviewees, it was impossible to apply the same inclusion criteria to them. Therefore, the findings from the qualitative data should be treated with caution, as they reflect the experiences of all African female academics, regardless of career stage.

7.5   Recommendations

Recommendations that ensure equal and equitable career development of female ECAs in Africa will necessitate sustained action from all relevant stakeholders. Therefore, based on the findings of this research, a number of recommendations can be made pertaining to mentoring, research funding and career challenges.

HEIs in Africa should design and offer mentoring programmes that are specifically targeted at providing mentoring on fundraising, and in the form of introduction to research networks. This

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[10] "A spurious relationship exists when there appears to be a relationship between two variables, but the relationship is not real: it is being produced because each variable is itself related to a third variable" (Bryman, 2012:345).

is because the findings of this research indicate that provision of mentoring in these aspects is likely to have a positive influence on related career outcomes. Further research should concentrate on examining, with more robust experimental designs, the activities or actions that are undertaken during mentoring of female ECAs in these specific aspects and which of these ultimately have a positive influence on their career outcomes.

Moreover, bearing in mind that female ECAs in Africa are a heterogeneous group of individuals, a one-size-fits-all approach cannot be used by HEIs in mentoring efforts that seek to enhance their career outcomes. When mentoring interventions are designed by HEIs, it is crucial to first consider the characteristics of the female ECAs in Africa that the interventions are supposed to serve. My study has shown how mentoring needs, experiences and outcomes differ according to field of specialisation, chronological age, rank of employment, research funding obtained, international mobility and collaboration patterns. For example, I have shown that important and large differences across fields of specialisation exist when receipt of mentoring in different aspects and lack of mentoring as a career challenge are considered. However, the exploration of this characteristic, and others according to which female ECAs' mentoring needs may differ, was beyond the scope of this study. Hence, further research could examine these differences in more detail.

Opportunities to receive mentoring in different aspects should be made available by HEIs, especially to African female ECAs in the engineering and applied sciences, as they are least likely to be mentored. Further research could examine why female ECAs in some fields, especially the health sciences fields, receive mentoring more often than those in other fields; and why the provision of mentoring in career decisions and fundraising is not prevalent among female ECAs in general. More effort should also be invested in ensuring that the mentoring that is provided by HEIs to female ECAs is focused, particularly on fundraising. The findings of this study provide evidence that receiving mentoring on fundraising is related to the ability to obtain research funding, and the literature cited highlights that a lack of research funding is a significant barrier to the career advancement of ECAs.

Orientation- and continuous-development programmes for ECAs at HEIs should include mentoring as part of their curriculum. This would ensure that mentorship is within reach of female ECAs, and that the burden of accessing mentoring is not placed only on the female ECAs, but is led by their respective HEIs. Furthermore, HEIs should reach out to senior academics who are close to retirement, or have already retired, to leverage their experience to assist in meeting the mentoring needs of female ECAs. However, it may be necessary to provide an incentive to these

senior academics so that they can be mentors. Also, peer mentoring should be explored as an option to provide mentoring to female ECAs who are specialised in niche fields. Lastly, this study has revealed a variation in the understanding of – and assumptions about – who a mentor is. A mentor is understood, or assumed, to be a coach, counsellor, career guide, adviser, insider, or networker. Moreover, a mentor is understood, or assumed, to be an individual who is not a mentee's line manager; works in a similar field; resides in the same geographical location; can provide "job shadowing" and is a late-career academic with demonstrable experience in building a successful academic career. It is therefore imperative that HEIs provide mentors who embody at least some of the characteristics in this wide spectrum.

Pertaining to research funding, HEIs and other organisations that offer research grants should consider providing training to female ECAs on aspects of fundraising, such as proposal writing and general resource mobilisation strategies, in order to improve female ECAs' rate of applying for and securing grants. Even more important is that organisations that provide research grants need to reconsider some of their eligibility requirements, such as chronological age. This criterion is discriminatory to female ECAs, because their early-career stage does not necessarily correspond to their early life-stage, as my research and other studies have shown. Hence, using a certain chronological age as an eligibility criterion for grant applicants is a disservice to some female ECAs, as it excludes them from accessing an essential career-development element. Finally, deliberate efforts must be made by HEIs and external research funding organisations to align their grant administrative procedures where possible, so as to make it easy for female ECAs to access their funding. Also, HEIs should ensure that staff members in charge of administering grants are made aware of expenditures allowed for different grants.

