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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 both to teach and to 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 that barriers were reduced and that confidence increased. Although the 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.

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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 (HESA, 2022). Women occupy 80% of HE

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administrative and secretarial roles, and 41% of female academics work part-time, as opposed to only 28% of male academics (HESA, 2022).

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, as well as in 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 (2022). Still, 70.5% of the Heads of Higher Education Institutions (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, 2022).

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 eight percent 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, 1989/2012) – 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 their confidence in applying for higher positions. Facilitators of 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 to identify the most efficacious programme elements' (p. 2) notes the prevalence of 'bottom-up' as opposed to 'top-down' (p. 1) policy-driven interventions (Laver et al., 2018), our findings concur (Westoby et al., 2021). Laver et al. (2018) report that programme participants recounted positive outcomes. These were most often self-rated skills and capabilities or intervention satisfaction. Tangible outcomes including promotion, retention, successful grant applications, and salary were more difficult to quantify and showed varied results (Laver et al., 2018). 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. Meanwhile, alongside structural interventions, there is a need to support individuals.

Based on the results of our review of barriers to success, we recommend the following interventions: i) generation of locally 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 of success, there are clear gaps. We can group barriers into themes and acknowledge the similarities between experiences and institutional policies throughout UK HEIs and beyond; however, we must simultaneously acknowledge that barriers are individual to the academics experiencing them and contextually sensitive.

We address and evaluate these recommendations in one UK HEI using a robust theoretical approach. We use 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, the framework 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 (Programme for Women achieving Excellence in Research).

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 interventions (Skivington et al., 2021) tailored according to local need (Baker et al., 2015) are more effective than those that are not. We therefore developed a pre-programme barriers survey as per precedent (Dyson & Cowdell, 2014; Dyson et al., 2013). 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).

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 based

Table 1. Example items according to domains.

Domain of the TDF	Example of items (derived from literature review)
Knowledge	I know about the faculty administrative processes for me to progress with research
Skills	I have the necessary skills to produce an academic paper
Professional role and identity	Production of research outputs sits outside of my general role
Beliefs about capabilities	I lack confidence in my research ability
Beliefs about consequences	It will reflect badly on my faculty and the university if I do not produce research outputs
Motivation and goals	I struggle to find the drive necessary to engage fully in the production of research outputs
Memory, attention, and decision processes	Research activity is embedded into my work routine
Environmental context and resources	I have time allocated in my workload for research
Social influences	There are women around me whom I see as role models
Emotion	I feel anxious when I think about having to produce research outputs
Action planning	Work is too unpredictable to make clear plans to produce research outputs

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	<ol style="list-style-type: none"> PoWER delegates are expected to commit to two research outputs They will email their expected outputs to one of the facilitators and feedback to the group on a regular basis An interactive educational session on prioritisation delivered by experts and gift a 15-part 'toolkit' of published and referenced productivity tools. PoWER delegates to be paired and meet during the programme (support and networking) Inspirational speakers A celebration event where delegates present their work to the female professoriate of the institution and PoWER peers 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 1. Process of intervention design for the barrier, 'prioritising research is difficult'.

on 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'.

General content

The literature identifies a need for locally supportive and accessible women-based networks, coaching, and role-models. We offered coaching from academic 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. Speakers were from a range of backgrounds (e.g. first female Bishop, comedian, broadcaster, and leaders of large institutions). Women outlined their career/life course and explained how they overcame any barriers, followed by a discussion with delegates. The programme was delivered for half a day each month, online (to facilitate engagement) for 10 months. To aid the application of learning, 'homework' was set each month.

Research design

PoWER was comprehensively evaluated to understand experiences and measure change where possible. To measure change we compared pre and post barriers to research (using the *barriers* survey). To understand experiences, we conducted an *evaluation* survey and 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 et al., 2017), UK HEI. All had joined PoWER because they either had, or wanted to have, research as a component of their professional role. Ten participants (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 contracts. 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 the academic year 2020/2021.

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 upon agreeing to the research element.

Comparison of pre and post barriers

Design. Barriers survey development is reported above. The survey was distributed 2 weeks pre and post PoWER.

Procedure. A link to the barriers survey was emailed to participants.

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

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), and
- outputs achieved (open text).

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

Procedure. A link to the 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 were thematically analysed according to Braun and Clarke (2006) (see below for details of the process).

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 were able to 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 & 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

Pre-post barriers survey

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

Findings

Figure 2 presents the most frequently reported barriers by survey item (%). The 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 were reduced throughout the programme.

