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A Programme for Women achieving Excellence in Research (PoWER): Theoretically informed intervention design, and evaluation

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Abstract

Academics in Higher Education are often expected to both teach and research; this is a particular challenge for women both structurally and individually. Initiatives to address structural issues include AdvanceHE. Here we focus on individual issues and report on the Programme for Women Achieving Excellence in Research, a theory-based intervention. Barriers to success were assessed and course content tailored accordingly. Evaluation demonstrated barriers reduced and confidence increased. Although barriers are both individual and contextual, our rigorous approach allows international application through intervention modification without loss of fidelity. This offers a new approach for academic developers to enable female researchers.

Key words: Academic development**,** Female, Theoretical Domains Framework

Introduction

Academic development needs to embrace not only 'creation of conditions supportive of teaching and learning' (Leibowitz, 2014, p. 359) but also the whole academic role (including research) and the whole institution (Sutherland, 2018). Higher Education (HE) academic workloads and performance assessments embrace teaching and research (Cadez et al., 2017). Research and teaching quality are positively related (Brew, 2017). Female academics face particular challenges engaging in research (e.g., gender expectations, male dominated hierarchy and, poorly implemented equality and diversity policies (EDI)). Academic developers can help support female colleagues to overcome barriers to research engagement. Gender inequality remains in academia. Despite 46% of academic staff being female, 38% of senior academic staff and 27% of professors are female. As seniority increases, so decreases female representation (Higher Education Statistics Agency [HESA], 2020). Women occupy 80% of HE administrative and secretarial roles and 41% of female academics work part-time, as opposed to only 28% of male academics (HESA, 2020).

Gender divides are stark in some subject areas. Women outnumber men in medicine, dentistry and health; the opposite applies in biological, mathematical and, physical sciences and engineering and technology (HESA, 2023). Females face structural issues driven by male-dominated political systems which routinely inhibit progress (O'Connor, 2020). Experiences of sexism (Edwards, 2017) and racism (Rollock, 2021) are prevalent, sometimes attributed to unconscious bias (Tate & Page, 2018).

AdvanceHE is a United Kingdom (UK) organisation committed to inclusive cultures in HE. Recent reports indicate minimal progress for the representation of senior female academics; from 40% in 2003/4 to 46.3% in 2018/19, a finding echoed by HESA (2020). Still 70.5% of Heads of HEIs are men and more men (49.2%) than women (41%) hold teaching and

research contracts (AdvanceHE 2021). Men dominate professorial posts (72%) and outweigh women at the top of the pay scale (HESA, 2020).

Academia sits within overarching gender inequality in the workplace. The Sex Discrimination Act (1975) and Equal Pay Act (1970) have been in place for half a century until superseded by the Equality Act (2010), yet evidence of workplace equity is limited or even stagnant in the UK and internationally with still no sectors where gender pay is equal; 80% of women work for an employer who pays male staff more (Wisniewska et al., 2019). Many women (41.2%) work part time; they are three times more likely to do so than men (HM Government [HMG], 2019). Dependent children impact disproportionately on women (HMG, 2019). The past 33 years have seen improved attitudes towards gender roles, in 2017 8% agreed 'a man's job is to earn money; a woman's job is to look after the home and family' compared with 43% in 1984 (HMG, 2019). Nonetheless, the 'second shift' (Hochschild & Machung 1989), the status quo where women take on significantly more unpaid hours on average per week than men, remains manifest in the division of household work (HMG, 2019).

Our systematic narrative review of UK HEIs identified barriers and facilitators to female academic success. Barriers included i) professional networking, ii) imposed home-work imbalance, iii) lack of inclusion, iv) working in a hierarchy and, v) structural institutional biases (Westoby et al., 2021). Everyday sexism prevails in the workplace, affecting women academics psychologically in their drive to progress and confidence in applying for higher positions. Facilitators to success in HEIs included i) supportive partners and ii) more robust EDI policies.

