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Research Article

Queen Bee Phenomenon Scale: Psychometric Evidence in the Brazilian Context

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ABSTRACT

This study aimed to develop an instrument to measure the queen bee phenomenon, present in women in positions of command who hinder the professional development of other women. In this article, the phenomenon is understood as a response to the social threat experienced by women who aspire to high positions in men's organizations. The sample, of 495 women who worked in higher education institutions, was divided into two groups: Group 1 (G1; 248, M_{Age} = 44 years old) and Group 2 (G2; 247, M_{Age} = 42 years old). These individuals answered the Queen Bee Phenomenon Scale (QBPS) and demographic questions. Considering the G1 participants, a principal component analysis was performed, which allowed the identification of a hexafactorial structure, explaining 60.5% of the total variance and presenting an overall internal consistency of 0.72. Subsequently, for the G2 participants, the adequacy of the QBPS hexafactorial structure was confirmed (CFI = 0.935, TLI = 0.923, and RMSEA = 0.049). It was concluded that there is evidence for both the validity of the factors and the internal consistency of the measure, which thus may be properly used in other studies.

Keywords: queen bee phenomenon; gender; leadership; scale

JEL Code: Nonadherent

INTRODUCTION

Despite having expanded their human and social capital, women face the paradox of not being able to occupy senior management positions as often as men do (O'Neil, Hopkins, & Bilimoria, 2008). Census data show that women are more present than men in the highest levels of education (Instituto Brasileiro de Geografia E Estatística [IBGE], 2018), and present advances in middle management (IBGE, 2018). However, the boards of directors in large private companies (International Labor Office, 2019), or even the highest positions in public management (Mota-Santos, Carvalho Neto, Oliveira, & Andrade, 2019), remain mostly male.

Although there is no gender parity in senior leadership positions, some professionals have succeeded in breaking the glass ceiling, contributing to the expansion of women into these positions (Meinhard & Faria, 2020). However, the performance of women in traditionally male positions is not calm and peaceful. Since leadership is associated with stereotypically male behaviors (Eagly & Carli, 2003), many women need to assume male behavior and distance themselves from other women. Staines, Travis, and Jayaratne (1974) were the first to associate such characteristics to the metaphor they called the queen bee syndrome. Ellemers (2001) understood the phenomenon as a response to social threat (Derks, Ellemers, Van-Laar, & Groot, 2011). In this view, the queen bee phenomenon can be seen as a response of women who experience low levels of gender identification at work, and whose social identity is threatened by male organizational culture (Derks, Ellemers, et al., 2011). Adopting the perspective of social identity, the queen bee phenomenon is considered in this article as an individual mobility behavior that allows women to reach positions of command in a context in which the female social identity is devalued (Derks, Van-Laar, & Ellemers, 2016).

Thus, the need for women in command positions to adjust their natural leadership style toward stereotypical characteristics of successful leaders makes them adopt agentic behaviors in distancing themselves physically and psychologically from women who are at the beginning of their careers, or at the bottom of the organizational hierarchy, to legitimize the gender hierarchy (Derks et al., 2016). Despite queen bee phenomenon criticisms (Mavin, 2008), recent studies have pointed out the male organizational context, and the female professional trajectory, marked by adversity, as drivers of this phenomenon (Faniko, Ellemers, Derks, & Lorenzi-Cioldi, 2017).

The queen bee phenomenon has been seen in European research assessing different work contexts: in universities (Ellemers, Heuvel, Gilder, Maass, & Bonvini, 2004), police service (Derks, Van-Laar, Ellemers, & Groot, 2011), and private companies (Faniko et al., 2017). However, the metaphor is little explored in Brazilian studies (e.g., Arvate, Galilea, & Todescat, 2018). Still, as far as the searches carried out by the authors, empirical studies on the queen bee phenomenon have produced quantitative procedures for data collection and analysis. Yet, there are no measures scaling the phenomenon in Brazilian or international studies. Searches were performed in the Scopus, Web of Science, Index Psi, LILACS, PubMed, Scielo, Spell, and Google Scholar databases to confirm this, using the descriptors: 'queen bee phenomenon' AND 'scale,' 'gender metaphors' AND 'scale.' The results of this search indicated the inexistence of measures to assess the phenomenon in question. Given this research gap for the subject, our study aimed to develop and validate a scale that assesses the queen bee phenomenon in a national context.

The study represents an opportunity to expand research on the queen bee phenomenon in Brazil, a country that, due to its colonization process, is socially marked by patriarchy (Teixeira, Galvão, Mota-Santos, & Carmo, 2021; Vieira, Carrieri, Monteiro, & Roquete, 2017). Despite the advances of women with regard to expanding education and conquering spaces in the labor market, the marks of patriarchy are preserved in Brazil, and can be perceived in established organizational power relations (Pereira, Nunes, & Oliveira, 2019; Vieira et al., 2017). Women continue to bear the full or principal responsibility of managing the home and family, which reduces both their attention and effort when related to their careers. This consequently presents a barrier to professional growth (Mota-Santos, Carvalho, Oliveira, & Andrade, 2019). In addition to having their image closely associated with motherhood, and although having children does not make up their repertoire of choices, they are still overlooked for professional ascension (Carrieri, Diniz, Souza, & Menezes, 2013; Mota-Santos et al., 2019).

Studying the queen bee phenomenon in a country with cultural characteristics that differ from those where the phenomenon is most frequently investigated potentially allows generalization of the phenomenon, as well as the relative involvements of women within the phenomenon. Further, the deepening of studies on this metaphor through its correlations with elements of organizational culture, as well as comparing queen bee traits in both women and men, allows us to investigate relationships between women in the workplace, and also contextualize and question their inter-competitiveness in the Brazilian national context.