Evaluation survey

Twenty-one of 25 participants responded.

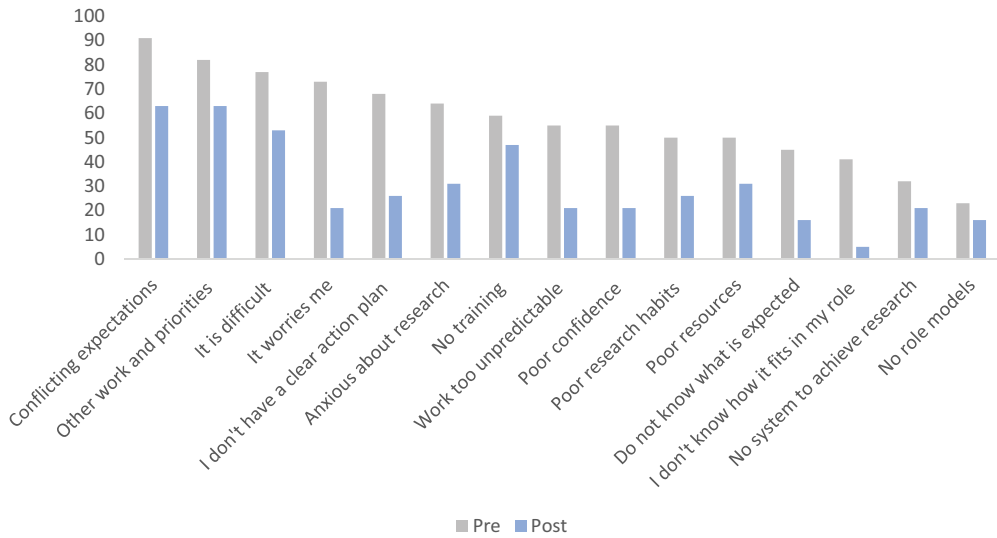


Figure 2. Most frequently reported barriers (survey items).

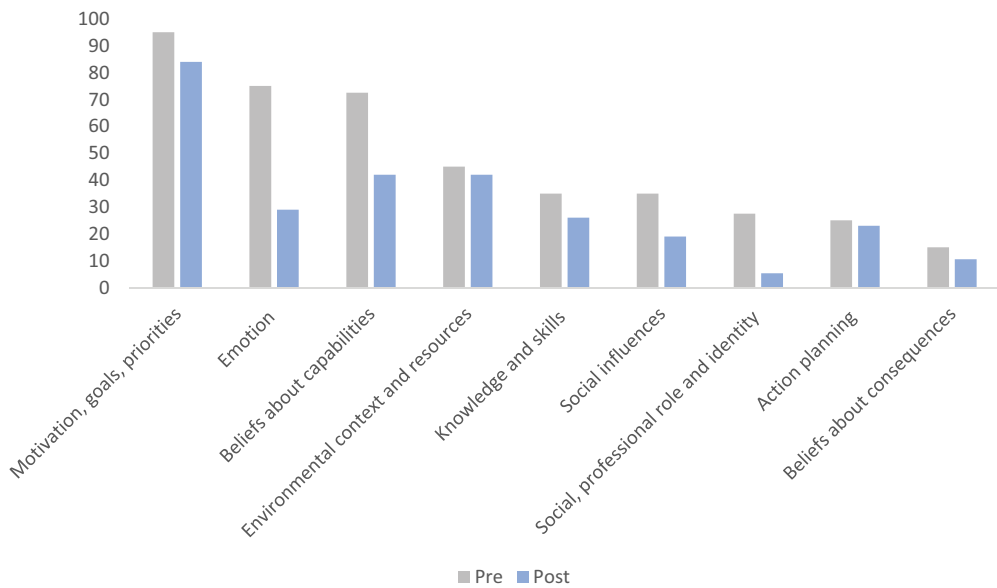


Figure 3. Barriers categorised to TDF.

Findings

Rationale for joining PoWER. Primary reasons for joining PoWER included enhancing research capability and being part of a women-only network. Other reasons were career progression, networking, and encouragement from a line manager.

Experience of PoWER. Elements of PoWER that 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: *'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: *'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 participants responded 'yes' and four 'maybe'.

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 networking 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). The themes and subthemes are presented in turn below.