Bearing in mind that balancing work and family demands, lack of research funding and lack of mentoring are the three major challenges experienced by female ECAs as having had a negative impact on their careers, it is imperative that the leadership of HEIs or line managers of female ECAs are made aware – or reminded – of these challenges. This would ensure that the leadership and line managers advocate for the formulation of new policies, or for the amendment or implementation of existing policies so that the burden of managing the role strain is not only borne by female ECAs and to foster their career development. HEIs in Africa that do not yet provide on-site childcare facilities for female ECAs should consider investing in such facilities to alleviate the role strain exerted by family and academic responsibilities. Further research could investigate the factors that influence field differences in the challenges experienced by female ECAs.

The final recommendations from this study relate to general research on ECAs. The description of female ECAs in Africa has been compiled using data from individuals that are nationals of 25 countries, further research could focus on the remaining 29 African countries in order to obtain a broader description of female ECAs in Africa, and address gaps in terms of generalisability of my study's results. Moreover, future research should examine African male ECAs as a subgroup of ECAs in order to characterise them, assess whether the career challenges that they experience and the mentoring that they receive differ or are similar to female ECAs.

As I end this dissertation and reflect on the entire study, one thing is clear. Although the YSA project uncovered various elements that comprise young scientists in Africa, this study went a step further and investigated female ECAs as a subgroup of young scientists. The findings of this study are interesting and significant because, as the saying goes, "the devil is in the detail". Consequently, I hope that interventions to support the career development of female ECAs in Africa will be informed at least by some of the findings of this study. Also, because I previously served as the Africa Coordinator of GenderInSITE[11], an international initiative under UNESCO, the topic of this study is close to my heart. The contribution of the higher education sector to sustainable development can only become stronger if the entire spectrum of academics equitably and equally participates. Thus, the key stakeholders in higher education need to ensure that all the best ideas are heard and voiced and given a chance to be implemented. It is the smart thing to do.

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[11] Gender in science, innovation, technology and engineering

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Appendix A: YSA Project questionnaire

Educational background

EDU.1 What is your highest qualification?

[ ] Doctoral or equivalent

[ ] Master or equivalent

[ ] Bachelor

[ ] Other (Specify)

EDU.2 When did you obtain your highest academic qualification?

Year [ ]

EDU.3 In which field did you obtain your highest qualification? (e.g. engineering, psychology, virology, agriculture etc.)

Open ended [specify field]

EDU.4 Was your highest qualification conferred by a university in one country?

[ ] Yes

[ ] No

EDU.5 [Only if EDU4=Yes] In which country did you obtain your highest qualification?

Country: [<dropdown list>]

EDU.6 [Only if EDU4=NO] In what countries did you obtain your highest qualification?

Country: [<dropdown list>]

Country: [<dropdown list>]

EDU.7 Are you currently enrolled in further postgraduate studies?

[ ] Yes

[ ] No

EDU.8 [Only if EDU5=Yes] At which institution and in which country?

[<open form.] – University

[<open form] – country

EDU.9 [Only if EDU7=yes]. Are your receiving a bursary or scholarship for your current studies?

[ ] Yes

[ ] No

Employment

EMP.1 Please specify the sector of employment of your current main job:

[ ] Higher/tertiary education [Explanation: university (public or private), college of technology, polytechnic and other institution providing tertiary education, or other institution directly under control of higher education institution]

[ ] Public research institution

[ ] Private research institution

[ ] Business enterprise

[ ] Non-governmental/non-profit organisation

[ ] Other Please specify: [< open form>]

EMP.2 What is your current employment status? If you hold more than one job, please answer for your main job.

[ ] Professor, Associate Professor or Reader at a Tertiary Institution

[ ] Senior lecturer at a Tertiary Institution

[ ] Lecturer or equivalent at a Tertiary Institution

[ ] Researcher/scientist

[ ] Postdoctoral fellow

[ ] Self-employed

[ ] Unemployed or inactive

[ ] Other Please specify: [< open form>]

EMP.3 [ONLY IF EMP2 ≠5,6,7] Is this position permanent or contract-based?

[ ] Permanent [Permanent employees are employed on an ongoing basis until the employer or the employee ends the employment relationship]

[ ] Contract-based [Contract employees are employed for a specific period of time or task, for example 6 to 12 months period, and employment ends on the date specified in the contract]

Working Conditions

WOR.1 On average, how many hours do you spend on your main job per week?

