R&D MANAGEMENT

Similar-to-me effects in the grant application process: Applicants, panellists, and the likelihood of obtaining funds

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We analyse if and how the characteristics of grant research panels affect the applicants' likelihood of obtaining funding and, especially, if particular types of panels favour particular types of applicants. We use the UK's Engineering and Physical Sciences Research Council (EPSRC) award decisions to test the similar-to-me hypothesis for the first time in the grant context. Our main results indicate that panel members tend to favour more (or penalise less) applicants with similar characteristics to them, as the similar-to-me hypothesis suggests. We show, for instance, that the quality of the applicants is more critical for panels of high quality than for panels of relatively lower quality, that basic-oriented panels tend to penalise applied-oriented applicants, and that panels with fewer female members tend to penalise teams with more female applicants. As a whole, we show that similar-to-me effects are simultaneously at work for a wide variety of functional, job-related research characteristics as well as for more well-known demographic attributes.

1. Introduction

Many organisations rely on panels or committees to evaluate applications and candidates in merit-based selection procedures. Funding agencies, for instance, rely on peer review panels to judge the quality of grant applications. In such merit-based selection procedures, the probability of success should depend on the characteristics of the applications but not on the characteristics of the panels. Panels, however, may have different levels and types of expertise, views about the requirements, and/or preferences for particular types of applicants. This may affect panels' evaluations and decisions, generating a 'luck of the reviewer draw' for particular types of applicants (Cole et al., 1981).

This paper analyses if and how the characteristics of the grant research panels affect the applicants' likelihood of obtaining funding and, especially, if particular types of panels favour particular types of applicants. Our focus is to understand if, conditional on applicant and panel characteristics, there exist 'similar-to-me' effects in the grant selection process. According to this hypothesis, tested primarily in the labour market context, applicants will be rated more favourably the more similar they are to the rater (Byrne, 1971). We investigate if the success probability depends on the similarities between the applicants and the grant evaluation panel in research-related and demographic attributes.

We use the award decisions of one of the major public funding organisations for scientific research worldwide, the UK's Engineering and Physical Sciences Research Council (EPSRC). Our dataset contains information about the EPSRC applications and panels between 2000 and 2007. We obtain prior publication data of the teams of applicants and panellists and some of their personal attributes. With this information, we construct variables reflecting research-related (research quality and orientation) and demographic characteristics (the ratio of females, the presence of members of an Asian origin, and affiliation to an elite university) of the team of applicants on one side, and of the panels, on the other. We base our choice of drivers of applicants' success on previous literature (e.g., Grimpe, 2012) and build equivalent variables for the panels to perform a systematic two-sided comparison.

We show that the effects of the characteristics of the applicants differ by the type of panel evaluating their application. By distinguishing panels by prior research performance, we find that the quality of the applicants is more critical for panels of 'top' quality than for panels of lower quality. In terms of magnitudes, a one standard deviation increase in the applicants' research performance increases the unconditional probability of success by 9.4% if evaluated by a top panel. In contrast, it is increased by just 2.1% if evaluated by a non-top panel. Distinguishing between 'applied' and 'basic' (non-applied) research-oriented panels, we show that the degree of appliedness of the applicants decreases the chances of success when evaluated by a basic but not by an applied panel. Finally, we classify the panels based on the personal attributes of their members. Our analysis indicates that panels with few female members tend to penalise female applicants, whereas panels with more female members do not. Non-Asian panels also tend to discriminate against Asian applicants, whereas Asian panels do not. As a sole dimension that does not provide full support for the 'similar-to-me' hypothesis, we find that Russell panels do not tend to favour teams from the Russell group of universities more than the non-Russell panels do.

Our paper contributes to the literature that studies how the likelihood of being funded in a merit-based selection procedure depends on the characteristics of the applicants and the panel members. We have ample evidence on the effects of the characteristics of the applicants. However, except for gender, we know really little about the role that the characteristics of the panel play in funding decisions. Jayasinghe et al. (2003) (on gender), Tamblyn et al. (2018) (on research quality), and Li (2017) (on research orientation) have results on which type of panels favours which type of applications. But, to the best of our knowledge, the 'similar-to-me' hypothesis has not been systematically tested in the grant application process, as we do here. We show, for the very first time, that similar-to-me effects are at work simultaneously for several research-related and demographic attributes, including some of those identified separately in previous literature, such as research orientation, but also others, such as race. Within the same framework, we show in particular that the similar-to-me hypothesis is satisfied for research orientation and quality, as well as gender and race.

This paper also contributes, more broadly, to the empirical literature that tests for 'similar-to-me' effects in evaluation and selection procedures. Most of the existing evidence concerns the labour market selection process. This literature has mainly focused on readily detectable demographic dimensions, such as race (e.g., Prewett-Livingston et al., 1996) or gender (e.g., Bagues and Esteve-Volart, 2010), rather than on less visible functional dimensions that are more job-related, such as the research-related attributes in academia. Two exceptions are Hamermesh and Schmidt (2003) and Bagues and Pérez-Villadoniga (2012), who examine the election of Fellows of the Econometric Society based on the research area and the entry to the Spanish Judiciary based on the area of expertise, respectively.[1] We show that similar-to-me effects can be equally or more important for functional dimensions than for demographic characteristics using, for the first time, the grant application process as context.

2. Literature review

We now provide a short review of the literature that investigates the effects of the characteristics of the team of applicants, as well as of the panels, on the probability that a grant is awarded funding. Table 1 provides a summary of the focus, context, and results of these and other papers in this literature.

An extensive literature has analysed the effects of the characteristics of the applicants on the likelihood

Table 1. Literature on the effect of applicants' and panels' characteristics, as well as their similarity, on the likelihood of success in grant application processes

Authors (year)	Focus of analysis	Country, founder, field, period	Main message
Banal-Estañol et al. (2019a)	Applicant	UK: Engineering and Physics Research Council (EPSRC). Engineering. 1991–2007	Diversity of the applicant team in knowledge, skills, education, and/or scientific ability is penalised
Banal-Estañol et al. (2019b)	Applicant	UK: Engineering and Physics Research Council (EPSRC). Engineering. 1991–2007	Researchers whose affiliation is their institution of graduation and collaborative projects are more likely to be financed
Bol et al. (2018)	Applicant	Netherland: Netherlands Organisation of Scientific Research. Many fields. Year not specified	Early successes increase future success chances, in particular because non-winners cease to compete
Bol et al. (2022)	Applicant	Netherland: Netherlands Organisation of Scientific Research. Many fields. 2005–2016	Female applicants receive lower scores than male applicants. However, panels compensate, thus, there is gender equity in funding outcomes
Bornmann et al. (2007)	Applicant	Meta-analysis of 21 studies	Male applicants have statistically significant greater likelihood of receiving grants than female applicants by about 7%.
Bornmann et al. (2008)	Applicant	Germany: European Molecular Biology Organisation. Biology. 1998, 2001–2002	Selected scientists perform better than the rejected ones. But 26%–48% of the decisions either over-estimate or under-estimate future performance
Boudreau et al. (2016)	Applicant; Similarity Applicant-Panel	US: Random experiment on university seed grants. Endocrinology. Year not specified	Lower scores to proposals closer to the panel's expertise and highly novel
Broder (1993)	Similarity Applicant-Panel	US: National Science Foundation. Economics. 1987–1990	There is a significant downward bias in the ratings by female reviewers of female proposals
Cole et al. (1981)	Applicant; Panel; Similarity Applicant-Panel	US: National Science Foundation. Chemistry; Economics; Physics. Year not specified	Randomness of opinions: the likelihood of success depends on the identity of the members of the panel
Gallo et al. (2016)	Applicant; Panel; Similarity Applicant-Panel	US: The American Institute of Biological Sciences. Biology. 2009–2012	When reviewers share expertise with applicants, they judge proposals more harshly
Ginther et al. (2011)	Applicant	US: National Institutes of Health (NIH). Health. 2000–2006	African-American and Asian researchers are less likely to receive research funding
Grimpe (2012)	Applicant	Germany: Four types of grants. Many fields. 2002–2006	Past research performance increases the likelihood of success for some specific grants but not for others
Jayasinghe et al. (2003)	Applicant; Panel; Similarity Applicant-Panel	Australia: Australian Research Council. Many fields. 1996	The correlation between the assessors' grades is higher for the team than for the proposal. No evidence shows that female (male) assessors favour female (male) applicants
Jerrim and Vries (2020)	Panel	UK: Economics and Social Research Council (ESRC). Many fields. 2013–2019	The correlation between the assessors' grades is very low. Reviewers selected by the grant applicant are overly generous