THE QUEEN BEE PHENOMENON: ATTITUDINAL FEATURES

Many studies demonstrate that the performance of women in strategic leadership positions can help create opportunities for other women (Arvate et al., 2018), encourage solidarity (Mavin, 2008), and promote responsibility in both demonstrating awareness and representing females in managerial practice, in addition to creating a commitment to change social structures for the benefit of women (Mavin, 2006). However, theoretical assessments of the queen bee phenomenon argue that this posture of solidarity is not universal (Faniko et al., 2017). Further, these understandings should not be investigated in isolation, as commonly carried out by the media (Khazan, 2017). As variables, experiences and organizational models must be analyzed together with the known features that make up the phenomenon.

Organizations mostly dominated by men maintain many mechanisms of discrimination that reinforce gender stereotypes and perpetuate inequality between men and women, hindering female professional advancement (Acker, 1990). Studies reveal that the experiences of discrimination faced by women throughout their professional trajectories are a constant determinant that makes up the queen bee phenomenon (Derks et al., 2016). Lack of female support itself stems from flawed working conditions that enhance masculinity and discredit female skills (Webber & Giuffre, 2019). A strategy often used by women to face the visible and invisible barriers imposed in organizations is to adopt gender behaviors that bring greater social prestige (Eagly & Carli, 2003).

Derks, Van Laar and Ellemers (2016) point out that instead of collectively facing the inequality established by traditional social structures, some women, when occupying commissioned or leadership positions, tend to perpetuate the sexist culture. This adaptive behavior reduces solidarity relationships within the disadvantaged group, imposes obstacles to female ascension, and limits both opportunities and gains arising from gender diversity in organizations, in addition to stimulating the emergence of behaviors characteristic of the queen bee phenomenon.

The queen bee phenomenon is attributed to psychological mechanisms such as: (1) male self-description; (2) strong engagement with one's career; (3) perception of sacrifices made in order to favor one's career; (4) denial of gender discrimination in one's organizational environment; (5) adherence to the meritocratic discourse; and (6) little or no support for affirmative action policies for quantitative gender equality.

Male self-description points out that to improve their social position and approximate characteristics related to men's leadership style, women in leadership positions adopt a more masculine posture (Derks et al., 2016), since this provides more status and power within the organization (Derks, Ellemers, et al., 2011). Empirical evidence from studies carried out with women in a managerial context (Faniko, Ellemers, & Derks, 2016), in the police service (Derks, Ellemers, et al., 2011; Derks, Van Laar, & Ellemers, 2011), and in the academy (Ellemers et al., 2004; Faniko, Ellemers, & Derks, 2021) has revealed high male self-description scores. In the engineering sector in Canada, women have even come to describe themselves as non-girls (Harvey & Tremblay, 2020).

In addition to presenting themselves as more masculine than their co-workers, they also declare themselves as more ambitious and 'assess their career commitment as superior to that of other women' (Faniko et al., 2016). Women who aspire to occupy positions of command, in various work contexts, realize that they need to be more dedicated to work to prove that they are competent (e.g., Ellemers et al., 2004; Faniko et al., 2017; Harvey & Tremblay, 2020). Greater commitment to their career is necessary, since they face less favorable conditions and receive fewer resources when compared to men in the same positions (Faniko et al., 2017).

High career commitment behavior is related to the perception of personal sacrifices and efforts in favor of one's career. Successful women who manifest queen bee traits highlight having made greater sacrifices than their peers who are in lower positions at the beginning of their professional careers or who prioritize love and family issues (Ellemers et al., 2004; Faniko et al., 2017). Sacrifices or choices in favor of a career are related to a woman's private life choices, such as getting married and having children, and the effort a woman needs to make in the context of work (Faniko et al., 2017).

Queen bees in turn ratify the 'status quo by denying gender discrimination' in traditionally masculine organizations, e.g., senior police officers (females) who in addition to denying the existence of gender inequality, distance themselves from more junior women, and are reluctant to mentor colleagues who work in lower positions (Derks, Ellemers, et al., 2011). Despite clear evidence of the existence of gender bias (Stroeb, Ellemers, Barreto, & Mummendey, 2009), women often deny it because calling attention to discrimination activates negative responses toward their

own femininity, and it is threatening to accept its existence in the face of their willing sacrifices; past, present, and future (Ellemers, 2018).
Faced with the denial of gender discrimination, organizations are appreciated as environments supported by merit. 'Queen bee women adhere to meritocratic discourses', even when faced with clear evidence of inequality (Harris & Giuffre, 2015). The meritocratic discourse strengthens the idea that dedication and hard work are crucial to achieving success (Weber & Giuffre, 2019). Thus, a strong adherence to meritocracy makes women believe that they alone are responsible for their failure to reach positions at the top of the organizational hierarchy.

A last behavior attributed to queen bee women is the lack of support for affirmative action policies that favor expansion of the representation of women in high command positions. Faniko, Ellemers and Derks (2016) show that although such women are against the application of affirmative action policies for co-workers who are not at the same level or who did not follow similar career paths as theirs, they are not totally inclined toward competitiveness. They defend and support policies that are intended to benefit colleagues at their same hierarchy level and who have undergone similar sacrifices. Still, Faniko, Ellemers, Derks and Lorenzi-Cioldi. (2017) note that benefiting from gender quotas may harm the careers of women, who become stigmatized as incompetent.