A USA focused review 'to identify intervention programmes to support the careers of women in academia' and 'identify the most efficacious programme elements' notes the prevalence of 'bottom-up' as opposed to 'top-down' policy driven interventions (Laver et al., 2018), our

findings concur (Westoby et al. 2021). Laver et al. (2018) reports programme participants recounted positive outcomes, these were most often self-rated skills and capabilities or intervention satisfaction. Concrete outcomes such as 'promotion, retention, grant success and pay' were more difficult to quantify and showed 'mixed results'. Even then it was not possible to attribute change to the intervention. The literature and available evidence point to a combination of individual and structural challenges for women in academia. Structural changes are vital actions and are ongoing but can take many years to achieve impact. In the meantime, alongside structural interventions there is a need to support individuals.

Based on the results of our review of barriers to success, we recommended the following interventions: i) generation of local supportive and accessible women-based networks, ii) institution-wide strategies to raise consciousness of overt and covert inequality, iii) role models to aspire to and, iv) mentoring and coaching to empower women (Westoby et al., 2021). Despite the existence of facilitators to success, there are clear gaps. We can group barriers into themes and acknowledge the similarities of experiences and institutional policies throughout UK HEIs and beyond, but simultaneously must acknowledge that barriers are individual to the academics experiencing them, and contextually sensitive.

We addressed and evaluated these recommendations in one UK HEI using a robust theoretical approach. We used the Theoretical Domains Framework (TDF) a synthesis of all published models of behaviour or behaviour change (environmental, social, cultural and institutional determinants) (Michie et al., 2005) to guide intervention design and delivery. Once barriers are categorised to the framework it offers a pragmatic way to select the behaviour change techniques (BCTs) (Michie et al., 2008) most likely to be effective (Baker et al., 2015). The TDF has been used extensively and successfully in healthcare practice (Cowdell & Dyson, 2019; Dyson & Cowdell, 2021) but not yet in educational settings.

Aim

To develop and evaluate a theoretically underpinned, tailored intervention to support women to progress in their research career; PoWER (**P**r**o**gramme for **W**omen achieving **E**xcellence in **R**esearch).

Materials and methods

The intervention and research design are described below.

Intervention Design

***Barriers assessment*:** Barriers to success are individual and culturally sensitive. Theoretically underpinned (Skivington et al., 2021) interventions tailored according to local need (Baker et al., 2015) are more effective than those that are not, therefore we developed a pre-programme barriers survey as per precedent (Dyson et al., 2013; Dyson & Cowdell, 2014). Likert style items derived from our literature review were categorised to the 11 domains of the TDF (Table 1); item direction was mixed to avoid acquiescence bias (Streiner et al., 2015).

[Table 1 near here]

Tailored content: TDF domain categorised items were mapped to BCTs likeliest to be effective given assessed barriers (Michie et al., 2008). These formed the 'active ingredients' for pragmatic interventions (educational content with associated application) to address barriers and enhance facilitators. We have systematically developed intervention components according to the needs of each PoWER cohort (reusing components when cohorts had barriers in common). Figure 1 illustrates the process of component development for the barrier 'conflicting priorities'.

[Figure 1 near here]

General content: Literature identifies a need for locally supportive and accessible women-based networks, coaching and role-models. We offered coaching from academics coaches. We built in small group tasks and networking opportunities including a 'buddy' system where delegates were paired for peer support throughout the PoWER and beyond. Role-modelling drew on the principles of positive deviance (Herington & van de Fliert, 2018), each session began with an 'inspirational' woman speaker from a range of backgrounds (e.g., first female Bishop, comedian, broadcaster, leaders of large institutions). Women outlined their career/life course and explained how they overcame any barriers, this was followed by a discussion with delegates. The programme was delivered for half a day each month, online (to facilitate engagement) for ten months. To aid application of learning 'homework' was set each month.