(Continues)

Table 1. (Continued)

Authors (year)	Focus of analysis	Country, founder, field, period	Main message
Li (2017)	Applicant; Panel; Similarity Applicant-Panel	US: National Institutes of Health. Biomedicine. 1992–2005	Evaluators identify quality better and are more biased in their own area of expertise
Li and Agha (2015)	Applicant	US: National Institutes of Health. Health. 1980–2008	Better peer-review scores are consistently associated with better research outcomes
Marsh et al. (2008)	Applicant; Panel	Australia: Australian Research Council. Many fields. 1996	There is little correlation between peer-reviews. The only major systematic bias is the inflated ratings by assessors nominated by applicants
Öcalan-Özel and Llerena (2021)	Applicant; Panel	EU: European Collaborative Research (EUROCORES). Many fields. 2002–2010	Industry engagement does not affect the chances of the applicants' success
O'Kane et al. (2022)	Applicant	New Zealand: Health Research Council. Health. 2018–2019	The universities' pre-grant funding support to the researchers increases the likelihood of success
Pohlhaus et al. (2011)	Applicant	US: National Institutes of Health (NIH). Health. 2008	Success for men and women is similar in most programs. However, funding rates are higher for men than for women for renewal applications
Sandström and Hällsten (2008)	Applicant; Panel; Similarity Applicant-Panel	Sweden: Medical Research Council in Sweden. Medicine. 2004	Female principal investigators (PIs) and PIs having a reviewer affiliation are favoured
Tamblyn et al. (2018)	Applicant; Panel; Similarity Applicant-Panel	Canada: Canadian Institutes of Health Research. Health. 2012–2014	Applied and female researchers get lower scores. Female panellists are tougher. More experienced panellists are more likely to provide higher scores to applicants with higher past success rates
Van der Lee and Ellemers (2015)	Applicant	The Netherlands: Netherlands Organisation for Scientific Research (NWO).	Male applicants have significantly higher success rates than female applicants. Disparities are most prevalent in life sciences and social sciences
Viner et al. (2004)	Applicant	UK: Engineering and Physics Research Council (EPSRC). Engineering, Physics. 1995–2001	Success in securing grants positively correlates with experience in the peer review system and the academic and department status
Wenneras and Wold (1997)	Applicant	Sweden: Medical Research Council in Sweden. Medicine. 1995	Reviewers give female applicants lower average scores than male applicants

of obtaining funding. Banal-Estañol et al. (2019a, 2019b), for instance, show that scientific performance and institutional eminence are important determinants of success in EPSRC grants and that more applied academics may find it more difficult to obtain financing. Similarly, Tamblyn et al. (2018) find that grant applicants with a higher h-index get higher scores, whereas those in the applied sciences get lower scores. Grimpe (2012), instead, shows that obtaining grants is often not influenced by publication or patent stock but by other personal, institutional, and discipline characteristics. Jayasinghe et al. (2003) find that those from more prestigious universities received higher ratings. Regarding gender, Tamblyn et al. (2018) and Jayasinghe et al. (2003) find that female researchers receive lower scores than male researchers. Viner et al. (2004) identify biases against women and non-white groups. Wenneras and Wold (1997) also find gender bias in grant applications.

We know substantially less about the effects of the characteristics of the panels, except for gender. Jayasinghe et al. (2003) and Tamblyn et al. (2018) argue that female panellists are tougher. Some papers have investigated the links between applicants and panellists. Viner et al. (2004), for instance, show that applicants benefit from having experience as panellists. Wenneras and Wold (1997) and Sandström and Hällsten (2008) show that applicants sharing an affiliation with members of the panels were more likely to be successful in the award decisions.

Very few papers study which type of panels favour which type of applications. Broder (1993) finds that female reviewers give lower ratings to female proposals, but Jayasinghe et al. (2003) do not obtain significant effects of the interaction of applicant and assessor gender. Tamblyn et al. (2018) find that reviewers with more expertise are more likely than those with less expertise to provide higher scores to applicants with higher past success rates. Li (2017) finds that increased relatedness between applicants and panellists, measured by cross-citations, raises the applicants' chances of winning a grant. In contrast, Boudreau et al. (2016) and Gallo et al. (2016) find that proposals closer to the panel's expertise receive lower scores.[2]

Our review of the literature has identified a wide set of research-related and personal characteristics of applicants and panellists that may influence the likelihood of application success (research performance, orientation, gender, race, and institutional eminence). We also note that there has not yet been a systematic review of which type of panels favours which type of applicants.

3. Hypothesis development

As documented in the previous section, prior literature has identified relevant characteristics of the applicants and panellists in the grant application process. We review the prior social psychology literature that develops a similar-to-me hypothesis and then apply it to the characteristics of applicants and panellists of the grant selection process identified in the previous section.

3.1. The similar-to-me hypothesis

The similar-to-me hypothesis, namely that applicants may be rated more favourably the more similar they are to the rater, is supported by a long-standing preference-based social psychology theory. There are two arguments: self-categorisation (Turner et al., 1987) and similarity-attraction (Byrne, 1971). According to the self-categorisation paradigm, our self-concept is based on the social categories we place ourselves in (e.g., gender, race) and a desire for a positive self-identity. The need for positive self-identity causes us to prefer and evaluate more positively those similar to us in the social category on which we base our identity.

According to the similarity-attraction paradigm, an affective response (e.g., interpersonal attraction or liking) mediates the relationship between similarity and evaluation. Similarity can be actual or perceived. Both actual and perceived similarity effects on key traits, values, and/or beliefs have been previously demonstrated in studies of interpersonal attraction in human resource decisions (e.g., selection decisions). In particular, Ferris and Judge (1991) argue that perceived similarity may be relevant because decision-makers act upon their perceptions of reality.

3.2. Hypotheses on the grant application process

We now apply the two social psychology arguments of the similar-to-me hypothesis to the research-related and personal characteristics identified in the above-mentioned literature review. The self-categorisation argument may clearly apply to personal characteristics such as gender, race, and institutional eminence in the grant application process. Indeed, gender and race are social categories we place ourselves in. The elite/non-elite institutional affiliation categorisation may admittedly be less clear than the other two categories for academic researchers.

Research-related characteristics, such as research performance and orientation, may not be considered standard social categories. But broad categories along these dimensions, such as top/non-top research performers and basic/applied researchers, may also be self-descriptive and may thus be used, in practice, as social categories that are important in describing the self and others. Thus, we should observe similar-to-me effects in both research-related and personal characteristics.

The similarity-attraction paradigm can also be applied to the grant selection process. Both the research-related and demographic characteristics identified above can be traits which may trigger an affective attraction. Researchers may be similar, for instance, in terms of research performance or orientation, or at least they may perceive themselves to be similar when using these dimensions. Also, being of the same gender or race as the applicants may produce interpersonal attraction or liking from the panel members and thus affect their evaluation of the research grant application.

Based on the previous discussion, we formulate two hypotheses:

Hypothesis 1 *Panel members favour more (or penalise less) applicants with research-related characteristics (research performance, orientation) similar to them.*

Hypothesis 2 *Panel members favour more (or penalise less) applicants with personal characteristics (gender, race, and institutional eminence) similar to them.*

4. Data, variables and descriptive statistics

Our data emanate from all the EPSRC grant applications from 2000 to 2007 (both included), from which we build variables describing the applicant teams, the evaluating panels, and the award decisions. This section describes, in turn, the EPSRC process, the data sources, the variables we use in the analysis, and their main descriptive statistics.