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). Participant 4 said, *'I was looking for the next level up, so I was looking for skilling up'*. **The opportunity to network** was important; PoWER provided a ready-made network for colleagues new to the

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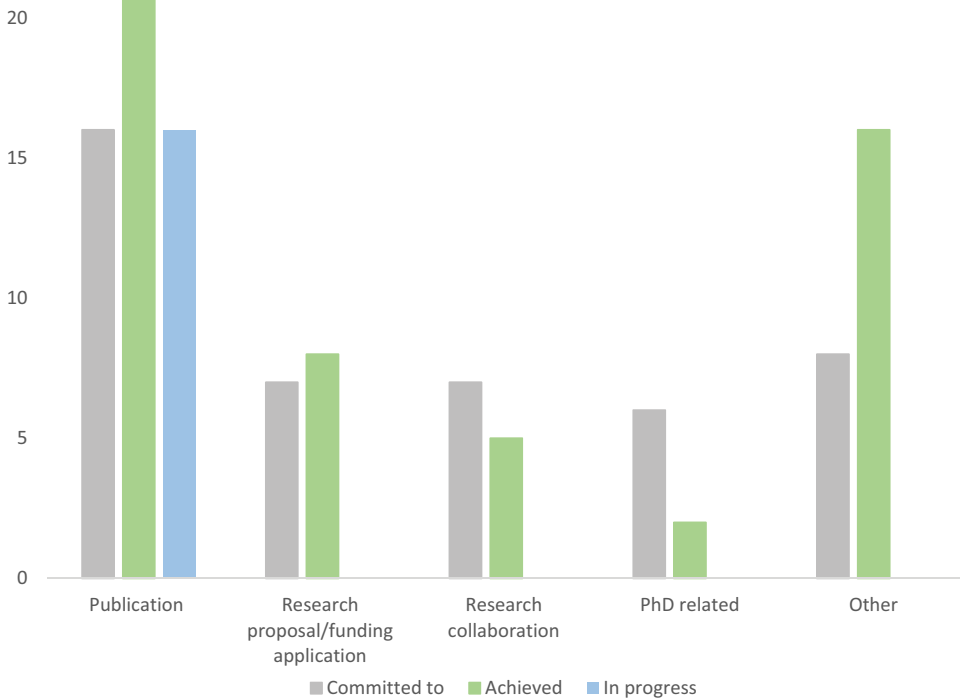


Figure 4. Number of outputs committed to, achieved, and in progress.

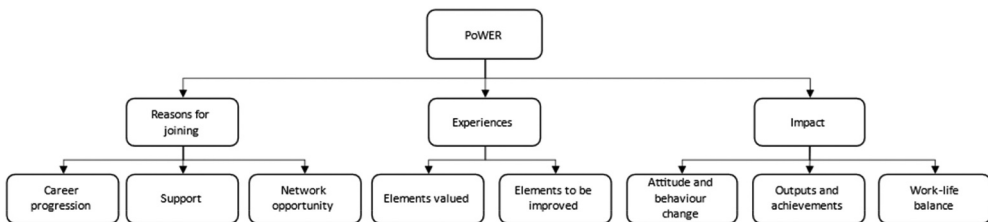


Figure 5. Themes and subthemes.

university as well as an opportunity for others 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 speakers and the 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 and reported that 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 the three elements where all participants reported PoWER had impacted them in one way or another. Working habits had changed. As an example, one participant noted, *'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 they 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: *'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 and post measurements, an evaluative survey, and semi-structured interviews. Barriers to success were diminished post programme compared with pre programme across the 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 papers included, only eight report on 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 on 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 from 10 months to 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 was 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 reported 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 of 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 programmes reported participant satisfaction, with 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 to 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 2 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.

The 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 the collection of limited sociodemographic data. Peer interviews are a ‘double edged sword’, with insiders having to contend with their own preconceptions (Mercer, 2007). We mitigated this by having two independent researchers lead, the full team confirming data analysis, and by triangulating our three data sources. Our post-intervention data were collected in the months following PoWER. Therefore, 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 as 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.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Judith Dyson PhD is a Professor of Implementation Science at Birmingham City University. Judith is a mixed methods researcher who investigates and applies strategies that expedite and enhance the adoption of evidence-based practice to reduce morbidity, mortality and to enhance patient safety and quality of care. As a chartered psychologist, her approach often involves understanding and supporting the many determinants of practitioner’s clinical behaviours and service user’s health behaviours to achieve this. Researchers (generally) generate evidence and practitioners (generally) apply it. Judith’s work aims to bridge this gap. Judith leads the Programme for Women Achieving Excellence in Research (PoWER).

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