British supervisors' conceptions of ideal and successful PhD attributes and their implications for equity in doctoral candidate selection

Abstract

Purpose
The study explores supervisors' conceptions of successful and ideal doctoral students' attributes, and their implications for integrating equity and diversity considerations into the doctoral selection process.

Design / methodology/approach
The study employs a qualitative approach and analyses data from extensive interviews with senior academics and a member of the professional staff in England on their perspectives of the attributes of ideal and successful doctoral candidates. The study is conceptually framed by the Research Development Framework (RDF) and an adapted ecosystem model of the factors influencing PhD completion (Lovitts, 2005).

Findings
The findings reveal that supervisors value both cognitive and non-cognitive attributes, with the majority of the non-cognitive attributes categorised in the RDF sub-domains of *personal qualities*, *self-management*, *working with others*, and *communication and dissemination*. Non-cognitive attributes were, moreover, valued not just for their contribution to doctoral success but also to the doctoral experience.

Practical implications
In contrast to the typically narrow criteria emphasised in UK doctoral selection, we argue that a wider, more holistic, range of attributes better represents what supervisors actually value, while offering greater opportunities for equitable selection of diverse doctoral cohorts. Two key macroenvironmental challenges are discussed: the difficulty of selecting for highly valued non-cognitive attributes; and the importance of institutional support for the creation and sustainability of more equitable selection processes.

Originality
The paper deepens the literature on supervisors' perceptions of the qualities or attributes of doctoral success and links this to the use of criteria which avoid reinforcing structural racial inequities in higher education.

Keywords: doctoral education, PhD attributes, equity, higher education

Introduction

Minoritised ethnic British candidates are underrepresented in postgraduate degrees, particularly at the doctoral level (Mateos-González and Wakeling, 2022), and particularly for funded doctorates (Williams *et al.*, 2019). Scholars have suggested that constraints to access for such candidates include structural (internal structures), organisational (locus of change) and cultural (resistance to acknowledging ethnic differences in attainment) factors (e.g., Tate and Bagguley, 2017). Of particular importance among these are the internal institutional structures which determine application requirements and influence selection processes and practices, contributing significantly to decisions about who receives an offer and who does not.

Evidence of selection bias has been highlighted in the literature around the explicit criteria and implicit judgements used to evaluate doctoral applicants (e.g., Jackson-Cole and Chadderton, 2021). Much of the latter stems from the US context where commonly used cognitive criteria – mental capabilities such as reasoning, problem solving, planning, abstract thinking, complex idea comprehension and experiential learning (Ispas and Borman, 2015) – deduced from tests such as the Graduate Record Examinations (GRE) have shown predictive limitations, i.e., for doctoral completion (Michel *et al.*, 2019; Miller *et al.*, 2019), ethnic and gender variances, as well as economic and geographical constraints (Posselt and Miller, 2018). Others have suggested that 'softer' cognitive attributes, e.g., creativity, practical intelligence (i.e., problem solving), may have lower racial, ethnic and socioeconomic variability than 'harder' cognitive attributes such as subject matter knowledge, coursework performance, and even the GRE (Lovitts, 2008). Others still have suggested that non cognitive criteria, e.g., personality, motivation, attitudes or other personal attributes, may offer greater opportunities for reducing selection biases (Michel *et al.*, 2019), thereby diversifying the pool of doctoral candidates. As Posselt (2016, 2020) argues, there is a critical connection between doctoral selection criteria and racial equity: only by addressing this pivotal stage of doctoral access can doctoral programmes hope to achieve more equitable outcomes (Posselt, 2020).

In the UK, where they are published, selection criteria for admission to doctoral study heavily favour academic grades, such as through first degree or master's classification (Mantai and Marrone, 2022). Graduates of higher-status first-degree institutions have significant advantages in entering higher degrees (Mateos-González and Wakeling, 2022; Pásztor and Wakeling, 2018), suggesting additionally that institutional status may act as a signal to selectors. A survey of university faculty and staff involved in doctoral admissions conducted by Smith McGloin *et al* (2024) identified the decision-making weight of (potential) doctoral supervisors as paramount, with those supervisors often favouring master's degree achievement and the status of an applicant's degree-awarding institution as gate-keeping criteria. As noted above, it is by no means clear that these academic proxies for applicant cognitive qualities are accurate predictors of capacity to thrive as a doctoral student. What *is* fairly clear, however, are the structural inequalities in the award of the highest degree classifications by race/ethnicity *and* the underrepresentation of racially minoritised UK students in the most selective and research-intensive universities (Arday et al., 2021). This implies a risk that typical doctoral selection criteria systematically disadvantage racially minoritised graduates' access to doctoral study. Based on the Smith McGloin *et al*. survey, Sheldon *et al*. (2024) propose a competency-based framework for doctoral admissions which focuses on communicative and analytical skills, motivation, curiosity and so on.