4.1. The EPSRC process

The EPSRC relies on peer review panels to judge the quality of applications. These panels are responsible for placing the applications in a funding priority order. An internal EPSRC ‘program manager’ uses this priority list to decide how many proposals they can support with the available funding.

The selection of panel members is the responsibility of an internal ‘portfolio manager’ of the EPSRC. Panel members are selected from the stakeholder community relevant to the specific panel remit. Most of the panel members are selected from a pool of academic researchers selected by the EPSRC, the so-called ‘EPRSC Review College.’ Other potential members are past applicants on similar research topics and keywords. Portfolio managers have access to an automated matching tool to help them identify suitable reviewers and panel members. Although the system can aid in the identification, the portfolio manager will always use his/her expertise and knowledge in the final selection.

As explained on the EPSRC website, ‘The aim of the [panel] selection process is to assemble a meeting that collectively possesses the requisite competencies including: (i) sufficient knowledge of the areas under consideration, (ii) knowledge of EPSRC and its processes, (iii) skills in analysis and judgement, (iv) appropriate interpersonal, organisational and management skills, and (v) an appropriate set of values and ethics.’ Panels have around ten members. The composition of the panels is not known ex-ante by the applicants, so it is not possible for them to self-select into a specific panel.

The EPSRC process also includes a ‘postal peer review’ stage, which consists of sending the application and a reviewer form to several people to review, make comments, and provide a score for the application. The selection of reviewers is also the responsibility of the portfolio manager. The reviewer forms are part of the information used by the panel to decide where the proposal will be positioned on the rank order list. Each proposal is considered sequentially, and the panel members must agree on the final score for ranking.

The EPSRC has a policy of identifying and avoiding conflicts of interest. Conflicts of interest occur if an individual involved in the assessment of a proposal has a personal or organisational relationship with the applicants that calls into question her/his ability to undertake her/his role objectively and unbiasedly. Panel members need to identify the conflicts of interest, and the conflicted member is asked to leave the meeting when that conflicted proposal is discussed.

4.2. Data sources

For each application, the EPSRC records contain the name of the principal investigator (the PI) and the co-investigators, the start and end dates, the holding organisation of the grant, and the amount of funding requested. The PI must be an academic from a UK organisation. In almost all the applications, the PI and the co-investigators are employees of the same holding organisation. We also know whether the application has been funded or not, as well as the name and the affiliation of each of the panel members who took the funding decision on that specific application. Unfortunately, we do not have information on the application grades or other details of the decision.

All the EPSRC grant applications are matched with the academic calendar census data of all the engineering departments of the 39 major universities in the UK (see Banal-Estañol et al., 2015, for details). Our sample includes the applications that contain at least one academic engineer of the calendar database as a PI or co-investigator. We discard the applications of teams of more than 10 academics so that individual characteristics matter, but the results are very similar when we include all the proposals (only 1.5% of the applications involve more than 10 academics). Our final sample has 7,189 applications over 8 years (2000–2007), which include at least one researcher with complete information.

We use prior publication data to identify research-related attributes of applicants and panellists. For each of them, we identify all their publications in the Web of Science (WoS) five years before the application date. For each of these publications, we identify (i) the number of citations received by December 2007 and (ii) the publishing journal's orientation category in the Patent Board classification (defined by Narin et al., 1976, and Hamilton, 2003).

We also obtained the personal attributes of the applicants and panellists. We identified the gender from the given names and their web pages. We also identified whether they are of Asian origin from the 200 most common Asian family names, complemented by a manual check.[3] We determine whether they work at one of the prestigious set of universities of the Russell Group. Finally, we obtained information on the PhD granting institution of each applicant, using specialised websites (ethos.bl.uk/Home.do and www.theses.com) and their web pages.

4.3. Variables

We base our choice of variables on the applicant characteristics in previous literature (e.g., Grimpe, 2012; Banal-Estañol et al., 2019a) and build equivalent variables for the panel members. Table 2 provides a summary of all the variables.

4.3.1. Dependent variable

Our binary dependent variable takes a value of 1 if the application was awarded funding and 0 if it was not.

4.3.2. Applicant characteristics

We construct vertical and horizontal research-related measures of the applicants. To build a vertical measure of research quality, we count the number of 'normalised' citations of each researcher's publications in the five years before the application. The normalised number of citations of a given publication is obtained by dividing the number of citations received by that publication by the average number of citations received by all the papers published in the same year and the same field as that publication. We define the variable *Acad Quality app* as the average number of normalised citations per year and the variable *Acad Quality PI* as the average number of normalised citations per year of the PI.

As a horizontal measure of research orientation, we construct a variable of how applied, relative to how basic, the research of each researcher is. To construct the measure, we use the four categories of the Patent Board classification of journals: (1) applied technology, (2) engineering and technological science, (3) applied and targeted basic research, and (4) basic scientific research. We define a researcher's degree of applied orientation as the fraction of her publications in the previous five years in the first category relative to the publications in all four categories (van Looy et al., 2006; Breschi et al., 2008). We define the variable *Applied Orient app* as the average degree of applied orientation of the application team and the variable *Applied Orient PI* as the applied orientation of the PI.

We also construct vertical and horizontal personal characteristics of the applicants. We define the variable *Ratio Female app* as the fraction of females in the application team. We also define the dummy variable *Asian app*, which indicates whether at least one of the applicant team members is of Asian origin. Similarly, we create two dummy variables: *Gender PI*, which equals 1 if the PI is a female, and *Asian PI*, which equals 1 if the PI's race is Asian. We finally define the dummy variable *Russell Gr app*, which takes the value of 1 if the host institution is one of the Russell Group universities.

4.3.3. Panel member characteristics

We construct analogous variables for the panel members as we do for the members of the applicant team. In particular, we create the variables *Acad*

Table 2. List of variables

Name of the variable	Definition of the variable
Award	Dummy equal to 1 if the application is awarded
Applicant's characteristics	
Acad Quality app	Annual normalised citations of papers published by the applicants divided by 10
Applied Orient app	Ratio # of papers category 1/# of papers all categories of papers published by the applicants
Ratio Female app	Ratio # of women in the team/# of total researchers in the team
Asian app	Dummy equal to 1 if there is an Asian in the team
Russell Gr app	Dummy equal to 1 if the host institution of the proposal is a university in the Russell group
Panel's characteristics	
Acad Quality pan	Annual normalised citations of papers published by the panellists divided by 10
Applied Orient pan	Ratio # of papers category 1/# of papers all categories of the papers published by the panellists
Ratio Female pan	Ratio # of women in the panel/# of total researchers in the panel
Asian pan	Dummy equal to 1 if there is at least one Asian member in the panel
Russell Gr pan	Dummy equal to 1 if the panel has a % of Russell members Group larger than the median panel
Cross variables	
Applicants exp as pan	Dummy equal to 1 if an applicant in the team has Applicants exp as pan before the application
Connection as Colleague	Dummy equal to 1 if there is a member in team and a panel member from the same university
Connection as Pre-doc	Dummy equal to 1 if there is a team member who did the phd in a panel member's university
Controls	
Applicants exp as app	Applicants' experience as applicants before
Panellists exp as pan	Panellists' experience as panel members before
Size Team app	Sum of the # of coinvestigators and the PI in the team of the project
Size Team app sq	'Size Team app' squared
Size pan	Sum of the # of members in the panel
Size pan sq	'Size pan' squared
Duration	Duration of the project (in years)
Funds per cap	Ratio of requested funding/# of members of the team (in millions)
Fraction Awarded	Fraction of money awarded within a given quarter
Types of panels	
Top pan	Dummy equal to 1 if panel's citation in first quartile of the distribution of 'Acad Quality pan'
Applied pan	Dummy equal to 1 if panel's applied orientation above the median panel
Female pan	Dummy equal to 1 if the ratio of women in a panel above the median panel
Asian pan	Dummy equal to 1 if there is at least one Asian member in the panel
Russell Gr pan	Dummy equal to 1 if the panel has a % of Russell Group members larger than the median panel

Quality pan and *Applied Orient pan* for each panel to measure each panel's research-related vertical and horizontal characteristics. We define the variable *Ratio Female pan* as the percentage of women in the panel and the dummy variable *Asian pan* to identify whether at least a panel member's race is Asian.