METHOD

Outline

The study was non-experimental (correlational), 'ex post facto', with psychometric emphasis. Taking into account the lack of measures aimed at evaluating the queen bee phenomenon in the Brazilian context, the aim of this study was to build an instrument, as well as to relate its psychometric properties. The construction of an instrument of this nature is needed due to the total lack of measures aimed at evaluating the queen bee phenomenon in its entirety. However, measures that assess related dimensions of the phenomenon, albeit in a fragmented way, are available in the literature.

Elaboration of the Queen Bee Phenomenon Scale (QBPS)

Pasquali (2017) reveals that one of the problems associated with self-reported measures refers to the systematization of the phenomenon; yet, given a cohesive theoretical foundation, it remains possible to operationally define the construct. Based on this premise, prior to the development of the instrument, the researchers carried out a comprehensive review of the literature on the phenomenon, attempting to understand which queen bee features had been both addressed and discussed in other empirical works.

After the comprehensive review of the literature on the phenomenon, other six steps were taken in the elaboration of the Queen Bee Phenomenon Scale (QBPS). They were the choice of scales previously validated in the international context; theoretical choices of the items related to the queen bee phenomenon; organization of the items into six hypothetical dimensions; translation,

back-translation, and adaptation to the national context; performance of a pre-test through interviews with civil servants; and final revisions.

The items used to build the scale for measuring the queen bee phenomenon came from other scales that have already been validated in previous studies in the international context. The choice of instruments composing the QBPS involved theoretical affinity issues, and were therefore selected because they are directly related to the queen bee phenomenon. This theoretical choice of items was made by the authors of this study and was based on the criteria recommended by Pasquali (2017): 'clarity' (the item must be intelligible even to the lowest stratum of the target population, using short sentences and simple expressions), 'simplicity' (an item must express a single idea), 'behavioral' (the item must express a behavior, not an abstraction), and 'credibility' (the wording of the item so that it does not look 'childish').

Also based on the literature review, the QBPS items were organized into six hypothetical dimensions, encompassing the main features that make up the queen bee phenomenon, which were called 'career engagement' – evaluated using Ellemers, Gilder, and Van Den Heuvel (1998) scale (e.g., 'My professional career is one of the most important things in my life'); 'male self-description' – rated on the Scott and Brown (2006) scale (e.g., 'I constantly contribute good ideas during discussions in group'); 'denial of discrimination' – assessed using the scales of Derks, Ellemers, et al. (2011) and Derks, Van Laar, et al. (2011) (e.g., 'During my career, I have always felt that women and men receive equal support throughout their careers'); 'support for gender quotas' – assessed using the scale by Faniko, Lorenzi-Cioldi, Buschini, and Chatard (2012) (e.g., 'Gender quotas are a good recruitment policy'); 'meritocracy' – measured using the Davey, Bobocel, Hing, and Zanna (1999) scale (e.g., 'In organizations, people who do their jobs well should reach the top'); and 'perceived sacrifice' – measured by the scale of Faniko et al., (2017) (e.g., 'I have dedicated my time to work instead of being with my family or friends').

Once the dimension building and item choosing stages were completed, the process of translation and adaptation to the national context began. The scale was also submitted to 'back-translation', performed by a professional English language teacher. Few differences were identified between the back-translation and the original scale items, so a pre-test was performed through interviews with civil servants, using the items from the selected scales. At this stage, certain items and scales were substituted due to the participants' difficulties in understanding the item – e.g., Bem scale (1974) was replaced by the Scott and Brown scale (2006). Further, a final review and debate among the authors led to a questionnaire with six dimensions, and 29 items.

Participants

The study included 495 women from 23 states who worked in higher education institutions in Brazil, with a mean age of 43 years (SD = 9.50; and ranging from 20 to 71 years). The sample was accessed for convenience (non-probabilistic) and to achieve the proposed objective, we chose to randomly divide the sample into two groups for exploratory and confirmatory analysis procedures. Group 1 (n = 248) presented a mean age of 44 years (SD = 9.05; ranging from 20 to 71 years), with the majority being married (60.9%) and holding a postgraduate degree (98.8%). In the period in which they responded to the survey, 24.6% of them also held a leadership

position. Group 2 (n = 247), in turn, presented a mean age of 42 years (SD = 9.78; ranging from 22 to 71); most of this group was married (54%), holding a postgraduate degree (96%), and when asked, 27.8% of respondents in this group said they held a leadership position.

Instruments

Participants answered demographic questions (e.g., age, gender, education, marital status) and responded to the Queen Bee Phenomenon Scale (QBPS), which initially contained 29 items (e.g., 'I work overtime for the organization'; or 'In organizations, people who do their job well should reach the top'), which were answered on a seven-point Likert scale, ranging from one (strongly disagree) to seven (strongly agree).

Procedures

Data collection

Data collection was carried out online from the Survey Monkey platform, which generated a link to the survey disseminated through online social media (e.g., WhatsApp). Through this channel, 57 questionnaires were obtained fully answered. Faced with the difficulty of obtaining significant feedback from the links shared via social networks, and in order to ensure a greater number of respondents from other states (not of the researchers), institutional e-mails available on the websites of 64 federal universities, private universities (e.g., Unifor, FGV, Mackenzie), and state universities (e.g., USP, UECE, EURJ, URCA) were searched, and 6,126 e-mails were sent, of which 438 fully answered questionnaires were obtained, which characterizes our sampling type as a non-probabilistic convenience one. Only those who agreed to participate in the study by signing the Informed Consent Form continued their participation in the research. They were assured of the privacy and the anonymity of their responses, the voluntary nature of their participation, and the prerogative of quitting at any time, without consequences. The average response time was 10 minutes.