Here, we seek to contribute to addressing equity issues in doctoral admissions through an in-depth exploratory study of the range of non-cognitive and cognitive criteria that doctoral supervisors consider actually contribute to doctoral success. Although there is some evidence of associations between non-cognitive criteria and doctoral completion from the US context (Michel *et al.*, 2019), limited evidence exists in the UK context. Given the importance of the perspectives of experienced academics in understanding graduate student attributes which lead to success (Manathunga and Lant, 2006), this paper focuses on British supervisors' views of the range of attributes perceived to contribute to success as well as those exhibited by their ideal candidates, i.e., candidates they prefer to supervise, *as distinct from those attributes which might habitually be employed in doctoral selection processes*. In doing so, the article offers group level views on factors for doctoral success which traverse individual candidate characteristics. and offers valuable insight for exploring opportunities for diversity and equity in doctoral education.

Ideas about doctoral success

Existing definitions of doctoral success in the literature include successful completion of the doctorate in minimal time (Cornell *et al.*, 2022; Kyvik and Olsen, 2013) or without delay. Bitzer (2011) is interested in minimal time-to-completion alongside a quality doctorate, while Lovitts (2008) distinguishes between an acceptable PhD and a distinguished, high quality, original or creative one. Latterly, scholars and policymakers have begun to expand conceptions of success to include student flourishing (e.g. through good wellbeing and positive post-doctoral destinations (e.g. Sverdlik et al., 2018). However, in the absence of consensus about definitions of doctoral quality, we define success simply as completion of the doctorate through the submission and successful defence of a thesis.

The limited literature on supervisor's view of success highlights cognitive and non-cognitive attributes alongside programmatic and other extra-student factors (Sverdlik *et al.*, 2018). In the US, alongside the immediate setting of the PhD and broader disciplinary norms, cognitive attributes of intelligence; knowledge; thinking styles (how a person uses their intellectual abilities); and non-cognitive personality traits; and motivation were perceived to contribute to students' transition to the dissertation stage and eventual completion (Lovitts, 2008). Certain attributes were believed conducive to completion with ease – patience, willingness to work hard, initiative, persistence and intellectual curiosity – while others were believed evident in completion with struggle – low capacity to manage frustration; fear of failure; ambiguity intolerance; and low capacity to delay gratification.

For scholars in South Africa, personal non-cognitive attributes play a prominent role in progression and completion. STEM supervisors/academics, for instance, highlight the importance of (intellectual) independence, initiative, commitment and resilience for progression, particularly for overcoming the difficult conceptual moments of the PhD (Cornell *et al.*, 2022). These supervisors also acknowledged the broader influence of structural factors such as increasing pressures of minimal time to degree, financial constraints, and pressures to increase PhD enrolees.

Studies from Australia highlight similar valuing of non-cognitive attributes. For instance, Green and Bowden (2012) suggest that Australian academics perceived a strong work ethic, a steady working pace and good working habits contributed to successful and timely completion, in addition to the social dynamic of the student's peer group and the supportive culture engendered by the group. In another study, cognitive and non-cognitive attributes such as motivation, written communication, critical thinking, enthusiasm, and (intellectual) independence were supervisors' most highly rated-attributes for the commencement of the PhD (Cardilini *et al.*, 2022).

Similar valuing of non-cognitive attributes is evidenced in Europe. Finnish supervisors perceived efficacious the social dimensions of the PhD process, particularly students' participation in research communities within and outside the institution (Cornér *et al.*, 2019). Less prominent but also important were the supervisor-student relationship, the organisation of the PhD programme and students' competencies where more generic skills (e.g., pedagogical skills, ethics competence and language skills) received greater emphasis than specific research or cognitive skills (e.g., domain knowledge, methodological skills, research conceptualisation). For supervisors in the UK, the attributes of the ideal doctoral student include specific skills for the proposed research project (or the capacity to acquire such skills), motivation, perseverance, independence, writing skills and critical judgement (Delamont *et al.*, 2004).

Analysing more than 13,000 cross-disciplinary PhD advertisements across Europe, Mantai and Marrone (2022) reveal the most desired criteria to be degree and achievements (81% of adverts); communication (52%); research, i.e., research experience (45%); interpersonal (43%); and personal attributes (39%). Amongst the top five ad-generating countries (Netherlands, Germany, France, Spain, and UK), interpersonal and personal attributes ranked lowest (17% each) in the UK, while degree and

achievements ranked highest (87%). The analysis further notes an increase in the quantity and diversity of desired attributes, with an upward trend in non-cognitive and softer, non-degree cognitive attributes.

As seen in the literature, broad consistency exits across different countries. Though there are minor variations across studies, there is limited evidence that non-cognitive attributes feature prominently in doctoral selection processes.

Conceptual Framework

Evident from the literature is the criticality of structural and agentic considerations amongst the factors perceived to contribute to PhD progress and success (Cornell *et al.*, 2022). This article draws from Lovitts' (2005) ecosystem model which suggests three main factors influence PhD completion: macroenvironment, microenvironment and individual resources. The macroenvironment consists of students' social, cultural and institutional contexts which together constitute the norms, values, and beliefs of graduate education and the discipline which guide action, interaction, teaching and training across institutions. The microenvironment comprises students' immediate environment, i.e., university, department, programme, lab, and their interactions or relations (e.g., with supervisors, department, faculty, peers, etc.) and resources within it. Individual resources constitute both cognitive (intelligence, knowledge, and thinking styles) and non-cognitive attributes (personality and motivation).