We define the variable *Russell Gr pan* in a slightly different way than *Russell Gr app*, as the median percentage of panel members from the Russell group is above 80%. The variable *Russell Gr pan* is a dummy variable that indicates whether the panel has a fraction of members from the Russell group larger than the median fraction of all panels.

4.3.4. Cross variables

We include three 'cross-variables' between the applicants and panels, i.e., variables that use information from the two sides. The dummy variable *Applicants exp as pan* indicates whether at least one member of the applicant team had the experience of being a panel member before the date of application. The dummy variable *Connection as Colleague* measures whether there is an applicant and a panel member who are from the same university, and the dummy variable *Connection as Pre-doc* indicates whether there is an applicant who defended the PhD in one of the universities of the panel members.

4.3.5. *Control variables*

Applicants' experience of applying to grants may increase their chances of success; hence, we include as a control a variable that accounts for the teams' average number of grant applications per year in the four years before the application date (*Applicants exp as app* and *PI exp as app*). Besides, panellists' experience of being evaluators may also influence their decision. Therefore, we consider the share of panellists who have experience as panellists before the current evaluation (*Panellists exp as pan*). We also include the size of the applicant team (*Size Team app*) and the square of the size as controls (*Size Team app sq*). That is, we allow for non-linear effects, following the results of the team science literature (see Von Tunzelmann et al., 2003). Similarly, we include the size of the panel (*Size pan*) and the square (*Size pan sq*).

Our regressions also control for the *Duration* of the project and the per-capita amount of funding requested (*Funds per cap*). Moreover, in all the regressions (following Banal-Estañol et al., 2019a), we include the overall fraction of money awarded in that quarter, denoted as *Fraction Awarded*, and constructed as the ratio between the total amount of funds disbursed by our EPSRC panels and the total amount requested.

4.3.6. *Types of panels*

We classify panels using research-related and personal characteristics. We consider a panel 'Top,' and define the dummy variable *Top pan* if its research quality is in the first quartile of the distribution of the quality of all the panels. Similarly, we consider a panel 'Applied,' and define the dummy variable *Applied pan*, if the panel's applied orientation, i.e., its level of appliedness, is above the median of all the panels.

At the personal level, we consider a panel 'Female' and 'Russell,' and define the dummy variables *Female pan* and *Russell Gr pan*, if the fraction of members of the Russell group and females are above the median fraction of all the panels, respectively. As mentioned above, the dummy variable *Asian pan* identifies the panels that include at least one Asian member.

4.4. *Descriptive statistics*

We present descriptive statistics of the main variables in Table 3. The percentage of applications that are successfully awarded is almost 30%.

5. Basic determinants of success

Table 4 shows how the likelihood of having a grant awarded depends on the characteristics of the applicants, those of the panel members, the cross variables, and the controls. The coefficients reported correspond to the marginal effects of a probit regression.[4]

5.1. *Applicant characteristics*

Concerning research characteristics, row 1 in column 1 shows, as one would expect, that a more accomplished team of applicants, in terms of citations, is more likely to succeed. This is consistent with the results in prior literature (e.g., Grimpe, 2012; Tamblyn et al., 2018). In terms of magnitude, a one standard deviation increase in applicants' research performance increases the probability of success by 1.4% (1.250 × 0.011 = 0.021) or 4.7% of the unconditional probability (0.021/0.299 = 0.047).

Considering the team's research orientation (row 2), more applied teams are less likely to be successful (as in Tamblyn et al., 2018, and Banal-Estañol et al., 2019a, 2019b). A one standard deviation increase in applicants' applied orientation decreases the probability of success by 1.0% (0.312 × 0.032 = 0.010) or 3.3% of the unconditional probability (0.010/0.299 = 0.033).

In terms of personal traits, teams that include more female researchers (row 3) or academics of an Asian origin (row 4) are less likely to succeed in the grant application process. These results are also consistent with previous literature (e.g., Wenneras and Wold, 1997; Viner et al., 2004).

Regarding demographics, the applicants' affiliation to a university that is part of the elite (Russell) group positively affects the probability of success (row 5). This is consistent with Peters and Ceci (1982), who showed that researchers affiliated with prestigious institutions tended to fare better than colleagues at less prestigious ones in the publication process. The universities in the Russell group may also provide better support to their research teams in the application process.[5]

5.2. *Panel member characteristics*

Being assessed by a more accomplished panel, again in terms of citations, decreases the chances that the application is awarded (row 6). This result suggests that higher academic quality panels are more demanding.

Panels with more female members and members of Asian origin are also less likely to award the grant (rows 8 and 9). In contrast, the average applied orientation of the panel and whether they have relatively more members affiliated with a Russell group university do not affect the likelihood of success (rows 7 and 10). Our results on gender are consistent with those of the few papers that analyse the effects of panel characteristics

Table 3. Descriptive statistics

Variable	Observation	Mean	Std. dev.	Median
Dependent variable				
Award	7,189	0.299	0.458	0
Team's characteristics				
Acad Quality app	7,189	0.721	1.250	0.323
Applied Orient app	7,189	0.243	0.312	0.100
Ratio Female app	7,189	0.064	0.195	0
Asian app	7,189	0.132	0.339	0
Russell Gr app	7,189	0.795	0.404	1
Panel's characteristics				
Acad Quality pan	7,189	3.370	2.600	2.731
Applied Orient pan	7,189	0.200	0.210	0.133
Ratio Female pan	7,189	0.113	0.104	0.111
Asian pan	7,189	0.188	0.391	0
Russell Gr pan	7,189	0.461	0.499	0
Cross variables				
Applicants exp as pan	7,189	0.319	0.466	0
Connection as Colleague	7,189	0.233	0.423	0
Connection as Pre-doc	7,189	0.256	0.434	0
Control variables				
Applicants exp as app	7,189	2.962	2.811	2.2
Panellists exp as pan	7,189	1.343	1.252	1
Size Team app	7,189	2.481	1.570	2
Size pan	7,189	9.744	3.307	10
Duration	7,189	2.848	0.867	3
Funds per cap	7,189	0.136	0.229	0.095
Fraction Awarded	7,189	0.314	0.081	0.306
Types of panels				
Top pan	7,189	0.253	0.435	0
Applied pan	7,189	0.505	0.500	1
Female pan	7,189	0.504	0.500	1
Asian pan	7,189	0.188	0.391	0
Russell Gr pan	7,189	0.461	0.499	0

on grant success (Jayasinghe et al., 2003; Tamblyn et al., 2018). We do not know of previous research that has studied the effects of the other characteristics.

5.3. *Cross variables*

Column 2 highlights that teams of applicants with at least one researcher with experience as a panel member have higher chances of success. Column 3 shows that the likelihood of success does not change if the affiliation of a panel member coincides with that of a team member or with the university where s/he earned the PhD. Column 4 confirms the results of the previous columns when we include all the cross-applicant-panel variables together.

Our results on experience are in line with those of Viner et al. (2004), who, using data also from the EPSRC, associate success in securing grants with experience in the peer review system. But our connection results stand in contrast with those of Wenneras and Wold (1997) and Sandström and Hällsten (2008). Thus, our results suggest that the EPSRC deals with conflicts of interest adequately.

5.4. *Controls*

In terms of controls, we just mention that applicants' experience in the process significantly increases their chances of success. On the other hand, panel members' previous experience as panellists makes them tougher in evaluating projects.

5.5. *Robustness*

We will use column 4 as a basis for the analysis of the next section. It highlights the average effects of the panel characteristics on the applicants' likelihood of success. Column 5 shows that the previous average effects results are very similar if we use the characteristics of the PI rather than those of the whole team of applicants.