Data analysis

Data were analyzed using the SPSS statistical package, version 25, to perform descriptive statistics (e.g., means, standard deviations, frequencies). Inferential statistics, as the Student's t-test, was used to verify the discriminative power of the items, and principal component analysis (PCA) was used to verify the measure's structure. In addition, Cronbach's alpha was used to assess internal consistency. The internal consistency indicators of the measure were considered suitable for research purposes with a Cronbach's alpha equal to or greater than 0.60 (Viladrich, Angulo-Brunet, & Doval, 2017). It is noteworthy that the choice of principal component analysis was based on the ease of interpreting the structure and the possibility of independently considering the six components (Damásio, 2012).

For the confirmatory factor analysis (CFA), the Amos software (version 25) was used with the following adjustment indicators for the model (Brown, 2015): χ^2 – chi-square (χ^2 – ideal low values; χ^2/gl recommended values between two and three); comparative fit index – CFI (satisfactory value close to 0.90); Tucker-Lewis coefficient – TLI (recommended values close to

1.00, but above 0.90); Root-Mean-Square error of approximation – RMSEA (values between 0.05 and 0.08); and standardized root mean square residual – SRMR (values less than 0.10, and preferably less than 0.08). As an additional CFA procedure, the evidence of the scale was verified through the discriminant validity and composite reliability, considering indices recommended by Costa (2011).

RESULTS

Principal component analysis results

Initially, to verify whether the items in the QBPS could discriminate subjects with similar scores, an analysis of their discriminative power was carried out. The total score of the participants was considered and two criteria groups were formed (below and above the median). Subsequently, the means of the groups were compared for each item of the instrument using a Student's t-test for independent samples. It was observed that the whole set of QBPS items was able to satisfactorily discriminate the two groups ($p < 0.05$). A complete table with these results is available upon request from the study authors.

Prior to the exploratory procedures involving the internal structure of the QBPS, the factorability of the data was assessed using Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity test criteria. The findings supported the PCA performance, suggesting extraction of at least one dimension underlying the items [KMO = 0.77 and χ^2 (406) = 2793.712, $p < 0.001$].

This type of analysis was performed to identify the number of components for extraction, while considering differing criteria. The Kaiser (eigenvalue equal to or greater than one) indicated a structure with eight components, with eigenvalues varying between 5.46 and 1.05, jointly explaining 63.4% of the total variance. The Cattell (graphical distribution of eigenvalues) suggested a six-component structure. These are also available upon request.

To resolve doubts concerning the number of dimensions, parallel analysis was used as a third criterion (Horn's criterion), which is a more robust criterion (Dobriban & Owen, 2019). Considering the parallel analysis data (Horn's criterion) and the parameters of the database (248 participants and 29 variables), in 1,000 simulations, the adequacy of the retention of a hexafactorial solution was confirmed. In other words, comparing the eigenvalues obtained using the Kaiser criterion with the parallel analysis values, it was found that the seventh eigenvalue of the empirical database (1.14) was lower than that obtained through parallel analysis (1.29), corroborating the existence of a hexafactorial structure.

Therefore, a new PCA was performed, fixing the extraction to a single component and adopting varimax rotation. It was found that the component jointly explained 55.8% of the total variance. To define the item as belonging to the dimension, it was assumed that it should have a minimum factor loading of |0.30|, which is the cutoff point suggested by the literature (Pasquali, 2017). All 29 items reached the required minimum saturation. However, it was necessary to exclude five items since they were semantically incompatible with their dimensions. Thus, a total of 24 items

remained. These remaining 24 items were submitted to another PCA [KMO = 0.78 and to Bartlet's sphericity test, X^2 (276) = 2290.392, $p < 0.001$], and the criteria for factor retention corroborated the hexafactorial structure: only six eigenvalues greater than one (Kaiser), and the sixth simulated value was lower than that observed (Horn). The results of this analysis are shown in Table 1 below.

Table 1.

Factorial structure of the Queen Bee Phenomenon Scale (QBPS)

Items	I	II	III	IV	V	VI
01. My professional career is one of the most important things in my life.	0.11	0.03	0.04	0.13	**0.73**	0.18
02. My life's ambitions are mainly related to my career.	-0.05	0.03	0.13	0.06	**0.80**	-0.04
03. My career plays a central role in my life.	0.1	0.04	0.18	0.07	**0.80**	0.15
04. I work for the organization outside working hours.	0.1	0.06	0.26	-0.03	-0.13	**0.78**
05. I always contribute with good ideas during group discussions.	-0.08	0.06	-0.11	-0.02	0.21	**0.63**
06. I work tirelessly to solve difficult problems at work.	-0.16	-0.08	0.09	0.16	0.34	**0.60**
07. During my career, I've always felt that women and men receive equal support throughout their career.	**0.69**	-0.26	-0.1	0.13	0.1	-0.1
08. In organizations, men and women have the same chances of being promoted.	**0.65**	-0.34	0.02	0.03	0.12	-0.07
09. In my career, I was ridiculed or discriminated against for being a woman. (R)	**0.85**	-0.03	-0.15	-0.03	0.04	-0.04
10. During my career, I've noticed that ambitious women are prevented from pursuing their careers and aspirations. (R)	**0.68**	-0.19	-0.19	-0.13	-0.07	0.01
11. I feel that being a woman has prevented me from receiving important promotions and salary increases. (R)	**0.80**	-0.1	-0.23	0.01	-0.03	0.06
12. In organizations, people who do their jobs well should make it to the top.	-0.04	0.14	0.01	**0.62**	0.12	0.02
13. In life, people should get what they deserve.	-0.08	-0.21	-0.01	**0.56**	0.05	0.05
14. Promotion decisions should consider the effort people put into their work.	0.05	0.14	0.07	**0.78**	-0.02	0.05
15. Qualifications should have more weight than seniority in promotion decisions.	-0.06	-0.06	0.12	**0.55**	0.12	-0.05
16. Considering equal abilities, promotion should always be given to the person who tries hardest.	0.13	0.04	0.01	**0.77**	-0.01	-0.01
17. I have dedicated my time to work instead of being with my family or friends.	-0.1	0.13	**0.71**	0.07	0.07	0.24