Research design

Comprehensive evaluation of PoWER to understand experiences and measure change where possible. To measure change we i) compared pre and post barriers to research (using the *barriers* survey) and to understand experiences we conducted ii) an *evaluation* survey and, iii) qualitative peer interviews. This dual qualitative-quantitative design brings both breadth and depth of understanding to evaluation (Kajamaa et al., 2020).

Participants

Participants were recruited from one PoWER cohort (n=25) in a post-92, teaching rather than research-intensive (Darabi, 2017), UK HEI. All had joined PoWER because they either had, or wanted to have, research as a component of their professional role. Ten (40%) were early career researchers or not currently research active and the remainder (n=15, 60%) had a contracted level of research responsibility. Most had permanent full-time contracts (n=16, 64%), with three (12%) being part-time permanent and the remainder on other types of

contract. PoWER participants described their disciplinary background as Art, Design and Media (n=9, 36%), Business or Law (n=4, 16%), Education (n=5, 20%), Social Sciences (n=3, 12%) Health (n=3, 12%) or Sports Science (n=1, 4%). All had agreed attendance with their line manager. Data were collected in academic year 20/21.

Ethical approval was granted by a Faculty Research Ethics Committee (reference: 9259/R(A)/2021). Participants were recruited via email, their place on PoWER was not contingent on agreeing to the research element.

i) Comparison of pre and post barriers

***Design*:** Barriers survey development is reported above. The survey was distributed two weeks pre and post PoWER.

Procedure: Link to barriers survey was emailed to participants.

Analysis: As surveys were anonymous, we could not compare individual level data, so we compared group responses using descriptive statistics (percentages) after reversing items where necessary so a response of strongly agree always represented a barrier.

ii) Evaluation Survey

Design: An evaluation survey was designed with 30 questions focusing on elements of PoWER including delegates':

- Rationale for joining (selection of options),
- Experience of PoWER (Likert scale items),
- Outputs achieved (open text).

Item clarity was ensured and items independently peer reviewed by colleagues for usability and face validity. Anonymity mitigated social desirability bias.

Procedure: Link to survey was emailed to participants

Analysis: Data were transferred to Microsoft Excel. Quantitative data were analysed using descriptive statistics (frequencies, percentages, means) and free text data thematically analysed according to Braun and Clarke (2006) (see below for detail of process).

iii) Qualitative peer interviews

Design: Semi-structured peer interviews were conducted using a topic guide. Peer interviews were used to reduce the power differential between interviewer and interviewee and avoid preconceptions and influences (Payne-Gifford et al., 2021) of PoWER leaders.

Procedure: Interview invitations were emailed with a participant information sheet. Participants could ask questions and gave pre-interview written informed consent. Interviews were conducted by two members of the PoWER cohort (TC and YA), both post-doctoral researchers. All interviews were conducted on Microsoft Teams.

Analysis: Audio recordings were transcribed verbatim. Thematic analysis followed a six step-process (Braun and Clarke 2006). Two researchers (CW and JS) i) familiarised themselves with the data (reading transcripts), ii) generated initial codes (independently then together until agreement of a convergent coding framework) and iii) identified higher level themes. All team members iv) reviewed and, v) named themes to ensure meaningful coherence as vi) reported below. Data collection and analysis were concurrent. Interviews continued until data saturation for this theory-based interview study was achieved (Francis et al., 2010).

Results

1. Pre-post barriers survey

Twenty-one of 25 participants completed pre-survey and 19 completed post-survey.

Findings

Figure 2 presents the most frequently reported barriers by survey item (%); top barriers were i) conflicting expectations, ii) other work and priorities and, iii) finding research 'difficult'. Figure 3 presents barriers categorised to TDF domains; most frequent were i) motivation, goals and priorities, ii) emotion and, iii) beliefs about capabilities. All barriers reduced throughout the programme.

[Figure 2 near here]

[Figure 3 near here]

2. Evaluation survey

Twenty-one of 25 participants responded.