Finally, column 6 shows that the results for the characteristics of the applicant teams and the cross-applicant-panel variables are similar when we include panel fixed effects. Analysing the overall impact of the panel characteristics is one of our main objectives. Hence, we will not include panel fixed effects in the following section. Untabulated regressions show that all the results in the following tables hold if we use panel fixed effects instead of the panels' variables.

6. The similar-to-me hypothesis in the grant allocation process

This section tests our two hypotheses, namely whether panel members favour (or penalise less) applicants with research-related and personal characteristics similar to theirs, respectively, as the 'similar-to-me' social psychology theory suggests.

We follow two empirical strategies. First, we run split sample regressions based on the panels' research-related and personal characteristics (top vs non-top, applied vs non-applied or basic, female vs non-female, Asian vs non-Asian, and Russell vs non-Russell). Second, we define dummy variables using the same panel classifications and run and interpret

Table 4. Average effects

	Initial	Experience	Connections	Average effect	PI average effect	Panel FE
	(1)	(2)	(3)	(4)	(5)	(6)
Applicants						
Acad Quality app/PI	0.011**	0.011**	0.011**	0.011**	0.029***	0.018***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.009]	[0.006]
Applied Orient app/PI	−0.032*	−0.032*	−0.032*	−0.032*	−0.023	−0.053**
	[0.019]	[0.019]	[0.019]	[0.019]	[0.018]	[0.021]
Ratio Female app/ Gender PI	−0.042	−0.046*	−0.042	−0.046*	−0.047**	−0.025
	[0.028]	[0.028]	[0.028]	[0.028]	[0.022]	[0.031]
Asian app/Asian PI	−0.043***	−0.040**	−0.043***	−0.040**	−0.065***	−0.029*
	[0.016]	[0.016]	[0.016]	[0.016]	[0.023]	[0.018]
Russell Gr app	0.032**	0.031**	0.031**	0.030**	0.026*	0.044***
	[0.013]	[0.013]	[0.013]	[0.013]	[0.014]	[0.015]
Panels						
Acad Quality pan	−0.009***	−0.009***	−0.009***	−0.009***	−0.009***	
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	
Applied Orient pan	0.007	0.006	0.007	0.006	0.014	
	[0.028]	[0.028]	[0.028]	[0.028]	[0.030]	
Ratio Female pan	−0.154***	−0.152***	−0.154***	−0.152***	−0.168***	
	[0.052]	[0.052]	[0.052]	[0.052]	[0.055]	
Asian pan	−0.034**	−0.033**	−0.034**	−0.034**	−0.032**	
	[0.014]	[0.014]	[0.014]	[0.014]	[0.015]	
Russell Gr pan	0.007	0.006	0.007	0.007	0.001	
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	
Cross variables						
Applicants exp as pan		0.032**		0.032**	0.047***	0.065***
		[0.013]		[0.013]	[0.014]	[0.014]
Connection as Colleague			0.008	0.008	0.007	0.005
			[0.013]	[0.013]	[0.014]	[0.015]
Connection as Pre-doc			0.002	0.001	0.002	0.002
			[0.013]	[0.013]	[0.014]	[0.015]
Controls						
Applicants/PI exp as app	0.006***	0.005*	0.006**	0.005*	−0.005	0.003
	[0.002]	[0.003]	[0.002]	[0.003]	[0.007]	[0.003]
Panellists exp as pan	−0.017**	−0.016**	−0.017**	−0.016**	−0.013***	
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	
Size Team app	−0.050***	−0.052***	−0.050***	−0.052***	−0.042***	−0.039***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.012]
Size Team app sq	0.004***	0.004***	0.004***	0.004***	0.004***	0.003*
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]
Size pan	−0.007	−0.007	−0.007	−0.007	−0.005	
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	
Size pan sq	−0.000	−0.000	−0.000	−0.000	−0.000	
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Duration	0.032***	0.032***	0.032***	0.032***	0.033***	0.041***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.010]
Funds per cap	−0.295***	−0.296***	−0.295***	−0.296***	−0.305***	0.010
	[0.060]	[0.061]	[0.061]	[0.061]	[0.064]	[0.034]

(Continues)

Table 4. (Continued)

	Initial	Experience	Connections	Average effect	PI average effect	Panel FE
	(1)	(2)	(3)	(4)	(5)	(6)
Fraction Awarded	0.476***	0.473***	0.476***	0.472***	0.458***	0.114
	[0.081]	[0.081]	[0.081]	[0.081]	[0.085]	[0.091]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	-
Panel fixed effects	-	-	-	-	-	Yes
Observations	7,189	7,189	7,189	7,189	6,637	6,116

This table reports marginal effects from probit regressions for the likelihood that a project is awarded. The dependent variable *Award* is a dummy equal to 1 if the project is awarded and 0 otherwise. Independent variables are characteristics of the team of applicants and the evaluation panel, and controls. All variables are defined in Table 2. Column (2) includes *Applicants exp as pan*, which is a dummy equal to 1 if an applicant has experience as member of panels and 0 otherwise. Column (3) includes the variables *Connection as Colleague* and *Connection as Pre-doc*, which are dummies equal to 1 if some applicant has the same affiliation or has defended the PhD, respectively, at the same department as some panel member and 0 otherwise. Column (4) includes all the previous variables. Column (5) replicates column (4) using the variables corresponding to the PI instead of the team. In these regressions, we include year fixed effects. Column (6) replicates column (4) without the panel variables and with panel fixed effects. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

interaction effects regressions, interacting these panel variables first with all the applicant variables and then with the corresponding applicant variable. We report, in this case, the coefficients rather than the marginal effects, as there are no marginal effects for the interaction terms. All regressions include all the variables of the previous section, although the coefficients of the controls are not displayed.

6.1. Top vs. non-top panels

Table 5 distinguishes panels by the research performance of their members, proxied by their average number of citations (top quartile vs bottom three quartiles of the distribution of panels). As a reference, we keep the results of the 'average effect' regression of the previous section, reporting its marginal effects in column 1 (i.e., the same as column 4 of Table 4) and the coefficients in column 4. Our results show that the similar-to-me hypothesis is satisfied along the research performance dimension in the grant selection process, as Hypothesis 1 suggests.

Columns 2 and 3 show that the research quality of the applicants is more important and more significant for panels of the highest quality than for those of relatively lower quality. In terms of magnitudes, a one standard deviation increase in the applicants' research performance increases the probability of success by 2.8% (1.250 ×0.022 = 0.028) or 9.4% of the unconditional probability if evaluated by a top panel (0.028/0.299 = 0.094) whereas it is increased (although the effect is not significant) by just 0.63% or 2.1% of the unconditional probability of success if evaluated by a non-top panel. The empirical *P*-value in Fisher's permutation test is 0.062, which suggests that the difference in the coefficients of the two groups is statistically significant.[6] Thus, the top panels are not only more demanding, in general, but they care more about the applicant team's research performance than the other panels.

Columns 5 and 6 show that the results are similar when using an interaction approach. They present the coefficients of the regressions when we include the interaction of the applicant's variables with the dummy 'Top pan,' which indicates whether the panel is in the top quartile of quality. Column 5 shows that the main effect of the applicant citations, i.e., the impact for the bottom three panels, is non-significant. Instead, the interaction term is positive and significant, indicating that the quality of the applicants is significantly more important for the panels of the highest quality. Column 6 confirms that the result is the same if we only interact the top panel variable with their quality.

Our setting also allows us to identify cross-effects, along different dimensions, between types of panels and characteristics of the applicants. As shown in columns 2 and 3, the positive effect of the affiliation to a Russell group university is significant for the bottom panels but not for the top panel. This result suggests that lower-quality panels may provide more importance to coarser quality measures such as institutional affiliation rather than actual research quality.

Columns 2 and 3 of Table 6 illustrate that the results are similar if we use the PI to construct the applicant measures instead of using the whole team. They show again that the applicant's research quality is more important for panels of the highest quality than for those of relatively lower quality (the *P*-value of the difference in Fisher's permutation test is .065).