Continues

Table 1 (continued)

Items	I	II	III	IV	V	VI
18. I canceled, reduced, or postponed family vacations to respect my professional commitments.	-0.08	0.07	**0.68**	0.03	0.07	0.22
19. Because of my career, I sometimes give less importance to my values and beliefs.	-0.04	0.04	**0.58**	0.01	-0.01	-0.38
20. I prioritized my career over my couple relationships.	-0.23	0.08	**0.72**	0.03	0.19	-0.06
21. I adapted my decision to have children or not depending on the demands of my career.	-0.25	0.11	**0.51**	0.08	0.11	-0.01
22. Gender quotas are a good recruitment policy.	-0.27	**0.87**	0.16	-0.02	0.05	0.02
23. I am in favor of gender quota policies.	-0.29	**0.88**	0.11	-0.03	0.04	0.02
24. Gender quotas allow women an equal chance as men to be promoted.	-0.2	**0.82**	0.15	0.13	0.02	0.02
Number of items	5	3	5	5	3	3
Proper value — Eigenvalue	5.13	3	1.95	1.64	1.49	1.3
% variance	21.4	12.5	8.13	6.2	5.42	4.4
Cronbach's alpha	0.84	0.92	0.71	0.67	0.75	0.55
Average inter-item correlation (ri.i)	0.51	0.58	0.33	0.28	0.50	0.29

Notes. I (Denial of discrimination); II (Support for gender quotas); III (Perception of sacrifice); IV (Meritocracy); V (Career engagement); VI (Male self-description); (R) (Inverted items).

A description and an interpretation of each component are presented below:

Component I. This component presented an eigenvalue of 5.13, explaining 21.4% of the total variance. The five items had factor loadings ranging from 0.65 (Item 08. In organizations, men and women have the same chances of being promoted) to 0.85 (Item 09. In my career, I was ridiculed or discriminated against for being a woman). In this sense, it seemed appropriate to define Component I as a 'denial of discrimination'. Its internal consistency (Cronbach's alpha) was 0.84, and its mean inter-item correlation (ri.i) was 0.51.

Component II. Its eigenvalue was 3.00 (12.5% of the total variance). The three items that represent it had factor loadings ranging from 0.82 (Item 24. Gender quotas allow women to have an equal chance with men to be promoted) to 0.88 (Item 23. I am in favor of policies for gender quotas). Its content seemed clear, given the name: 'in support of gender quotas', and it presented an adequate internal consistency (α = 0.92 and ri.i = 0.58).

Component III. This component presented an eigenvalue of 1.95 (8.13% of the total variance) and items with factor loadings between 0.51 (Item 21. I adapted my decision to have children or not depending on the requirements of my career) and 0.72 (Item 20. I prioritized my career over

my couple relationships), being named 'perception of sacrifice'. Its Cronbach's alpha (α) was 0.71 and homogeneity (ri.i) was 0.33.

Component IV. Its eigenvalue was 1.64 (6.20% of the total variance) and its items presented saturations between 0.55 (Item 15. Qualifications should have more weight than seniority in promotion decisions) and 0.78 (Item 14. Promotion decisions should consider the effort people put into their work). It was decided to name this 'component meritocracy'. It presented an internal consistency index (Cronbach's alpha) of 0.67 and a mean inter-item correlation (ri.i) of 0.28.

Component V. This component presented an eigenvalue of 1.49, explaining 5.42% of the total variance; and its items presented factor loadings ranging from 0.73 (Item 01. My professional career is one of the most important things in my life) to 0.80 (Item 02. My life's ambitions are mainly related to my career). From the items that made up this dimension, it was decided to name it 'career engagement'. It had an internal consistency (Cronbach's alpha) of 0.75, and a mean inter-item correlation (ri.i) of 0.50.

Component VI. This last component presented an eigenvalue of 1.30, explaining 4.40% of the total variance. Its items presented loading factors that ranged from 0.60 (Item 06. I work tirelessly to solve difficult problems at work) to 0.78 (Item 04. I work overtime for the organization). This dimension was named 'male self-description', with a Cronbach's alpha of 0.55 and a mean inter-item correlation (ri.i) of 0.29.

Confirmatory factor analysis results

After the exploratory analyses, a confirmatory factor analysis was carried out to test the hexafactorial structure of the scale, considering the covariance matrix and opting for the maximum likelihood (ML) estimator. The results for Model 1 presented the following results: χ^2 (237) = 436.58, $p < 0.001$, $\chi^2/gl = 1.84$, CFI = 0.90, TLI = 0.88, SRMR = 0.06, RMSEA = 0.05 ($CI_{90\%}$ = 0.050-0.067).

Therefore, a change was made based on the software's adjustment indices to improve the model. This change was related to a connection between the errors in the measurements of the first two items of the 'denial of discrimination' dimension. After correction, a new analysis was performed (Model 2), which demonstrated satisfactory fit indices, as follows: χ^2 (236) = 373.64, $p < 0.001$, $\chi^2/gl = 1.58$, CFI = 0.93, TLI = 0.92, SRMR = 0.06, RMSEA = 0.04 ($CI_{90\%}$ = 0.039-0.058).