Findings

Rationale for joining power: Primary reasons included enhancement of research capability and to be part of a women only network; others were career progression, networking and line manager encouragement.

Experience of PoWER: Elements of PoWER participants did and did not value were categorised into five themes. ***Inspirational speakers*** were consistently cited as positive, for example *'I was inspired by her career trajectory, especially her fortitude and resilience in the light of obstacles'* (P1). (P6). A ***sense of shared endeavour*** was valued, for example, '*I felt like part of a community'* (P4). Participants reported ***applying skills and techniques*** discussed in sessions to their day-to-day work lives; *'I felt empowered by the clear examples of concrete strategies I could put into place'* (P14). Finally, participants spoke about valuable or less valuable ***content.*** Several responses suggested programme content was novel and unexpected, for example *'each session was unique, I learned from it things I never thought about needing to learn'* (P1). Sessions on motivation, prioritisation, cultural busyness and active bystander were particularly valued. A minority appreciated these less, for example *'I*

don't think any were not [valuable] *but some, for example time management and motivation, I was already familiar with, but it was good to be reminded'* (P17). Several participants wanted more input from their own field of academia. Finally, participants reflected on the positive impact of PoWER on their ***career planning***. Examples included *'more self-focused on career progression'* (P1), *'helped clarify how I can progress my role with simple changes'* (P5) and '[I] *have much clearer research and career vision'* (P8). When asked to rate the value of PoWER out of five, with five being extremely valuable, the mean response was 4.48 (range 3 to 5). When asked about the personal impact of PoWER, 84% reported they were kinder to themselves, 89% were more motivated to be active researchers and 95% were more proactive in career planning.

Outputs achieved: Figure 4 shows intended, in progress and achieved outputs. Most were publications and research proposals or collaborations. Most (81%) reported their output plans evolved through the programme. When asked if they attributed success to PoWER, 17 responded 'yes' and four 'maybe'.

[Figure 4 near here]

3. Qualitative peer interviews

Twelve interviews were completed. No new categories were identified after eight of these indicating data saturation (Francis et al., 2010).

Findings

Three key themes and seven subthemes were derived from the data: i) reasons for joining PoWER (career progression, support and network opportunity), ii) experiences of PoWER (elements valued and to be improved) and, iii) impact (attitude and behaviour change and outputs and achievements) (see Figure 5) and presented in turn below.

[Figure 5 near here]

Theme 1: Reasons for joining PoWER

Most participants wanted to join PoWER as they saw it as a means of ***career progression***: *'I, in many ways, desperately need to progress my career… I also wanted to get clearer insight into why I wasn't achieving'* (P6). Some considered skills acquisition would support achievement: *'It was the academic development, I think, the academic side. Because I thought it would help me, you know, as an academic, with my writing'* (P11), *'I was looking for the next level up, so I was looking for skilling up'* (P4). ***The opportunity to network*** was important; PoWER provided a ready-made network for colleagues new to the university and for others an opportunity to share experiences with other women researchers or find role models. *'It exceeded my expectations . . . the networks. . . the support that's provided and the role modelling is just, you know, something you can't really put a price on'* (P7). Some participants intended to sustain connections after the programme ended. Peer and group ***support*** attracted participants and encouraged them to attend consistently: *'One is about emotional support . . . I'm doing research, I often feel like a bit of a satellite, and a bit alone. . . it was very supportive'* (P9) *'It's kind of like a POWER support group'* (P7).

Theme 2: Experience of PoWER

Responses were predominantly positive with most frequent ***elements valued*** including the inspirational speaker and diversity of their experiences and approaches to overcoming barriers: '*Listening to the speakers has been incredible because they're all so very diverse and all at different stages within their career and within research. That has been really comforting, because there's no one way. I kind of feel like if you don't tick a certain box or look a certain way then it's very difficult but, actually, there's lots of different ways and lots of different people that progress in research'* (P5). Several valued coaching, reporting it was, '*one of the best aspects because I got the right coach for me and I think that's really crucial . . . I got so much value from it and now I've come out . . . with a ten-year plan'* (P4).