Finally, unreported regressions show that the differences between the top quartile and the bottom three quartiles are stronger than those between the top and bottom two (or above and below the median).

Table 5. Research quality of the panel members

	Average effect	Top pan	Non-top pan	Average effect	Interaction all	Interaction quality
	(1)	(2)	(3)	(4)	(5)	(6)
Applicants						
Acad Quality app	0.011**	0.022**	0.005	0.033**	0.013	0.013
	[0.005]	[0.009]	[0.006]	[0.015]	[0.017]	[0.017]
Applied Orient app	−0.032*	−0.056	−0.037*	−0.095*	−0.088	−0.090
	[0.019]	[0.046]	[0.021]	[0.056]	[0.060]	[0.056]
Ratio Female app	−0.046*	−0.032	−0.041	−0.137*	−0.134	−0.141*
	[0.028]	[0.047]	[0.034]	[0.082]	[0.099]	[0.082]
Asian app	−0.040**	−0.037	−0.043**	−0.120**	−0.126**	−0.120**
	[0.016]	[0.031]	[0.019]	[0.048]	[0.055]	[0.048]
Russell Gr app	0.030**	0.020	0.033**	0.089**	0.094**	0.091**
	[0.013]	[0.028]	[0.015]	[0.040]	[0.045]	[0.040]
Interactions						
Top pan × Acad Quality app					0.052*	0.053*
					[0.029]	[0.028]
Top pan × Applied Orient app					−0.018	
					[0.151]	
Top pan × Ratio Female app					−0.025	
					[0.176]	
Top pan × Asian app					0.022	
					[0.111]	
Top pan × Russell Gr app					−0.012	
					[0.097]	
Panels						
Acad Quality pan	−0.009***	−0.005	−0.028***	−0.026***		
	[0.003]	[0.005]	[0.007]	[0.008]		
Applied Orient pan	0.006	0.101	−0.019	0.019	0.057	0.057
	[0.028]	[0.086]	[0.031]	[0.084]	[0.082]	[0.082]
Ratio Female pan	−0.115***	−0.099	−0.163***	−0.451***	−0.427***	−0.426***
	[0.052]	[0.109]	[0.060]	[0.155]	[0.156]	[0.156]
Asian pan	−0.034**	−0.074**	−0.010	−0.101**	−0.095**	−0.095**
	[0.014]	[0.031]	[0.017]	[0.042]	[0.042]	[0.042]
Russell Gr pan	0.007	0.008	0.000	0.020	0.015	0.015
	[0.011]	[0.023]	[0.013]	[0.033]	[0.033]	[0.033]
Top pan					−0.103	−0.115**
					[0.097]	[0.048]
Cross variables						
Applicants exp as pan	0.032**	0.035	0.029**	0.094**	0.093**	0.093**
	[0.013]	[0.024]	[0.015]	[0.038]	[0.038]	[0.038]
Connection as Colleague	0.008	0.002	0.012	0.025	0.023	0.023
	[0.013]	[0.024]	[0.016]	[0.040]	[0.040]	[0.040]
Connection as Pre-doc	0.001	0.017	−0.009	0.002	0.001	0.001
	[0.013]	[0.024]	[0.016]	[0.039]	[0.039]	[0.039]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,189	1,820	5,369	7,189	7,189	7,189

This table presents the results of probit regressions for the likelihood that a project is awarded. The dependent variable *Award* is a dummy equal to 1 if the project is awarded and 0 otherwise. Independent variables are characteristics of the team of applicants, characteristics of the evaluation panel, and some controls. All variables are defined in Table 2. Columns (2) and (3) replicate column (1) for the subset of projects evaluated for panels in the first quartile and in the other quartiles, respectively, in terms of average number of citations of the panels. Columns (1) to (3) report marginal effects. Column (4) reports the coefficients from the same regression as column (1). Column (5) includes the interaction of the five applicants' characteristics with a dummy equal to 1 if the panel is in the first quartile in terms of average citations and 0 otherwise. Column (6) only includes the interaction with the quality of the applicants. In all regressions, we include year fixed effects. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 6. Research related measures of the panel members and PI characteristics

	PI average effect	Top pan	Non-top pan	Applied pan	Non-applied pan
	(1)	(2)	(3)	(4)	(5)
Principal investigators					
Acad Quality PI	0.029***	0.047***	0.021**	0.016	0.033***
	[0.009]	[0.015]	[0.010]	[0.018]	[0.010]
Applied Orient PI	−0.023	−0.042	−0.027	−0.011	−0.056*
	[0.018]	[0.044]	[0.020]	[0.023]	[0.032]
Gender PI	−0.047**	−0.059	−0.035	−0.056*	−0.038
	[0.022]	[0.040]	[0.026]	[0.033]	[0.029]
Asian PI	−0.065***	−0.064	−0.068**	−0.062**	−0.064*
	[0.023]	[0.045]	[0.027]	[0.031]	[0.033]
Russell Gr app	0.026*	0.015	0.029*	0.043**	0.007
	[0.014]	[0.030]	[0.016]	[0.020]	[0.021]
Panels					
Acad Quality pan	−0.009***	−0.005	−0.024***	−0.000	−0.016***
	[0.003]	[0.005]	[0.007]	[0.005]	[0.004]
Applied Orient pan	0.014	0.111	−0.008	−0.002	0.273
	[0.030]	[0.089]	[0.033]	[0.045]	[0.189]
Ratio Female pan	−0.168***	−0.082	−0.182***	−0.114	−0.244***
	[0.055]	[0.114]	[0.063]	[0.078]	[0.077]
Asian pan	−0.032**	−0.073**	−0.008	−0.009	−0.062***
	[0.015]	[0.032]	[0.017]	[0.021]	[0.021]
Russell Gr pan	0.001	0.009	−0.005	0.023	−0.013
	[0.011]	[0.024]	[0.013]	[0.016]	[0.016]
Cross variables					
Applicants exp as pan	0.047***	0.055**	0.043**	0.057**	0.038**
	[0.014]	[0.026]	[0.017]	[0.021]	[0.019]
Connection as Colleague	0.007	−0.011	0.016	0.014	−0.001
	[0.014]	[0.025]	[0.017]	[0.021]	[0.019]
Connection as Pre-doc	0.002	0.024	−0.009	0.024	−0.020
	[0.014]	[0.025]	[0.016]	[0.020]	[0.019]
Control variables	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	6,637	1,701	4,936	3,325	3,312

This table reports marginal effects from probit regressions for the likelihood that a project is awarded. The dependent variable *Award* is a dummy equal to 1 if the project is awarded and 0 otherwise. Independent variables are characteristics of the PI and the evaluation panel, cross variables, and controls. All variables are defined in Table 2. Columns (2) and (3) replicate column (1) for the subset of projects evaluated for panels in the first quartile and in the other quartiles, respectively, in terms of average number of citations of the panels. Columns (4) and (5) replicate column (1) for the subset of projects evaluated for panels above and below the median, respectively, in terms of appliedness of the panel members. In all regressions, we include year fixed effects. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

This means that the differences, in terms of quality, are relevant at the top of the distribution of the panel.

6.2. *Applied vs basic panels*

Table 7 distinguishes between 'applied' and 'non-applied' or basic panels, defined as those above and below, respectively, the median level of average appliedness of the panels. As a reference, we keep again (columns 1 and 4) the results of the 'average effect' regression of the previous section. Our results confirm that the similar-to-me hypothesis is also satisfied along the research orientation dimension, as our Hypothesis 1 also suggests.