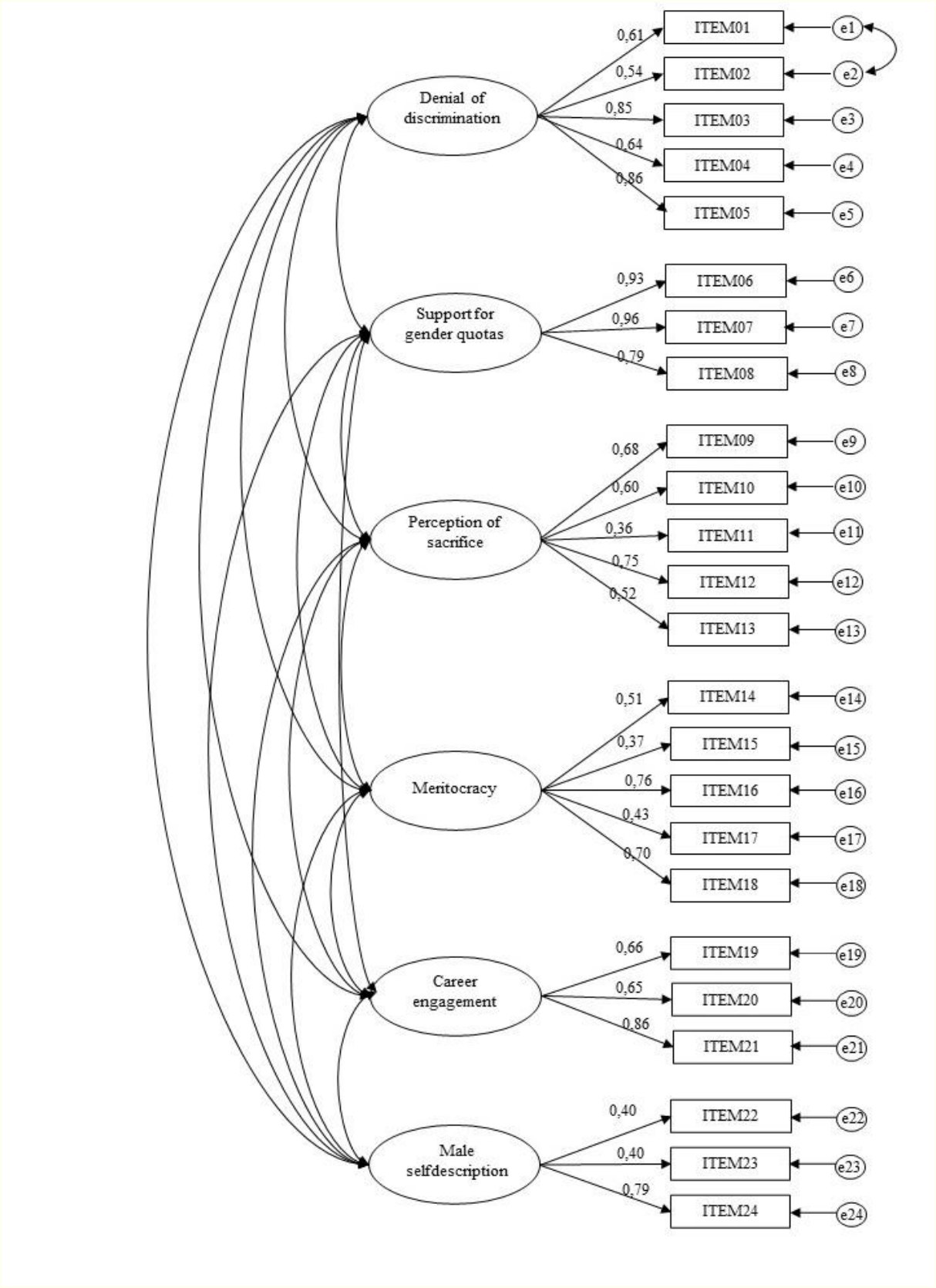

Figure 1. Hexafactorial model of the Queen Bee Phenomenon Scale (QBPS).

As shown in Figure 1, all saturations (lambdas, λ) were statistically different from zero ($t > 1.96$, $p < 0.001$), and presented values within the expected range |0-1|, ranging from 0.36 (Because of my career, I sometimes give less importance to my values and beliefs) to 0.96 (I'm in favor of gender quota policies).

Complementary analyses

From the results of the steps described above, and to obtain better reliability for the scale, calculation of discriminant validity and composite reliability was performed. For these analyses, respondents from the second group of data used in the confirmatory factor analysis were considered. Table 2 below shows the extracted and shared variance data that are used to verify the discriminant validity.

Table 2.

Measures of extracted and shared variance

	Extracted and shared variance					
Denial of discrimination	**0.617**					
Support for gender quotas	0.246	**0.864**				
Perception of sacrifice	0.151	0.114	**0.475**			
Meritocracy	0	0.004	0.02	**0.452**		
Career engagement	0.002	0.006	0.073	0.042	**0.675**	
Male self-description	0.009	0.011	0.033	0.008	0.078	**0.528**

In Table 2, we note that the results of the extracted variance (main diagonal) are systematically greater than the explained variances (square of the correlation between dimensions). Thus, there is evidence of discriminant validity between the six proposed dimensions (Costa, 2011). Complementing this step, we proceeded to composite reliability, whose measure is obtained through the formula $\Sigma (\Lambda)^2/\Sigma (\Lambda)^2 + \Sigma (\varepsilon)$, where $\Lambda_{(s)}$ are the factor loadings and ε is the measurement error. The sum of the squared factor loadings minus the measurement error is equal to one, so the error value is obtained by the formula $1-\Lambda^2$. Thus, the composite reliability of the scale reached a value of 0.94, which ensures a measure above the acceptable minimum of 0.70 (Costa, 2011). Discussions and implications of the construction of the scale from a technical and theoretical point of view are presented below.