Given the conceptual overlap between the intelligence constructs and the context specificity of individual resources, this article instead applies Vitae's (2010) Research Development Framework (RDF) domains to conceptualise individual resources. The RDF comprises UK researchers' views on the characteristic of 'excellent' researchers. It conceptualises the knowledge, abilities and standards believed required to do research in one cognitive domain: knowledge and intellectual abilities (A); and three non-cognitive domains: personal effectiveness (B); research governance and organisation (C); and engagement, influence and impact (D). The four domains have twelve sub-domains: knowledge base (A1), cognitive abilities (A2), and creativity (A3); professional and career development (B3), self-management (B2), personal qualities (B1); professional conduct (C1), research management (C2), and finance, funding and resources (C3); and working with others (D1), communication and dissemination (D2), and engagement and impact (D3). The sub-domains have 63 descriptors, and each descriptor has up to five stages of development.

The choice of the RDF is further justified by its use as a doctoral researcher development tool across many institutions in the UK, and even in other contexts such as Australia (e.g., Pitt and Mewburn, 2016). However, despite its contextual relevance, its factors rely primarily on individual resources. The macro- and microsystem dimensions of Lovitts' (2005) model are therefore an important complement for considering the extra-individual or structural factors that intersect and influence the PhD process. Figure 1 illustrates the adapted conceptual approach:

Figure 1 The conceptual framework (Source: Authors' adaptation of Lovitts (2005) model of factors influencing degree completion and creative performance)
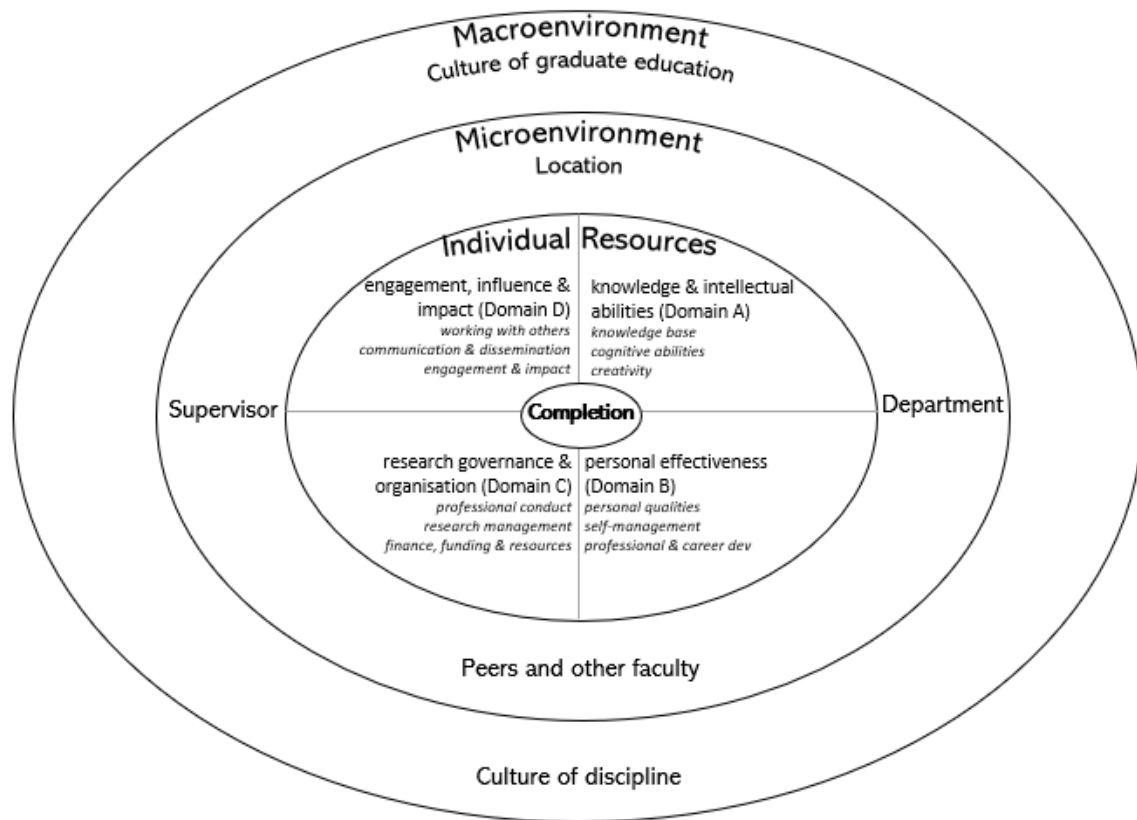
Methodology

The current study is embedded within a project funded by the Office for Students and Research England, one among thirteen such projects seeking to address barriers to access and participation in postgraduate research (PGR) studies for Black, Asian and minoritised ethnic British students. Ethics approval was obtained from the authors' departmental Ethics Committee (Ref 22/27). Interviews were conducted with nine academic and one professional staff from the project's pilot departments with the aim of understanding views of doctoral success. Participants were asked their definitions of doctoral success; conceptions of attributes of ideal and successful PhD students and the differences between these; and factors contributing to lack of success. Academics had extensive experience of PhD candidate selection, supervision and tutorship, and held senior leadership roles involving decision making around the experiences and progression of doctoral students. The professional services colleague was included due to their substantive involvement in the doctoral selection process, including taking part in the interviewing process, and in student support.