Columns 2 and 3 show that the degree of appliedness of the team of applicants decreases the chances of success only if a non-applied panel evaluates them. In terms of magnitudes, a one standard deviation increase in the applicants' applied orientation decreases the probability of success by 2.4%

Table 7. Applied orientation of the panel

	Average effect	Applied pan	Non-applied pan	Average effect	Interaction all	Interaction orient
	(1)	(2)	(3)	(4)	(5)	(6)
Applicants						
Acad Quality app	0.011***	0.020*	0.011*	0.033**	0.022	0.032**
	[0.005]	[0.011]	[0.006]	[0.015]	[0.016]	[0.015]
Applied Orient app	–0.032*	–0.010	–0.076**	–0.095*	–0.228**	–0.215**
	[0.019]	[0.023]	[0.033]	[0.056]	[0.099]	[0.099]
Ratio Female app	–0.046*	–0.075*	–0.026	–0.137*	–0.071	–0.134
	[0.028]	[0.042]	[0.036]	[0.082]	[0.110]	[0.083]
Asian app	–0.040**	–0.037	–0.045*	–0.120**	–0.156**	–0.121**
	[0.016]	[0.022]	[0.023]	[0.048]	[0.069]	[0.048]
Russell Gr app	0.030**	0.050***	0.004	0.089**	0.006	0.090**
	[0.013]	[0.019]	[0.020]	[0.040]	[0.059]	[0.040]
Interactions						
Applied pan × Acad Quality app					0.055*	
					[0.032]	
Applied pan × Applied Orient app					0.201*	0.164
					[0.119]	[0.117]
Applied pan × Ratio Female app					–0.141	
					[0.165]	
Applied pan × Asian app					0.073	
					[0.095]	
Applied pan × Russell Gr app					0.153*	
					[0.080]	
Panels						
Acad Quality pan	–0.009***	0.000	–0.014***	–0.026***	–0.027***	–0.026***
	[0.003]	[0.005]	[0.004]	[0.008]	[0.008]	[0.008]
Applied Orient pan	0.006	0.012	0.239	0.019		
	[0.028]	[0.043]	[0.182]	[0.084]		
Ratio Female pan	–0.152***	–0.119	–0.202***	–0.451***	–0.459***	–0.440***
	[0.052]	[0.074]	[0.074]	[0.155]	[0.156]	[0.156]
Asian pan	–0.034**	–0.015	–0.059***	–0.0101**	–0.102**	–0.100**
	[0.014]	[0.020]	[0.020]	[0.042]	[0.042]	[0.042]
Russell Gr pan	0.007	0.025	–0.007	0.020	0.022	0.021
	[0.011]	[0.016]	[0.016]	[0.033]	[0.033]	[0.033]
Applied pan					–0.180**	–0.012
					[0.080]	[0.042]
Cross variables						
Applicants exp as pan	0.032***	0.043**	0.018	0.094***	0.92**	0.094**
	[0.013]	[0.018]	[0.018]	[0.038]	[0.038]	[0.038]
Connection as Colleague	0.008	0.005	0.006	0.025	0.025	0.024
	[0.013]	[0.020]	[0.019]	[0.040]	[0.040]	[0.040]
Connection as Pre-doc	0.001	0.027	–0.025	0.002	0.002	0.003
	[0.013]	[0.019]	[0.018]	[0.039]	[0.039]	[0.039]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,189	3,631	3,558	7,189	7,189	7,189

This table presents the results of probit regressions for the likelihood that a project is awarded. The dependent variable *Award* is a dummy equal to 1 if the project is awarded and 0 otherwise. Independent variables are characteristics of the team of applicants and the evaluation panel, cross variables, and controls. All variables are defined in Table 2. Columns (2) and (3) replicate column (1) for the subset of projects evaluated for panels above and below the median, respectively, in terms appliedness of the panel members. Columns (1) to (3) report marginal effects. Column (4) reports the coefficients from the same regression as column (1). Column (5) includes the interaction of the five applicants' characteristics with a dummy equal to 1 if the panel is above median in terms of appliedness and 0 otherwise. Column (6) only includes the interaction with the applied orientation of the applicants. In all regressions, we include year fixed effects. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

(0.312 ×0.076 = 0.024) or 8.0% of the unconditional probability if evaluated by a basic panel (0.024/0.299 = 0.080) whereas it is decreased by just 0.3% or 1.0% of the unconditional probability of success if evaluated by an applied panel, and the effect is not significant. The empirical *P*-value of the difference between the coefficients of the two groups is significant, 0.042 according to Fisher's permutation test. Thus, the reference (average) effects of the type of research of the applicants, displayed in Column 1, are driven by the non-applied panels only. Columns 5 and 6 corroborate this result using an interaction approach.

Moreover, columns 4 and 5 of Table 6 show that an applied PI is less likely to get funded than a basic PI, but only if the research orientation of the evaluating panel is not applied. The difference between the coefficients of the variable *Applied Orient PI* is significant since the empirical *P*-value of the difference according to Fisher's permutation test is .097.

6.3. Personal characteristics of the panels

Table 8 distinguishes between 'female' and 'non-female' and 'Russell' and 'non-Russell' panels, based on the comparison of the ratio of Russell group and female members, respectively, and the median of all panels. It also distinguishes between 'Asian' and 'non-Asian' panels based on the inclusion of at least one panel member of Asian origin. We keep the results of the average effects regression of Column 4 of Table 4 as Column 1 again. Our results suggest that the similar-to-me hypothesis is satisfied along the gender and race dimension in the grant allocation process, as our Hypothesis 2 suggests, but not for the institutional eminence classification we use.

Columns 2 and 3 show that non-female panels tend to penalise female applicants, whereas female panels do not (the *P*-value of the difference of the coefficients is .087).

Columns 4 and 5 show that non-Asian panels tend to discriminate against Asian applicants more than Asian panels do, as our Hypothesis 2 suggests. However, the difference in the coefficient is not significant according to Fisher's permutation test (the *P*-value of the difference of coefficients is .37). Failure to achieve significance may be due to the small number of researchers of Asian origin.

Columns 6 and 7 show that Russell panels do not favour teams of a Russell group university more than non-Russell panels do. In fact, the coefficient for non-Russell panels is slightly larger (and slightly significant). The difference between the coefficients is not significant, though (the *P*-value of the difference of coefficients is .40). This result is also consistent with the non-significance of the coefficients of the university connections between the applicants and the panel members that we reported in columns 3–4 of Table 4.

Let us stress that untabulated regressions confirm the previous results when we use variables that reflect the PI's personal characteristics instead of the team's.

7. Discussion and conclusion

Most research financing programmes rely on panel evaluation systems to select the most promising and deserving applications. In this process, the panel composition may not be neutral. Even if the panel's composition is adequate in knowledge and expertise, its decisions may be influenced by its members' views and preferences. In this paper, we have investigated how the characteristics of the panels affect the chances of obtaining funding by different types of applicants in the EPSRC grant allocation process. Our main question is whether the similarity, that is, the resemblance between the applicants and the panel, affects the chances that an EPSRC application is funded.

We have shown, first, that the likelihood that an application obtains funding depends not only on the applicants' traits, as one would hope, but also on the composition of the evaluating panel. In particular, high-performing panels, female panellists, and panellists of Asian origin are less likely to award funding than others. Our results on female panel members being tougher are consistent with prior evidence in Jayasinghe et al. (2003) and Tamblyn et al. (2018), but the effects of the rest of research-related and demographic characteristics are, to the best of our knowledge, new.

More importantly, our paper suggests that the similarities between applicants and panels matter. Panellists with a solid publication record give more weight to the applicants' publication history than those with weaker publication records. Also, an application is more likely to be successful if the applicants and the team members are 'similar' in terms of research orientation as well as in gender and (Asian) origin. These results are broadly consistent with those separately identified in previous literature for research performance (Tamblyn et al., 2018) and research orientation (Li, 2017), but they are different from the non-existence effects of gender (Jayasinghe et al., 2003). Overall, we find evidence that there are a wide variety of 'similar-to-me' effects simultaneously at work in the EPSRC grant selection process.