[ ] (maximum accepted: 100 hours)

WOR.2 In a typical year, what percentage of your working time do you spend on each of the following tasks?

[ ] % Undergraduate and Postgraduate teaching

[ ] % Training/supervising postgraduate students

[ ] % Research

[ ] % Administration and management

[ ] % Service (counselling of patients, voluntary services within or outside your organisation, article review, editorial duties)

[ ] % Consultancy

[ ] % Raising funds/grants for research

[ ] % Other, please specify [< open form>]

Research Output

Research OutputRO.1 Please indicate how many of the following research output types you have produced over the last three years:

[Drop down: Options n/a,0,1,2,3,4,5,6,7,8,9,10,11+] Articles published/accepted (including co-authored) in refereed or peer-reviewed academic journals

[Same options] Books (i.e. monographs and edited volumes)

[Same option] Book chapters (including co-authored)

[Same option] Conference papers published in proceedings

[Same option] Presentations at conferences to predominantly academic audiences

[Same option] Written input to official public policy documents

[Same option] Research reports (contract/consultation research)

[Same option] Articles in popular journals/magazines, essays, newspaper articles or other public outreach media

[Same option] Patents (applied for and/or granted)

[Same option] Computer programmes (including co-writing)

[Same option] Creative/artistic works of art performed or exhibited (e.g. music, sculpture, paintings, theatre, film)

[ ] Others, Please specify: [< open form with categories>] x3

RO.2 [Only if RO 1 CAT 1 ≠ 0] When did you publish your first research article in a refereed or peer-reviewed journal?

Year [ ]

RO.3 As far as your research is concerned, which of the following statements best describe the overall value or outcome of your research? Also rate the extent to which you believe that these have been successfully attained where applicable.

	Highly successful	Successful to some extent	Not successful at all	N/A
Advancement of knowledge	[ ]	[ ]	[ ]	
Solving of theoretical problems	[ ]	[ ]	[ ]	
Solving of immediate technical/applied problems	[ ]	[ ]	[ ]	

	Highly successful	Successful to some extent	Not successful at all	N/A
Solving of environmental or social problems	[ ]	[ ]	[ ]	
Development of skills and competencies	[ ]	[ ]	[ ]	
Change behaviour/attitudes/values	[ ]	[ ]	[ ]	
Influence policy/decision-makers	[ ]	[ ]	[ ]	
Influence practice	[ ]	[ ]	[ ]	
Stimulation of discussion/debate	[ ]	[ ]	[ ]	

RO.4 Please indicate which of the following stakeholders you consider when conceptualising your research:

[ ] Colleagues/scholars/peers in own discipline

[ ] Colleagues/scholars/peers in other discipline

[ ] The contracting agency

[ ] Industry/business/firm(s)

[ ] Ministry/government agency

[ ] Specific interest groups (e.g. farmers, researchers, nurses, doctors, consumers)

[ ] General public/society/community

Funding

FUN.1 Have you received any research funding over the past three years? (Excluding bursaries or scholarships for studying purposes)

[ ] No[ ] Yes - but I am not the primary recipient/grant holder of the funding

[ ] Yes- I am the primary recipient/grant holder of the funding

[ ] Yes – In some cases I am the primary recipient and in some cases I am not the primary recipient of the funding

FUN.2 [Only if FUN 1 =Yes] Approximately what percentage of this funding was for infrastructure and equipment? (Don't know, N/A, 0%,10% intervals)

[ ] %

FUN.3[Only if FUN 1 =Yes] What proportion of this funding was obtained from national and international sources? (10% intervals)

[ ] % National

[ ] % International

FUN.4 [Only if FUN 1 =Yes] Which amount best correspond to the total amount of research funding you have received during the past three years?