Four participants were from the Sciences (including the professional colleague), three Arts and Humanities, and three Social Sciences. Seven identified as female and three as male, and all identified as White, with varying origins including British, Scottish and European. Amongst the academics, five were full Professors, one was a Reader, while the other three were either Senior Lecturer or Senior Fellow (equivalent to Associate Professor). Table 1 summarises these and other key demographics.

Table 1 Participant demographics (Source: Authors' own work)

Participant#	Broad Discipline	Gender	Ethnicity	Role type	Academic Rank	Institution
A	Arts & Humanities	M	White Scottish	Academic	Professor	2
B	Science	F	White British	Academic	Senior Lecturer	3
C	Social Science	F	White British	Academic	Professor	1
D	Arts & Humanities	F	White European	Academic	Professor	4
E	Science	M	White British	Academic	Professor	2
F	Science	F	White British	Professional	N/A	4
G	Social Science	F	White European (British)	Academic	Senior Lecturer	1
H	Social Science	F	White British	Academic	Senior Fellow	1
I	Science	M	White British (European)	Academic	Professor	1
J	Arts & Humanities	F	White British / New Zealand	Academic	Reader	1
K	Science	F	White British	Professional	N/A	1

Interviews were conducted online and were extensive, lasting an average of one hour and twenty minutes. Transcripts were automatically generated and then reviewed, during which notes were generated around salient ideas, with particular attention to differences and similarities. Member checks (Shenton, 2004) were conducted by sharing transcripts with participants for review and approval. Participants later validated some preliminary analyses during a convening some months after the interviews. Participants are pseudonymised in this paper according to the letters of the alphabet.

Coding was used to analyse the transcripts. A code is a "word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of…data" (Saldaña, 2021, p. 5). Coding includes assigning codes and generating categories, the latter the grouping of codes (and their data) according to a shared characteristic to observe a pattern or consolidate meaning (Saldaña, 2021). With coding as an analytical approach, a theme is not a category but rather a phrase or sentence describing a pattern or concept (Saldaña, 2021). In this study, relevant data were coded to capture the essence of parts of the texts in relation to views of successful and desired students' attributes; and codes were reviewed then clustered into categories according to the pattern of meaning across codes.

Data were coded in a simple word processing software to prevent the tendency to over-code with computer assisted data analysis software (Linneberg and Korsgaard, 2019). Whilst coding, additional notes were added to existing ones to expand key ideas as well as highlight key analytical ideas, consistencies and contradictions. Various types of codes were generated, including codes which

represented the cognitive and non-cognitive attributes perceived as embodied by ideal and successful students. These 'attribute' codes were in vivo codes, that is, there were the terms used by participants themselves (Saldaña, 2021). Attributes are here defined as words of short phrases which revealed a quality of characteristic of a student, e.g., enthusiasm, or contributes to research environment. All 'attribute' codes were screened to remove duplicates and synonyms. 'Attribute' codes were categorised as one of ideal (cognitive), ideal (non-cognitive), successful (cognitive) or successful (non-cognitive), with two levels of sub-categories: relevant RDF domains and sub-domains.

Findings

Individual resources

Ideal and successful attributes and their domains

As seen in Figure 2, 34 ideal (17 cognitive and 17 non-cognitive) and 25 successful attributes (four cognitive and 21 non-cognitive) were identified. Italicised attributes are those shared by the ideal and successful cognitive, on the one hand, and the ideal and successful non-cognitive, on the other.

[Insert Figure 2 – new page, landscape orientation]

Figure 2 List of attributes (codes) and their (sub) categories (Source: Authors' own work)