Participants commented on the value of being able to apply techniques presented in their day-to-day working lives: *'I think for me, it was just being able to pick the value from each session and apply it to my situation'* (P4). ***Elements to be improved*** included recording sessions: *'I think it would have been great if sessions were recorded ... to remind myself'* (P4). Most wanted follow-on sessions after the programme: *'It would be good to do a post POWER session, it really would… It could be, like, a sharing experience… 'where are you now' type thing would be good'* (P5).

Theme 3: Impact

Attitude and behaviour change was one of three elements where participants considered PoWER had impacted them as reported by all participants in one way or another. Working habits had changed, for example, **'***I realised you could be your own barrier'* (P2). Others reported 'mindset' changes: '*Through POWER* [I learned] *to be strict and . . . the ability to say no'* (P4). Individuals began to appreciate their unique differences, and increased in confidence and self-belief with a better sense of career direction: *'A massive impact as far as my vision of what I'm trying to do research wise and personally. . . what my future should look like'* (P8). All participants reported on ***outputs and achievements*** corroborating and adding depth to our survey data. Sometimes PoWER gave them the confidence to progress an output: *'I'd been accepted to speak at a conference and then I'd sort of chickened out a bit because I didn't think it was for me. So, that was again imposter syndrome. And now I'm speaking at a conference . . . I'm doing it'* (P5). Attitudes to ***work-life balance*** changed for some, for example: *'I can fulfil parental duties and not feel bad about it impacting on work because I know I put the work in here'* (P2). Others became less concerned about the judgement of colleagues: *'I feel a lot more confident to draw my boundaries and my manager has noticed that, that I'm much more strict about my boundaries'* (P9).

Discussion

Many academics in HE are expected to excel in both teaching and research. Women are disadvantaged in academia and engagement in research is challenging. Theoretically underpinned, tailored interventions are more effective than those that are not. For these reasons we designed, delivered and evaluated the Programme for Women achieving Excellence in Research. We conducted a holistic evaluation with one PoWER cohort (n=25), using pre-post measurements, a evaluative survey and semi-structured interviews. Barriers to success were diminished post compared with pre across highest reported barriers and within all domains of the TDF. Evaluation was positive; participants valued inspirational speakers, a shared endeavour, peer support, coaching, applicability to their day-to-day work and the ability to develop concrete action plans for progress. There is also evidence of tangible research outputs which most participants attribute to attending PoWER.

Few papers report programmes to support female academic career progression. One exception is a systematic review focusing on medicine (Laver et al., 2018). Of the 18 included papers only eight report programmes (Bauman et al, 2014; Chang et al., 2016; Dannels et al., 2008; Helitzer et al. 2014; Levine et al., 2015, McDade et al., 2004; Richman et al., 2001; Seritan et al., 2007). Five papers report the same intervention the Executive Leadership in Academic Medicine for women program (ELAM) (Chang et al., 2016; Dannels et al., 2008; Helitzer et al., 2014; McDade et al., 2004; Richman et al., 2001). The ELAM studies were conducted at the same institution and included some of the same participants. All programmes were predetermined, they lasted 10 months - 2 years and had no evidence of theoretical underpinning. Although, most were based on the challenges to women identified in the literature, unlike PoWER, none were tailored according to context or individuals. Intervention components were largely educational (e.g., collaboration skills) but some also

included networking, discussion and career counselling. More recently a mentoring programme for female researchers in health and medicine reports positive impacts including more promotions and grant opportunities (Vassallo et al., 2021). Whilst PoWER delivered across all of these areas, we went further in providing coaching, inspirational women and a repertoire of evidence-based techniques for delegates to use in their day-to-day practice. There is no mention of academic developers being involved or having adopted research focused interventions and this is perhaps a missed opportunity.