Dropdown list < Less than US$10 000; US$10 000 - 25 000; US$25 000 - 50 000; US$50 000 - 75 000;

US$75 000 - 100 000; US$100 000 - 250 000; US$250 000 - 500 000; US$500 000 - 1 000 000;

More than US$ 1 000 000>

FUN.5 [Only if FUN 1 =Yes] Please specify the three organisations/agencies from which you have received the most funding over the past three years

[Specify] [< open form>]

[Specify] [< open form>]

[Specify] [< open form>]

Challenges

CHA.1 Indicate, where applicable, which of the factors listed below have impacted negatively on your career as an academic or scientist

	Not at all	To some extent	To a large extent
Lack of mentoring and support	[ ]	[ ]	[ ]
Job insecurity	[ ]	[ ]	[ ]
Balancing work and family demands	[ ]	[ ]	[ ]
Lack of mobility opportunities	[ ]	[ ]	[ ]
Lack of training opportunities to develop professional skills	[ ]	[ ]	[ ]
Lack of access to a library and/or information sources	[ ]	[ ]	[ ]
Lack of research funding	[ ]	[ ]	[ ]
Lack of funding for research equipment	[ ]	[ ]	[ ]
Limitation of academic freedom	[ ]	[ ]	[ ]
Political instability or war	[ ]	[ ]	[ ]
Other, please specify	[ ]	[ ]	[ ]

International Mobility

MOB.1 In which country do you currently work/reside?

[<dropdown list>]

MOB.2 During the past three years, have you studied or worked in a country other than what you would consider your home country (i.e. abroad)?

[ ] Yes

[ ] No

MOB.3 [Only if MOB2 = Yes] Compared to the study/working conditions in your home country, how would you rate the study/working conditions abroad?

Researchers from:	Much worse abroad	Somewhat worse abroad	About the same	Somewhat better abroad	Much better abroad
Employment/job security	[ ]	[ ]	[ ]	[ ]	[ ]
Work-family balance	[ ]	[ ]	[ ]	[ ]	[ ]
Training opportunities	[ ]	[ ]	[ ]	[ ]	[ ]
Opportunities for research collaboration	[ ]	[ ]	[ ]	[ ]	[ ]
Research resources (personnel, scientific literature, material, etc.)	[ ]	[ ]	[ ]	[ ]	[ ]
Research funding opportunities	[ ]	[ ]	[ ]	[ ]	[ ]
Others, please specify [< open form>]	[ ]	[ ]	[ ]	[ ]	[ ]

MOB.4 [Only if MOB2 = Yes] How would you rate the importance of having studied/worked abroad for your career development?

[ ] Not important

[ ] Somewhat important

[ ] Important

[ ] Very important

[ ] Essential

MOB.5 Have you ever considered leaving the country where you currently work?

[ ] No, never

[ ] Yes, sometimes

[ ] Yes, often

MOB.6 [Only if MOB5 = Yes] List the main considerations for leaving the country:

<open ended form> x3

Collaboration

COL.1 How often do you collaborate, either in joint research or through joint publications, with the following categories of researchers:

	Never or very rarely	Rarely	Sometimes	Often	Very often/ always
Researchers at your own institution	[ ]	[ ]	[ ]	[ ]	[ ]
Researchers at other institutions in your own country	[ ]	[ ]	[ ]	[ ]	[ ]
Researchers at institutions in other African countries	[ ]	[ ]	[ ]	[ ]	[ ]
Researchers at institutions outside of Africa (e.g. Europe, North America, Asia, etc.)	[ ]	[ ]	[ ]	[ ]	[ ]

Mentoring

MO.1 During your career so far, have you ever received mentoring, support or training in the following:

	Never or very rarely	Yes but it was not valuable	Yes and it was valuable
Career decisions	[ ]	[ ]	[ ]
Introduction to research networks	[ ]	[ ]	[ ]
Attaining a position/job	[ ]	[ ]	[ ]
Research methodology	[ ]	[ ]	[ ]
Fundraising	[ ]	[ ]	[ ]
Scientific writing	[ ]	[ ]	[ ]
Presenting research results	[ ]	[ ]	[ ]

Demographic background

DEM.1 Are you:

[ ] Male

[ ] Female

DEM.2 What is your year of birth?

YEAR [ ] (yyyy)

DEM.3 What is your nationality?

Dropdown list [ ]

DEM.4 How many children or other dependents do you have?

Please enter a number in the relevant boxes.

[ ] Number of children/dependents aged 0 to 5

[ ] Number of children/dependents aged 6 to 18

[ ] Number of adult dependents aged 19 or older (including elderly)

[ ] I do not have any dependents.

DEM.5 How is the care work and general housework for all dependents distributed in your family/relationship/household?