IDEAL (COGNITIVE)	IDEAL (NON-COGNITIVE)	SUCCESSFUL (COGNITIVE)	SUCCESSFUL (NON-COGNITIVE)
Knowledge base (A1) Appropriate [academic] skills and knowledge Experience with archives or familiarity with historical theories Good background fit for Science PhD Minimum academic requirements (e.g., UG 2:1; Master's by Research 2:2) Strong Master's dissertation Understands research topic/field **Cognitive abilities (A2)** Ability to do close reading Cognitively capable Effective problem solver **Creativity (A3)** *Ability to do original research* Develops scientific ideas *Creativity* High degree of natural curiosity *Independence (intellectual)* Open and enquiring mind / willing to learn Courage (in work) **No RDF sub-domain** *Can meet institutional progress requirements*	**Personal qualities (B1)** *Confidence* *Drive/ motivation* *Enthusiasm/ interest in subject / passion* *Resilience / tenacity* *Self-direction (incl. supervision-ready)* **Self-management (B2)** *Commitment (incl. emotional, intellectual, etc.)* *Time management skills* **Professional and career development (B3)** Engages with opportunities offered (e.g., career, training, etc.) **Working with others (D1)** *Colleague-like* Committed to (broader) community of researchers Team-oriented **Communication and dissemination (D2)** *Good communicator* **Engagement and impact (D3)** Engages with public **No RDF sub-domain** *Active member of PhD community / Contributes to research environment* *Enjoys doing and writing up research* *Flexibility* *Hard work*	**Creativity (A3)** *Makes original systematic contribution* *Creativity* *Intellectual Independence* **No RDF sub-domain** *Meet PhD criteria / produces defensible thesis / Produces PhD standard work / No corrections viva*	**Personal qualities (B1)** *Confidence* *Drive / motivation* *Enthusiasm / interested in subject* Good perspective and awareness about PhD work *Resilience/ perseverance/ determination* *Self-direction* **Self-management (B2)** *Commitment (to PhD work)* *Time management skills* Knows when to ask for support / Recognises and addresses mental health needs **Working with others (D1)** *Colleague-like* **Communication and dissemination (D2)** *Effective communicator* **No RDF sub-domain** Accepts different perspectives exist Accepts things going wrong *Adaptability / flexibility* Clarity about PhD outcome *Commitment to PhD community* Discards notion of ideal thesis / Overcomes anxiety re PhD quality / reduces self-pressure *Enjoys doing and writing up research / flourishes / has organic and enriching PhD journey / personal fulfilment* *Hard work* Self-belief Understands preciousness of PhD period

Nearly all the cognitive attributes fell within the knowledge and intellectual abilities RDF domain, the majority falling within knowledge base (A1) sub-domain. The non-cognitive attributes were within the personal effectiveness (B); and engagement, influence and impact (C) domains, with the personal qualities (B1) sub-domain having the most attributes. One cognitive – *meet institutional requirements (or meet PhD criteria)* – and a few other non-cognitive attributes – e.g., *flexibility*, *hard work* – could not be classified within the RDF. This is possibly due to the PhD specific purpose of the current study, unlike the RDF. More 'ideal' than 'successful' attributes were identified overall, but the successful non-cognitive category had the highest number of attributes of all four categories.

As the italicised attributes show, four ideal cognitive attributes were also considered successful. Except the unclassified *meet PhD criteria*, the remaining three are part of the creativity (A3) sub-domains: *makes original systematic contribution*; *creativity*; and *intellectual independence*. Across the non-cognitives, 13 ideal non-cognitive attributes were also considered successful. These were in the sub-domains of personal qualities (B1), self-management (B2), and communication and dissemination (D2). The large number of shared non-cognitive attributes reiterate participants' perception of the particular importance of non-cognitive attributes in the reality and for the success of the PhD.

Success is multi-modal

In terms of definitions, ideal attributes were those perceived to characterise students considered most ideal for a PhD, i.e., the students with whom participants would like to work; while successful attributes were perceived as characterising students who completed, or met the criteria for the award of the PhD. In general, this meant successful submission and defence of the thesis, with Participant A noting that this entails making an original, systematic contribution to knowledge. Success, attributes were therefore those which contributed to the production of a thesis assessed by examiners to be sufficiently original and systematic as to be awarded a doctorate, corrections notwithstanding.

For some participants, (e.g., Participants E and F from the Sciences), additional, 'traditional' dimensions of success persisted amongst academics for whom, in addition to the 'core' definition of thesis submission and successful defence, specific material output such as publications (in good journals), conference papers, and posters were markers of success. For others (e.g., Participants A, C, D, E, G), students also hold personal definitions which they negotiate throughout the PhD given their progress, life events, or personal realisations.

Suggesting that success ought to be conceived in 'multi-modal' ways to accommodate diverse definitions, including students', Participant A nevertheless emphasised the need to, "hold in the background the need to meet the criteria for the PhD." Thus, while acknowledging the varied ways in which success may be defined, this paper employs the definition of success as completion of the PhD through successful submission and defence of the thesis.

Similarities, nuances and assumptions of the ideal and successful

Similarities between ideal and successful attributes occurred in part because some participants merely repeated ideal attributes as successful ones because they believed ideal attributes typically, though not always, lead to success (e.g., Participants B, D, E, F, J). For example, for Participant J, ideal and successful attributes are "sort of the same thing" and the ideal student is "perhaps just better at those things."

However, participants reiterated the criticality, at the minimum, of successful cognitive attributes. Participant J continued, "although it's not as straightforward as that because an unsuccessful student could be extremely hard working and self-motivated and very committed but isn't able to complete the work at the required standard." Views on the criticality of successful non-cognitive attributes were thus more nuanced. While participants agreed that the ideal student usually succeeds, for most,

students with 'only' ideal or successful cognitive attributes, but few ideal/successful non-cognitive attributes may also succeed. For Participant C, both her ideal *colleague-like* and the (successful) demanding, *island-like* student, may succeed with the requisite (i.e., successful) cognitive abilities.