Evaluation in these other programmes focused mainly on leadership and satisfaction. Four programmes captured improved self-reported leadership skills (Dannels et al., 2008; Helitzer et al., 2014; Levine et al., 2015; Ovseiko et al., 2016). As with PoWER, two reported participant satisfaction, the main benefits being a sense of community, empowerment and career satisfaction (Bauman et al., 2014; Seritan et al., 2007). No other programme captured or reported on tangible outputs or measurable reduction in barriers to success. Other studies reported interventions delivered in a single faculty. PoWER was delivered across the University, representing multiple academic disciplines, thus expanding opportunities for knowledge sharing and networking. Some programmes are resource intensive. In particular the ELAM programme required two weeks of residential input, requiring significant time and financial commitment from facilitators and delegates alike. This compares with 20 hours of preparation and 40 hours of PoWER delivered online by two facilitators at a cost of approximately £4,320.

Strengths of this study were the development of an original, theoretically underpinned, tailored programme with rigorous evaluation. Barriers are likely to vary according to individuals and context. Therefore, content will vary too. However, this study demonstrates a new approach to supporting research excellence in academic women that can be modified and

adopted by other HEIs internationally. We have built a suite of intervention components, which incorporates user guides. These should be selected according to pre-assessed barriers, thus allowing modification without loss of fidelity.

Limitations include our focus on one cohort in one university and collection of limited sociodemographic data. Peer interviews are a 'double edged sword', with insiders having to contend with their own pre-conceptions (Mercer, 2007). We mitigated this by having two independent researchers lead and the full team confirm data analysis and by triangulation of our three data sources. Our post-intervention data were collected in the months following PoWER so although positive, we do not claim sustained change. Our work addresses predominantly individual factors, but structural changes must also happen and can take decades to be embedded. In the meantime, we intend to support women to achieve their potential within existing structures.

The focus of academic developers tends to be on professional development in teaching, learning and assessment. We concur with Sutherland (2018) that we should shift our focus toward the whole academic role and the whole institution. We recommend that more HEI based academic developers adopt interventions, such a PoWER, to support women achieving excellence in research using the existing evidence base. However, we caution against treating PoWER as an 'off the shelf' intervention but rather one that should be adapted to cultural context. There is a need for economic evaluation of such programmes. Evaluation is a step in the right direction but there remains a need for robust research capturing objective measures and impact.

Declaration of interest: None to declare

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Figures and tables (uploaded separately)

Figure 1: Process of intervention design for the barrier 'prioritising research is difficult'

Barrier	**Domain of the TDF[2] within which the barrier fits**	**Behaviour change techniques (BCTs) likely to be effective[3]**	**Pragmatic interpretation of BCTs**	**Final interpretation/Intervention components**
I find prioritising research difficult	Motivation, goals and priorities	Specify goal, behaviour or outcome	Set goal for amount of research time per week and for research outputs	1. PoWER delegates are expected to commit to 2 research outputs 2. They will email their expected outputs to one of the facilitators and feedback to the group on a regular basis 3. An interactive educational session on prioritisation delivered by experts and gift a 15 part 'toolkit' of published and referenced productivity tools. 4. PoWER delegates to be paired and meet during the programme (support and networking) 5. Inspirational speakers 6. A celebration event where delegates present their work to the female professoriate of the institution and PoWER peers 7. Homework, apply techniques between session and feed back to the group
		Contract/Commitment	Specify goals set to others	
		Rewards/incentives	Appreciation and regard from the PoWER community and senior colleagues	
		Graded tasks/start with easy tasks	Deliver input on goal setting strategies	
		Social processes of encouragement, pressure, support	Use of 'buddying', coaches, feedback from the PoWER community	
		Persuasive communication	Present evidence for strategies, inspirational women speakers	

Figure 2: Most frequently reported barriers (survey items)