DISCUSSIONS

The aim of this study was to develop an instrument to assess the queen bee phenomenon in the Brazilian context, verifying its evidences of factor validity and internal consistency. Initially, the elaboration process of this instrument, called the Queen Bee Phenomenon Scale (QBPS), is

discussed, and its psychometric evidences afterwards. Additionally, the theoretical implications of having an instrument aimed at measuring the queen bee phenomenon in the Brazilian context are discussed. Finally, some potential limitations of the study and recommendations for future research are discussed.

The QBPS construction process

During the item elaboration process, theoretical, empirical, and analytical procedures following the recommendations of Pasquali (2017) were considered. The care taken in constructing the QBPS, as previously described, seems evident. Specifically, the literature on the construct was consulted, seeking to systematize the theoretical framework that supported the instrument (Derks et al., 2016). In this sense, the construct was constitutively defined in line with the literature (Ellemers et al., 2004; Faniko et al., 2017).

The following step was to operationalize the construct, bringing together items from other existing instruments in addition to following the criteria suggested by Pasquali (2017), and choosing the items that would make up the final version of the instrument: 'clarity' (the item must be intelligible even to the lowest stratum of the target population, using short sentences and simple expressions), 'simplicity' (the item must express a single idea), 'behavioral' (the item must express a behavior, not an abstraction), and 'credibility' (wording the item so that it does not look 'stupid').

Empirical and analytical procedures were then performed, including statistical treatment and analysis of the items (Pasquali, 2017). In this juncture, the American Educational Research Association, the American Psychological Association, and the national Council on Measurement in Education (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NMCE], 2014) declare that validity verification comprises one of the most fundamental conditions when it comes to instrument construction and analysis, since it reveals their psychometric qualities (Damásio & Borsa, 2017).

QBPS psychometric evidence

Understanding the various phenomena that take place in social life is the primary objective of human and social science investigations. When choosing to use self-reporting measures as a methodological resource to apprehend such phenomena, it is necessary to ensure that the items in these measures are rigorously representative of the construct or phenomenon in question. Thus, factorial validity assumes a prominent role, since it brings together a set of technical procedures that ensure that the items of a given psychometric measure portray the theoretical theme they claim to correspond (Chizzotti, 2018). Important initiatives, such as the International Test Commission (International Test Commission [ITC], 2017), have been created in order to provide guidelines for the development of valid and reliable measures that can be used in different cultural contexts.

In this sense, empirical and analytical procedures were performed, contemplating the statistical treatment of the QBPS items (Hair, Black, Babin, Anderson, & Tatham, 2009; Pasquali, 2012). The literature indicates that for construction and cross-cultural validation of instruments, investigating indicators of factor validity for the measure is essential, since it allows us to assess its psychometric qualities (Damásio & Borsa, 2017). Thus, in addition to the verifying initial evidences of factor validity and the internal consistency of the measure — indicated by Pasquali (2012) and Damásio (2012) —, the discriminative power of the QBPS items was also analyzed.

The QBPS appears to be psychometrically adequate. Its items present satisfactory discriminative power, and within the analyzed construct, allow differentiation of respondents with similar scores. The factorability of the data matrix was also evaluated, and the KMO index and Bartlett's sphericity test indicated its suitability for principal component analysis (Pasquali, 2017). To identify the factorial solution best suited to the items, multiple criteria, being those classically used in the literature (Kaiser, Cattell, and Horn), were used. Given that the first two indices (Kaiser and Cattell) did not provide effectively conclusive data, it was decided to adopt the dimensionality indicated by Horn's criterion (Dobriban & Owen, 2019).

From this, the QBPS presented a hexafactorial structure, and by fixing the number of components, the structure was suitable even when the more robust parallel analysis method was used. The internal consistency indicators of the measure were suitable for research purposes as well, with a Cronbach's alpha equal to or greater than 0.60 (Viladrich, et al., 2017), and a higher average for inter-item correlations than recommended (Silber, Robmann, & Gummer, 2018). It is noteworthy that one of the dimensions of the measure, specifically the 'male self-description' component, did not obtain a satisfactory internal consistency index. Thus, it is important to consider that this study is a preliminary step in construction of a measure for a still little explored social phenomenon in the Brazilian context, and it is still necessary to replicate our findings, here in more representative samples of the population. Borsa and Seize (2017) note that the construction of new measures takes place when there is an absence of instruments suited to the context and objectives of the researcher, and only an incipience of instruments with adequate psychometric properties. In this juncture, the researcher may face lower than expected indices, especially when it comes to a construct using self-reporting measures, and which has been little utilized.

Even in the face of these challenges, the authors of this study consider that a proper investigation of attitudes and opinions with the use of questionnaires, scales, and self-reported inventories is essential to understand the perception of individuals concerning their own behavior and that of others (Faleiros, Käppler, Pontes, Silva, Goes, & Cucick, 2016). In this sense, self-reporting is not only able to account for the subjective experience, but also for an immense network of events, both internal (e.g., emotions) and external (e.g., behavioral dispositions), making it an effective methodical category.

Considering the eminently exploratory nature of principal component analysis, more robust analyses were also used. Specifically, we sought to confirm the structure of the QBPS in a different sample through confirmatory factor analysis. This procedure allows a more accurate conclusion

concerning the factorial validity of the measure mentioned herein, and indicates how the empirical data fit the proposed theoretical model (Franco, Valentini, & Iglesias, 2017).