The findings therefore suggest that participants' high valuing of non-cognitive attributes is predicated upon students' possession of, or capacity to acquire, successful cognitive attributes such as those within the *knowledge base*, *cognitive abilities* and *creativity* sub-domains. This implies a holistic set of individual resources which comprises some key cognitive capabilities alongside a broader set of non-cognitive attributes. In other words, students who are "not just technically competent" but who hold diverse personal qualities and are motivated (Participant F). Though there was no weighing of non-cognitive attribute choices, participants overwhelmingly selected *resilience* (or its variants, e.g., adaptability, perseverance, tenacity, etc.) as the most critical.

Microenvironmental factors

You miss them when they're gone

The importance of students' interactions within, at the very least, their immediate environment was evident in the data. Discussions around ideal non-cognitive attributes focused on students' individual experiences during the PhD as well as relationships with supervisors, peers, and others within and beyond students' immediate programmes or departments. For instance, for Participant C, students' individual experiences are intertwined with their relationships with others, particularly their supervisor. As such,

> … an ideal person would be somebody who can work out what they need rather than wait for the supervisor to tell them to do ABC and … they can, they want to take on the burden of learning themselves, they want to take control of the learning, I think that is an ideal person.

For others, relationships with other peers and contribution to programme and department were critical. For Participant J, the ideal student is "someone who's going to come and teach us stuff and make a contribution to research environment and add something." They are "someone who at the end you miss them when they've gone because they brought something…" be it through "giving talks and/or talking to other students about" a methodology, technique, etc. Relationships with others is therefore inherent within their contribution to community. Echoing the idea of communality was Participant A for whom, in addition to knowledge base and the ability to enjoy doing and writing research, the ideal student has an

> …attitude to coming to be in the community of researchers, which is that they need to be excited to have their ideas stretched and challenged, but also to inspire others with their ideas. So that's it's really about the coming into a research community or research environment …. We want people … to want to be working together. Not as a team but as a kind of community, as a community of inquirers…

Communality was explained through intellectual as well as social contribution to community, particularly in terms of bringing other students together and getting involved to try to change or improve things for the better (Participant C). The existence and quality of students' relational experiences during the PhD, especially within students' immediate programmatic or departmental contexts, thus formed an important aspect of participants' discussion of the ideal.

Macroenvironmental factors

Evidence of the macroenvironment, particularly in relation to disciplinary norms and values, on the one hand, and institutional selection processes, on the other were also present in the data.

Comparing the disciplines

The data hints at disciplinary norms. Three attributes were identified specifically by participants from the Sciences (B, E, and F): effective problem solving (cognitive – cognitive abilities, A2), communication skills (non-cognitive – communication and dissemination, D2), and team-orientedness (non-cognitive – working with others, D1). Science participants E and F's ideal student was an effective problem solver who could "think around the problem" (F) or "think about solving novel problems" (E). This is not surprising given the problem-focused nature of many Scientific disciplines, particularly the need to prove or disprove a hypothesis. Communication abilities, though arguably also important in the Social Sciences and Arts & Humanities, were only explicitly mentioned by Science participants. For Participant B,

> an ideal/successful PhD knows how to communicate at all levels and all different types of communication, can write successfully, can communicate with peers, can communicate with their supervisor, can communicate with external collaborators or at conferences and people in their field as well.

For Participants E and F, students' ability to communicate their ideas at conferences was critical, enabling them to network to create or capture highly competitive post PhD opportunities. The explicitness of team-orientedness (working with others) is likely due to the nature of Science PhDs where students work within a specific research group. Team-orientedness was evoked slightly differently by participants in the Arts & Humanities and Social Sciences who valued students' ability to be collegial, i.e., with their supervisors; to engage with other students within their programmes, departments; and to engage more broadly within their fields and discipline. For Participant D, a Historian, the cognitive *ability to do close reading* appeared a particularly critical discipline-specific skill.

Apart from these potential differences, there was generally high agreement across the disciplines. For example, there was broad agreement that the ideal student requires relevant knowledge base (sub-domain A1) even if the specific knowledge type differed for each discipline, e.g., project specific scientific techniques or familiarity with relevant historical topics or theories. Creativity attributes, e.g., creativity, intellectual independence, were consistently evoked as were non-cognitive attributes within the personal qualities and self-management sub-domains.

Selecting for the ideal

Participants highlighted the limitations of their ideal perspectives, particularly as it related to selecting for such attributes in reality. Except committee-based interviews for scholarships (mostly in the Sciences), candidate selection processes, i.e., institutional requirements or policies, (and practices, i.e., what academics do) did not typically include an explicit assessment of valued non-cognitive attributes. Assessment practices often focused on the ideal candidate *on paper* who possessed ideal cognitive abilities and, as a result, "*appear[s] to have* confidence and independence" (Participant D). This evaluative focus on the cognitive is, in part, because ideal non-cognitive attributes are, according to Participant D, the most difficult to assess at the application stage.

However, participant D's *appear to have* phrase suggests some implicit consideration of non-cognitive attributes such as confidence and independence, as assumed cognitive attributes. Participant A echoes this, noting that ideal non-cognitive attributes are indeed considered but quickly and in a more "anecdotal or non-evidenced way." Participant J, who incidentally is from the same discipline as Participant D, admits to neither an implicit nor explicit consideration, noting that her conception of the ideal is not "something we'd be looking for in an application [because] it's not an application

criteria." Nevertheless, she admits to being excited by applicants with unique experiences or skills which can be shared within the department.