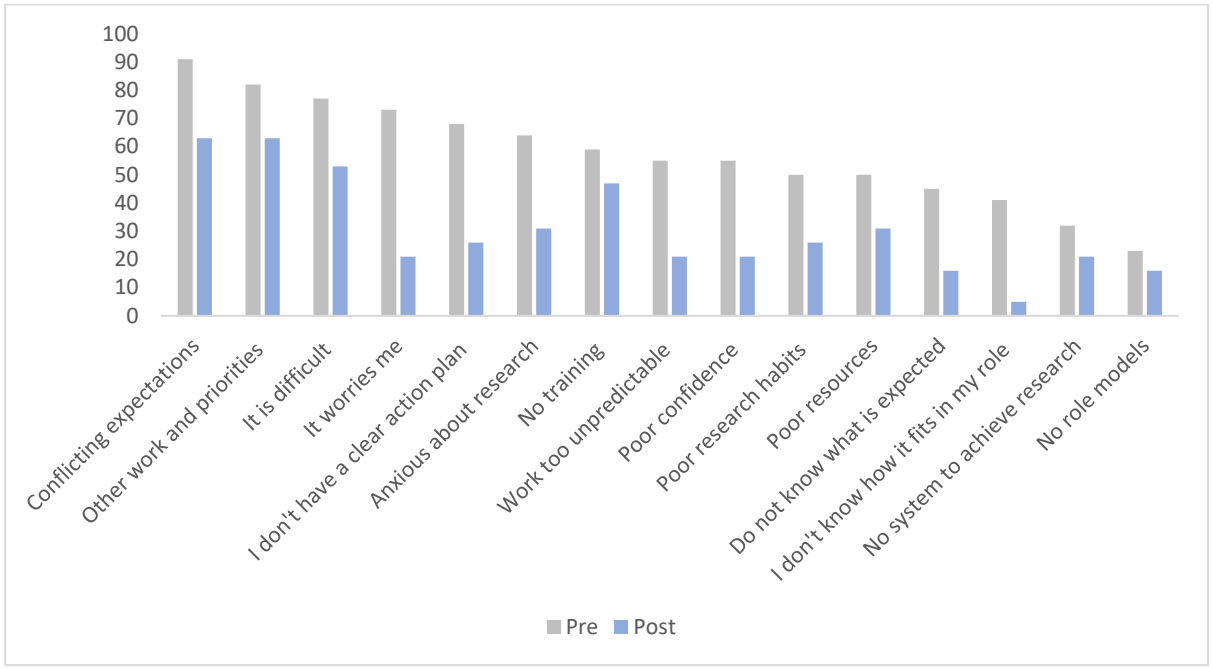

Figure 3: Barriers categorised to TDF

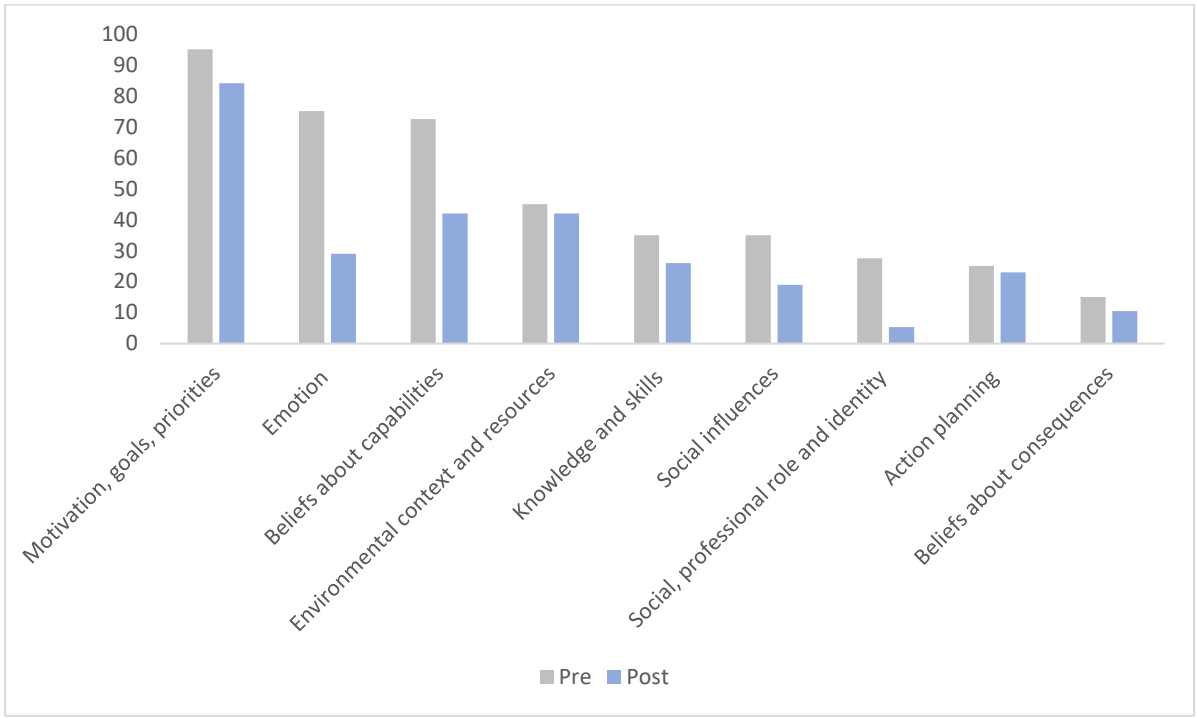