Based on the results, the exploratory phase confirmed a hexafactorial model with good adjustment indices, requiring only the correction between the measurement errors of two variables in the 'denial of discrimination' dimension due to their high covariance. Thus, considering the literature values (Brown, 2015) for the adjustment indices in the theoretical model, we confirmed the six-component structure.

The additional procedures involved calculation of the discriminant validity measure, which "indicates how much a scale is different from others that should in fact differ" (Costa, 2011, p. 259), and composite reliability, which is a supplementary parameter to Cronbach's alpha, attesting to the reliability of the scale. The results demonstrated that the QBPS presents both good discriminant validity and composite reliability. Thus, based on the various results discussed above, there are many evidences from a psychometric point of view that the scale proposed here is reliably valid for future use in other studies.

Theoretical and social implications of the QBPS

The queen bee phenomenon is a metaphor that presents behavioral characteristics of women in leadership positions that can impede or reduce the professional development of other women at the beginning of their careers or in positions at the bottom of the organizational hierarchy. Studies on the QBP strive to denounce male organizational contexts as promoting such behaviors (Faniko et al., 2017).

The mostly male composition of an organizations' directorship and the relationship that the image of successful leadership has with characteristics historically associated with men (Eagly & Carli, 2003) together result in adherence to stereotypically male behaviors and the legitimization of the hierarchy by women who aspire to occupy the highest positions in organizations.

Although in the short term these individual strategies are more efficient than collective strategies, in the long term they bring negative consequences since these leaders are unable to enjoy the support of their subordinates. Women who are in the early stages of their careers and aspire to professional success often have their advancement opportunities limited and their self-esteem compromised due to the behavior of their queen bee leaders. Thus, such women at the beginning of their careers tend to feel demoralized by their supervisors when they might have found mentors in them, who could help their professional development and modeling female leadership (Derks et al., 2016).

The behaviors mentioned above ('male self-description; strong engagement with one's career; perception of sacrifices' made in order to favor the career; 'denial of gender discrimination' in their organizational environments; 'adherence to meritocratic discourse'; and 'little or no support for affirmative policies for quantitative gender equality') are measured in the QBPS, whose social relevance lies in its ability to assess the queen bee phenomenon in graduated responses, and understand QBPS from its traits rather than as a general state that would be reduced to simply

classifying some women as queen bees and others not (Derks et al., 2016). The QBPS also allows capturing nuances of the phenomenon in light of the respondent's age range or field of professional activity. Differences between private or public organizations, or traditional or new organizational models that focus on technology and innovation, whether they belong to the primary, secondary, or tertiary sectors of the economy, as well as classifications establishing variations in work contexts differently according to positions or professions regarded as male or female, are assessed by the QBPS.

Further scientific studies may help toward a broader understanding of the phenomenon to minimize the negative effects of the image conveyed by the popular media of women who assume the highest leadership positions (Khazan, 2017) and to stimulate reflection at individual and organizational levels on policies and practices for managing people, and the behavior of managers that may favor gender hierarchy at work. This would allow organizations to take advantage of the opportunities and gains that arise through gender diversity. Thus, validation of the QBPS represents a theoretical contribution to (workplace) gender studies, since measures of the phenomenon are not found in either national or international articles. Validation also contributes to the operationalization of research on the phenomenon, being only incipient in the Brazilian context (e.g., Arvate et al., 2018).

FINAL CONSIDERATIONS AND FUTURE DIRECTIONS

Although this research has potential and contributes to the literature by providing an instrument with appropriate psychometric indices, it is necessary to consider its limitations. Specifically, it is necessary to take into account that the sample was selected for convenience and thus includes women in commissioned positions, and who have occupied or occupy positions of responsibility in the scientific and administrative sphere, with women who have never occupied leadership positions. The choice to include this last group was motivated by the need to expand the sample and enable more robust statistical testing. Such sample characteristics prevent generalization of the data to the population. However, this study does not propose to generalize results, but to demonstrate the parameters of the measure, enabling its use. In this sense, the number and nature of the participants were sufficient for the outlined psychometric purposes (Pasquali, 2012).

Further, since upon answering the QBPS, the respondents needed to think about and use self-reporting measures while answering, it remains possible that certain participants have been influenced by the bias of social desirability (Hauck-Filho & Valentini, 2019). In this regard, and with a view to future studies, the discriminant validity of the measure in relation to social desirability must be correctly evidenced and understood.

In the psychometric sphere, it would be good to have studies replicated with the QBPS, in addition to verifying its convergent validity with other measures, such as the 'servant leadership' (Pereira & Ferreira, 2019) and 'abusive leadership' (Puente-Palacios & Côrtes, 2019) scales. Additionally, analyzing the quality of each item via item response theory (IRT) is proposed to obtain additional information concerning the difficulty and discrimination of each item.

Finally, to expand our understanding of the queen bee phenomenon, it will be important to understand the relationship between the dimensions of the QBPS with other constructs that it might be associated with to verify whether the perception of an adequate working climate and support from colleagues and the organization presents an impact on the queen bee phenomenon. Further, certain positions and professions might be of peculiar interest for investigation, since they belong to environments traditionally occupied by men, such as politics, whether at the municipal or state level; science, especially in STEM areas (science, technology, engineering, mathematics), in which gender differences have changed little (Barros & Mourão, 2020); and even in the arts, where some niches are quite masculine such as film direction or orchestral conducting. Thus, it is suggested that future studies examine the queen bee phenomenon in different work contexts and even establish comparisons of the ways the phenomenon's features are expressed in different scenarios.

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