Although it appears students may not explicitly be required to possess certain valued non-cognitive attributes upon application, the data suggests that participants do expect students to be able to develop them during their PhD. This is particularly the case for those ideal attributes simultaneously perceived as contributing to success. For Participant D, the capacity to acquire the requisite cognitive or non-cognitive attributes over the PhD was critical. This sentiment was reiterated by Participant B:

> Obviously, you're not going to have all of those ideal attributes in every single candidate but I think that during the PhD because it is a training development, I would anticipate that a student would acquire those skills, those or at least different levels of those ideal attributes to allow them to succeed during their PhD.

Like the possession of these attributes, the ability to assess for the capacity to develop these is also difficult to gauge.

Intersectional factors

Linkages between individual resources, and the micro- and macro-environments were most evident in participants' discussions of those who do not succeed, i.e., do not complete or meet the criteria for the PhD. Attributes of such students included cognitive and non-cognitive attributes as well as personal circumstances. Though few participants mentioned lack of knowledge such as technical writing skills (Participant C, E) or below standard work (Participant J), the majority of reasons provided were related to students' personal qualities on their own, or as they influence or are influenced by students' life circumstances.

For instance, for Participant D, the least successful students in her experience were those in whom the capacity to be flexible and adaptable was least developed during the PhD. Such students, for her, are too "rigid about what they think they should be doing or need to do or want to get out of the [PhD] project." Likewise, Participant B highlighted lack of resilience and time management skills. For Participant E, lack of self-reflection about the reason for doing the PhD was a critical factor for non-completion while, for others, e.g., Participants A, B, D, E, anxiety about the quality of the PhD or a desire to produce the perfect thesis had a crippling effect on progress and completion.

Mental health, illnesses or other personal life events (exacerbated in recent years by the pandemic) also resulted in an inability to make progress, reproducing anxiety or mental health challenges in relation to the PhD (Participant J). Among others, this negatively affects the ability to develop or sustain 'successful' attributes such as those within the personal qualities, self-management and working with others sub-domains. For some students, "the sheer emotional undertaking" of a PhD simply becomes too much (Participant B). Notably, for Participants A and D, it is not the existence of mental health challenges which hinder success, but the inability to recognise them and explore or request institutional support structures to address them. As explained by Participant A,

> I think those students who are able to … recognise when they weren't able to work in that way that I highlighted as ideal and took a leave of absence and went away, came back when they were able to work like that, they are very successful. … I don't think that there's no correlation between having generally good mental health and being successful as a PhD student. [However] if you find ways to manage it and work with the systems just to help, then that works okay.

For others, an irreparable breakdown in the supervisor-student relationship can lead to non-completion (Participant C) as can self-funded students' financial pressures, given such students are more likely to be studying part-time, juggling academic study with work and other responsibilities (Participant J). Yet still, other students do not 'succeed', because they realise that the PhD is not for them and therefore discontinue it to pursue other interests or opportunities (Participants E, F, J).

Despite these explanations, participants were quick to highlight that only a small proportion of students do not complete and that typically, this outcome is realised before the thesis submission. In other words, a lack of success is not typically brought about failure of the thesis defence, but by non-submission of a thesis or drop-out due to one or a combination of individual, micro- and macro-environmental factors as explained.

Discussion

The study has explored academics' views of the attributes of ideal (desired) and successful doctoral students, using a basic definition of success, i.e., the successful submission and defence of the thesis. It has revealed a myriad of valued individual attributes with the majority of these being non-cognitive attributes aligned with the personal effectiveness domain (B) of the Researcher Development Framework (RDF). Various similarities between participants' conception of ideal and successful students were highlighted, particularly in relation to non-cognitive attributes, suggesting that participants generally believed their ideal students were also highly likely to be successful. For our interviewees, the ideal or desired PhD student is an active member of their microenvironment. They are communal, building and sustaining positive social relations with others, particularly within the immediate programmatic and departmental setting of the PhD, underlining supervisors' interest in the social dimensions of the PhD (Cornér *et al.*, 2019). They participate in research communities within, and collaborate beyond the institution. They may face challenging circumstances, but can respond positively to the provision of suitable support. While they show suitable subject knowledge, and where relevant, technical skills, these aspects form only one part of the picture.

The high valuing of non-cognitive, personal attributes resonates with some of the views expressed by UK doctoral supervisors through a recent large survey (UKCGE, 2021), but crucially allows us to explore opinions in depth in a manner not possible using a nomothetic approach. Whereas through the survey, supervisors more often reported preferences for cognitive criteria such as quality of research proposal, contribution to the field, and degree classifications (UKCGE, 2021), our in-depth discussions instead highlight supervisors' apparently stronger emphasis on softer cognitive attributes such as creativity, intellectual independence and perhaps above all, evidence of resilience and/or the capacity to develop it. We acknowledge that our small sample, drawn from one UK region, makes general claims trickier than making claims from a large survey. Nevertheless, our idiographic approach offers higher validity, added to which is the considerable consistency across supervisors in distinct disciplines. When given the time and space discursively to consider their views of PhD students' ideal and successful attributes then, supervisors' views apparently diverge both from what they might respond to a short question. They also vary markedly from the typically stated formal criteria for doctoral applicants, as reported in Mantai and Marrone (2022) systematic analysis of UK (and other European) PhD adverts in Europe. Thus, the attributes that academics seem to value for doctoral study articulate with the early career researcher skillset, as captured in the RDF and also to those identified by Smith McGloin *et al*. (2024b), but not with published PhD criteria.