[ ]% me   [ ]% partner   [ ]% others (e.g. extended family, paid service)

Appendix B: Permission to access survey data

SciSTIP

DST-NRF Centre of Excellence in
Scientometrics and Science,
Technology and Innovation Policy

27 November 2019

Dear Ms Phyllis Kalele

Permission to access survey data

You are hereby granted permission to access, for the purposes of your PhD research, a subset of anonymised survey data that were collected in the period 2016–2017 as part of the "Young scientists in Africa" project. This permission to have access to the data only applies for use for your PhD and not for any other (future) project. Please also note that you are not allowed to share this data with a third party.

Yours sincerely,

Prof. Johann Mouton
Director: DST-NRF Centre of Excellence in Scientometrics and STI Policy

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Appendix C: Ethics application amendment approval

POLYTECHNIQUE MONTRÉAL
UNIVERSITÉ D'INGÉNIERIE

APPROBATION D'AMENDEMENT

Montréal, le 7 novembre 2019

Mme Catherine Beaudry
Département de mathématiques et de génie industriel
Polytechnique Montréal

N/Réf : Dossier CER-1516-43

Madame,

J'ai le plaisir de vous informer que les membres du Comité d'éthique de la recherche (CÉR) ont procédé à l'évaluation en comité restreint de votre demande d'amendement au projet de recherche intitulé « *Young scientists in Africa: Factors influencing research performance and career development* ».

Votre demande d'amendement relative à l'ajout de Mme Phyllis Kalele, doctorante à Stellenbosch University, à l'équipe de recherche est acceptée.

Nous vous rappelons que votre certificat arrive à échéance le **4 août 2020**. Veuillez noter que conformément aux exigences des organismes subventionnaires, **il est de votre responsabilité de soumettre au CÉR un rapport annuel ou un rapport final avant l'expiration du présent certificat** afin de l'informer de l'avancement de vos travaux. Le formulaire à remplir est disponible à l'adresse suivante : (http://www.polymtl.ca/recherche/formulaires-et-guides).

Il est également de votre responsabilité d'informer le CÉR de toute modification qui pourrait être apportée à votre protocole expérimental, ou de tout problème imprévu pouvant avoir une incidence sur la santé et la sécurité des personnes impliquées dans votre projet.

Bonne continuation dans la poursuite de vos travaux de recherche.

Farida Cheriet, Présidente
Comité d'éthique de la recherche avec des êtres humains

cc: Céline Roehrig (DFR); Mélissa Mirabella (Service des Finances)

Comité d'éthique de la recherche avec des êtres humains
Céline Roehrig, Coordonnatrice
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Appendix D: Ethics clearance

NOTICE OF APPROVAL

REC: Social, Behavioural and Education Research (SBER) - Initial Application Form

10 March 2020

Project number: 13085

Project Title: THE ROLE OF MENTORING IN THE RESEARCH PRODUCTION OF EARLY-CAREER WOMEN ACADEMICS IN AFRICA

Dear Ms Phyllis Kalele

Your REC: Social, Behavioural and Education Research (SBER) - Initial Application Form submitted on 29 November 2019 was reviewed and approved by the REC: Humanities.

Please note the following for your approved submission:

Ethics approval period:

Protocol approval date (Humanities)	Protocol expiration date (Humanities)
10 March 2020	9 March 2023

GENERAL COMMENTS:

Please take note of the General Investigator Responsibilities attached to this letter. You may commence with your research after complying fully with these guidelines.

If the researcher deviates in any way from the proposal approved by the REC: Humanities, the researcher must notify the REC of these changes.

Please use your SU project number (13085) on any documents or correspondence with the REC concerning your project.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

FOR CONTINUATION OF PROJECTS AFTER REC APPROVAL PERIOD

Please note that a progress report should be submitted to the Research Ethics Committee: Humanities before the approval period has expired if a continuation of ethics approval is required. The Committee will then consider the continuation of the project for a further year (if necessary)

Included Documents:

Document Type	File Name	Date	Version
Research Protocol/Proposal	P Kalele_PhD Proposal_Final Submitted_12 09 16	05/11/2019	Final
Investigator CV (PI)	P Kalele_CV_November 2019_CREST	05/11/2019	November 2019
Proof of permission	CER-1516-43 Amendement 2019-11-07_Polytechnique Montreal	07/11/2019	Final
Proof of permission	Phyllis Kalele_permission for use of CREST data_27 November	27/11/2019	Final

If you have any questions or need further help, please contact the REC office at cgraham@sun.ac.za.

Sincerely,

Clarissa Graham

REC Coordinator: Research Ethics Committee: Human Research (Humanities)