Table 8. Personal characteristics of the panel

	Average effect	Female pan	Non-female pan	Asian pan	Non-Asian pan	Russell gr pan	Non-Russell gr pan
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Applicants							
Acad Quality app	0.011***	0.013*	0.010	0.019	0.011*	0.007	0.019**
	[0.005]	[0.008]	[0.007]	[0.013]	[0.006]	[0.006]	[0.009]
Applied Orient app	–0.032*	–0.020	–0.047*	0.001	–0.042**	–0.024	–0.049*
	[0.019]	[0.025]	[0.027]	[0.044]	[0.021]	[0.028]	[0.025]
Ratio Female app	–0.046*	–0.014	–0.091**	–0.108*	–0.039	–0.055	–0.034
	[0.028]	[0.036]	[0.042]	[0.065]	[0.030]	[0.041]	[0.037]
Asian app	–0.040**	–0.020	–0.058**	–0.029	–0.044**	–0.050**	–0.033
	[0.016]	[0.022]	[0.023]	[0.031]	[0.019]	[0.024]	[0.021]
Russell Gr app	0.030**	0.024	0.032*	0.019	0.033**	0.030	0.034*
	[0.013]	[0.019]	[0.019]	[0.029]	[0.015]	[0.021]	[0.018]
Panels							
Acad Quality pan	–0.009***	–0.001	–0.014***	–0.025***	–0.008***	–0.008**	–0.008*
	[0.003]	[0.004]	[0.004]	[0.007]	[0.003]	[0.004]	[0.004]
Applied Orient pan	0.006	0.046	–0.022	0.023	–0.001	0.048	0.002
	[0.028]	[0.041]	[0.040]	[0.072]	[0.031]	[0.044]	[0.037]
Ratio Female pan	–0.152***	–0.189*	–0.430**	–0.297**	–0.157***	–0.251***	–0.061
	[0.052]	[0.099]	[0.199]	[0.137]	[0.058]	[0.070]	[0.077]
Asian pan	–0.034**	–0.036*	–0.034			–0.001	–0.056***
	[0.014]	[0.021]	[0.021]			[0.021]	[0.020]
Russell Gr pan	0.007	–0.003	0.012	0.023	–0.001		
	[0.011]	[0.016]	[0.016]	[0.024]	[0.012]		
Cross variables							
Applicants exp as pan	0.032**	–0.001	0.073***	0.004	0.040***	0.036*	0.031*
	[0.013]	[0.018]	[0.018]	[0.027]	[0.014]	[0.019]	[0.017]
Connection as Colleague	0.008	0.002	0.011	0.066**	–0.007	0.006	0.005
	[0.013]	[0.019]	[0.019]	[0.027]	[0.015]	[0.020]	[0.018]
Connection as Pre-doc	0.001	0.000	–0.002	–0.027	0.009	–0.012	0.009
	[0.013]	[0.019]	[0.019]	[0.028]	[0.015]	[0.019]	[0.018]

(Continues)

Table 8. (Continued)

	Average effect	Female pan	Non-female pan	Asian pan	Non-Asian pan	Russell gr pan	Non-Russell gr pan
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,189	3,626	3,563	1,352	5,837	3,314	3,875

This table reports marginal effects from probit regressions for the likelihood that a project is awarded. The dependent variable *Award* is a dummy equal to 1 if the project is awarded and 0 otherwise. Independent variables are characteristics of the team of applicants and the evaluation panel, cross variables, and controls. All variables are defined in Table 2. Columns (2) and (3) replicate column (1) for the subset of projects evaluated for panels above and below the median, respectively, in terms rate of female among the panel members. Columns (4) and (5) replicate column (1) for the subset of projects evaluated for panels with and without, respectively, panel members of Asian origin. Columns (6) and (7) replicate column (1) for the subset of projects evaluated for panels above and below the median, respectively, in terms rate of members of the panel affiliated to a university in the Russell group. In all regressions, we include year fixed effects. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Our results may be explained by the two main arguments of the preference-based social psychology theory. Following the self-categorisation argument (Turner et al., 1987), high-performers and basic researchers may consider themselves, respectively, social categories. Consequently, the desire for a positive self-identity makes high-performing panel members reward high-performing applicants more strongly than low-performing panel members. Similarly, the desire for a positive self-identity leads basic panel members to penalise applied applicants. According to the alternative similarity-attraction argument (Byrne, 1971), high-performing individuals may consider other high-performing individuals more attractive, as they are perceived to be similar in attitudes and values. For the same reason, basic-oriented individuals may consider applied-oriented individuals relatively less attractive.

Concerning personal characteristics, gender and race are two dimensions on which social psychology has focused. For example, being male in such a male-dominated discipline as engineering and the physical sciences may be an essential social category in which male researchers have a positive self-identity leading to similar-to-me behaviour. In contrast, the similar-to-me hypothesis is not supported along the institutional eminence dimension. The elite/non-elite Russell group categorisation may be less clear for academic researchers than the other categorisations we use.

Although our analysis is confined to the EPSRC grants, our results should hold for other project grants and fellowships. Many other grant allocation processes follow similar procedures, including those of other national agencies and the EU's European Research Council (ERC) grants. As the EPSRC, these processes rely on peer review panels to judge the quality of the applications competing for funding. The composition of the panels is often not known ex-ante by the applicants, but the panellists typically know the applicants' identity and characteristics. as is the case for the EPSRC grants.

Our paper underscores the importance of the selection of panel members in grant allocation processes. Their research and personal characteristics may strongly influence the award decisions, not only in general terms but also in relation to the characteristics of the applicants. Policymakers need to ensure that the grant allocation processes assemble a panel that possesses not only sufficient knowledge and expertise but also enough diversity in terms of research-related and demographic characteristics.

We have deliberately avoided using the concept of 'bias.' Indeed, some of the effects we identify, such as those on gender and race, might be called 'biases,' as these characteristics should not affect the likelihood of success. But others, such as those on research performance and orientation, are less clear, as these characteristics may affect ex-post performance. For instance, penalising applicants with low past performance may not be 'unfair' or considered a bias because their ex-post performance may also be worse than that of applicants with high past performance.

Still, our analysis already suggests that at least some types of panels are biased. Take, for instance, research orientation. Provided that it is a horizontal characteristic, it should not influence the likelihood of obtaining funding. In this case, our results suggest that applied panels are not biased, whereas basic panels are. In contrast, if research orientation is not a horizontal characteristic and applied teams have lower productivity ex-post, applied panels are biased, whereas basic panels are not. Our analysis cannot assess whether we are in the first or the second case.

Making statements on the characteristics of the panels that lead to fair decision-making would require further analysis (and data). Previous papers indicate that public research and innovation agencies are biased against diverse topics or teams (Langfeldt, 2006; Laudel, 2006; Banal-Estañol et al., 2019a) or novel projects (Boudreau et al., 2016). One could compare the drivers of success in the ex-ante evaluation and award process to the drivers of success in ex-post performance (as Banal-Estañol et al., 2019a, do). That would require information on ex-post performance, though. The question of biases in panel evaluations and, more generally, the optimal design of the grant allocation panels remains an exciting avenue for further research.

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Notes

[1] Note that this human resource literature does not always support the similar-to-me hypothesis. Bagues and Esteve-Volart (2010), Zinovyeva and Bagues (2015), and Bagues et al. (2017) find that female candidates are

not more likely to be hired and promoted when the randomly assigned selection committee has a higher percentage of female evaluators. Bursell (2007) finds that the applicants with a Swedish-sounding name are more likely to receive a call-back if the CEO has a foreign-sounding name than if s/he has a Swedish-sounding name.

[2] In another context, Criscuolo et al. (2017) study the novelty of the R&D projects selected among those submitted by employees of a multinational company and find that whether the applicant and a panel member work at the same office does not affect the likelihood of funding a novel project.

[3] Asian researchers have significant contributions to engineering and the physical sciences. To identify this ethnic minority group in the UK, we follow Lauderdale and Kestenbaum (2000) and Shah et al. (2010) and use Chinese, Japanese, Korean, and South Asian surnames.

[4] Results are similar if we use a linear probability model instead.

[5] O'Kane et al. (2022) highlight the importance of the universities pre-grant funding support to the researchers in New Zealand's universities.

[6] Fisher's permutation test is used to test whether there is a significant difference between the coefficients in different groups. For more details, see, for instance, Soms (1977).

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