Non-cognitive attributes are difficult to assess. Certain cognitive measures, such as average marks, degree classifications etc are easier and cheaper to obtain, and at least superficially, easy to compare. They at least appear to be more objective, and hence for some seem fairer, or perhaps more practical for a busy doctoral selector faced with a high volume of applications. This may explain their dominance in published criteria, as Mantai and Marrone (2022) found. Nevertheless, there is of course a risk that

simply adopting non-cognitive attributes may retain or even extend bias, particularly if anecdotal, unstandardised processes of consideration are utilised. Evidence from the U.S. context suggests information about applicants' personal attributes is typically gleaned from personal statements, letters of recommendation and interviews, albeit these face similar challenges of weak standardisation and low inter-rater reliability (Michel *et al.*, 2019). Academics in the UK are likely to use similar documents in their anecdotal assessments of non-cognitive attributes, but limited evidence exists on how this occurs in practice. To equitably conduct such 'holistic' assessments (Kent and McCarthy, 2016), i.e., of both cognitive and non-cognitive attributes, in the US context, scholars have advocated the use of formal evaluation guidelines and rubrics (Kent and McCarthy, 2016; Michel *et al.*, 2019). However, rubrics may themselves reproduce bias when criteria are narrowly conceived and applied (Culpepper and White-Lewis *et al.*, 2023; White-Lewis, 2020), leading to calls for more co-generative processes of setting explicit criteria, including substantive (not identity-based) diversity, equity and inclusion criteria, and the use of rubrics across different stages of selection.

Relatedly, institutional (and funder) support is needed for meaningful integration of non-cognitive attributes into the selection process. Even where an individual academic may be intrinsically motivated, they are likely to face significant constraints without clear institutional support and explicit processes which do not increase workload, at least in the longer term. In the 2021 UKCGE doctoral supervisors' survey, 64% of respondents agreed that their top three priority selection factors aligned with their institutions' priorities, while 11% disagreed. However, only 11% included access to PGR for under-represented groups among their priorities, suggesting that many of the remaining 89% belonged to institutions who may not explicitly share this priority. Arguably, such lack of prioritisation may be due to a number of factors, including the presence in the UK of a diverse international PGR-student body, often used as a proxy for overall diversity.

Nevertheless, this study's findings suggest much greater scope exists for institutional leadership, through explicit messaging and renewed policies and processes, for more holistic selection processes and practices. Without, and perhaps even with, such institutional leadership, as highlighted by participants, even the well-intended academic risks falling back on existing practices in light of the changes required to implement a more holistic review process. This is particularly likely for more consultative and deliberative rubrics-based processes which are slower and more time consuming (Culpepper and White-Lewis *et al.*, 2023). Institutional leadership, and by extension commitment, within the macroenvironment of the PhD is thus a critical component of a more holistic process which moves beyond the evaluation of a narrow set of applicant attributes.

Conclusion

In UK higher education, selection is among the structural factors which advantages some, but restricts others (Pásztor and Wakeling, 2018). At the PhD level, one of the ways this operates is through the disproportionate reliance on a narrow set of typically cognitive attributes which reward educational opportunities afforded to a few. The formative role of the PhD is undermined by this cognitive gatekeeping, where selection decisions are based almost entirely upon the dispositions that applicants already possess, and not those they have the capacity to develop. As highlighted by academics in this study, a narrow set of cognitive attributes may not, on their own, determine success, i.e., completion, and success is not the only outcome that supervisors value. Supervisors value a range of cognitive and non-cognitive attributes believed to, together, contribute to doctoral success *and* experience. Given the ways in which putatively meritocratic cognitive criteria functions in practice to exclude certain groups in postgraduate studies (Jackson-Cole and Chadderton, 2021), this wider range of attributes offers greater opportunities for the equitable selection of a diverse study body, particularly for minority ethnic UK-domiciled students who remain underrepresented at the doctoral level (Lindner, 2020). While there are extrinsic motivations to work towards greater diversity among PhD holders,

such as mandates from funding councils and increasing public expectations, there are also intrinsic ones. These include increased opportunities for diversity amongst future faculty and in research and scholarship (Pásztor and Wakeling, 2018). Beyond the intellectual diversity this affords within the academy, outside the academy, greater doctoral diversity expands the pool from which future leaders are drawn, enabling the realisation of a fairer and more socially just society. There are no easy solutions to these challenges and we are not advocating for naïve adoption of some non-cognitive criteria as a magic bullet. But equally, given the extensive structural inequalities in undergraduate higher education, if doctoral selection keeps using its existing approaches to selection, it is highly likely to lead to the same outcome.

Disclosure statement
No potential conflict of interest was reported by the authors.

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