Figure 4: Number of outputs committed to, achieved and in progress

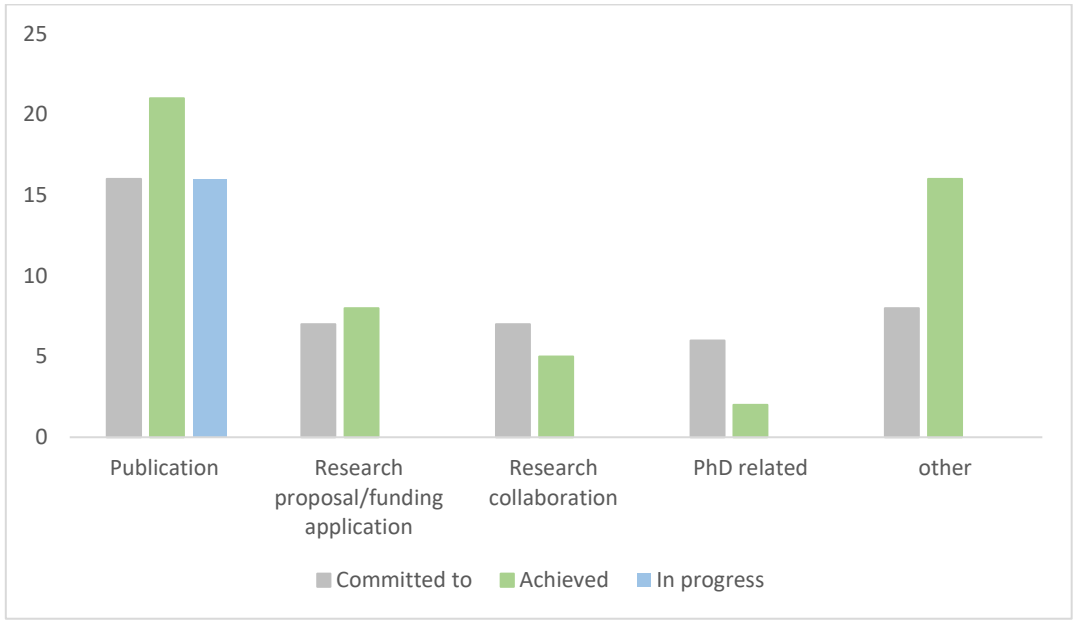

Figure 5: Themes and subthemes