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Determinants of Peer Review Acceptance: Motivational Insights From German Academia

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ABSTRACT

This article examines how motivation affects peer review acceptance of journal manuscripts among German professors of biology, business administration, mechanical engineering, and sociology. Data collected via an online survey (March–May 2022) tested hypotheses based on self-determination theory. The results show significant discipline-specific differences. In the soft disciplines, intrinsic motivation, own manuscript submissions (reciprocity), and external motivation positively influenced peer review acceptance, while the motive to discover something new had a negative effect. In the hard disciplines, only sense of obligation to the scientific community was significant. Staff support positively influenced peer review acceptance in soft disciplines. The control variables revealed that the total number of peer review requests was positively related to acceptance. However, age, gender, departmental budget linked to publications, and academic discipline were not significant factors. These findings deepen our understanding of motivational factors in peer review and highlight important disciplinary differences.

1 | Introduction

Peer review, often hailed as "the golden standard of science" (Horta and Santos 2023), is crucial for maintaining the integrity and robustness of academic research. Consequently, understanding the motivation of those who participate in this voluntary and time-consuming process, notably professors, remains an area of interest. This is especially relevant in the German context because the organizational structure of German research universities is significantly shaped by professorships, which function as central units for academic management and research (Wilkesmann and Wagner 2024; Brechelmacher et al. 2015; Fumasoli, Goastellec, and Kehm 2015; Enders 2001). Professors in Germany are typically appointed as civil servants, with dedicated staff who work exclusively for them. They lead research teams with considerable autonomy and have substantial influence on research agendas, academic culture, and the development of young scientists (Clark 1983; Neave and Rhoades 1987; Hüther and Krücken 2018). Thus, the study of professors is particularly interesting because they play a crucial role in shaping the academic landscape. Moreover, professors often have considerable experience and are more likely to be invited to review journal manuscripts, making their motivations and behaviors highly relevant to understanding the overall dynamics of peer review in academia.

Recent concerns about the sustainability of the peer review system stem from a significant increase in article submissions (Horta and Jung 2024; Altbach and De Wit 2019; Oosterhaven 2015). From 2013 to 2016, submissions increased by 6.1% per year, while published articles increased by only 2.6% (Clarivate Analytics 2022). This disparity has not been matched by a proportional increase in the pool of qualified reviewers, resulting in an increased workload for existing reviewers (Kovanis et al. 2016). Furthermore, not all authors who submit articles reciprocate by reviewing, further

widening the gap between submitted articles and available reviewers (Dean and Forray 2018). In this context, Horta and Jung (2024) emphasized that the inequities of the peer review system have become even more pronounced. While universities, governments, publishers, and authors all benefit from the system, reviewers—who play a crucial role in maintaining the quality of scholarly work—do so without any financial compensation (Copiello 2018). This imbalance is further exacerbated by a "publish or perish" culture that creates incentives for rapid publication over the careful, time-consuming work of peer review, thus jeopardizing the long-term viability of the entire system.

Despite its scholarly importance, peer review can also be perceived as part of the broader bureaucratic demands that are placed on academics. The growing volume of publications, coupled with the increasing pressure on academics to contribute to peer review, can make review feel like an administrative task rather than a purely intellectual exercise (Mulligan, Hall, and Raphael 2013). This perception of an increasing "academic bureaucratization" (Gornitzka, Kyvik, and Larsen 1998) is particularly relevant when the time spent on peer review detracts from other academic activities, such as conducting original research, mentoring students, or securing funding (Woelert 2023). This can lead to a situation where peer review is deprioritized or viewed as a secondary obligation, despite its critical role in the research ecosystem.

These competing demands on professors' time raise the question of what motivates them to participate in peer review. According to a study by Publons, motivations to review include viewing it as fundamental to their research role (40.8%), a form of reciprocity (35.1%), keeping abreast of research trends (32.9%), ensuring research quality (32.9%), serving their discipline (17.5%), enhancing their reputation (13.9%), improving writing skills (13.5%), and building relationships with journals and editors (11.9%) (Clarivate Analytics 2022).

Currently, a few empirical studies address peer review motivation and behavior (e.g., acceptance rates or number of accepted reviews) beyond univariate and bivariate analyses. Most studies also lack a theoretical basis, with the exception of Ohly and Schneijderberg (2021) who used self-determination theory (SDT; Ryan and Deci 2000a, 2000b) to examine German professors' motivations in accreditation and evaluation processes. Comprehensive multivariate studies focusing on actual peer review behavior, such as the number of peer reviews accepted, also remain scarce to date. Horta and Santos' (2023) international study stands out in this context. They analyzed data from 2089 academics and highlighted that age, gender, and strategic research agendas influence peer review engagement, while academic inbreeding negatively affects review quality (review length). In addition, their study suggests that peer review is often deprioritized in favor of publishing, especially when resources and funding are abundant.

This study aims to provide empirical, theoretically grounded evidence focused on professors at German research universities using data from a nationwide survey that was conducted between March and May 2022 among all professors and their scientific staff in the fields of biology, business administration, and mechanical engineering. The survey included various target group-specific topics relating to workload, research activities, and collaboration within academic teams at German professorships. Notably, peer review behavior was specifically addressed in the professors' questionnaire due to their central role in academic leadership and decision-making. Therefore, the main research question of this study is:

> How is motivation to peer review associated with the number of journal manuscript reviews completed by German professors?

The rest of this study is organized as follows. It begins with the theoretical framework, proceeds with a literature review, and subsequently presents six hypotheses derived from this framework. This is followed by a brief description of the sample and an examination of the conditions related to peer review activity faced by German professors. The next sections describe the measurement instruments that were used in the study and present the statistical analysis, reporting both bivariate and multivariate results. This study concludes with a discussion that summarizes the main findings, compares them to the existing literature, addresses the limitations, and makes several recommendations for future research directions.

2 | Theoretical Framework: SDT

To better understand the motivation behind peer review acceptance, we draw on SDT (Ryan and Deci 2000a, 2000b). In particular, SDT presents a continuum of motivational concepts ranging from extrinsic (non-self-determined) to intrinsic, based on an individual's perception of the environmental structure. According to Ryan and Deci (2000a, 2000b), high external determination is associated with amotivation, slightly lower external determination with extrinsic motivation, and high self-determination with intrinsic motivation. Intermediate levels of other- or self-determination reflect different forms of extrinsic motivation resulting from internalization of rewards, social norms, or identities (Wilkesmann and Lauer 2020; Ryan and Deci 2000a, 2000b; Wilkesmann 2023). These intermediate levels of extrinsic motivation include introjected (internal rewards and punishments), identified (personal importance), and integrated regulation (synthesis with self).

Within SDT, self-determined action leads to intrinsic motivation, which is characterized by the enjoyment individuals derive from engaging in peer reviews. Integrated regulation addresses the professional identity closely linked to engaging in peer reviews. Identified regulation involves internalizing social norms, which is a common feature across professions (Freidson 2001). Professional norms guide research and academic teaching (Jaffe 2017), indicating an obligation to participate in the peer review process to ensure the quality of journal articles. Introjected regulation is characterized by internal pressures and a desire to meet internalized standards or avoid negative feelings. External regulation reflects a higher level of non-self-determination, where actions are driven by rewards or strategic considerations. In peer review, external motivation may involve nonmonetary incentives (Frey 2007), such as professional recognition, the

potential advantages of publishing in high-impact journals, or leveraging personal relationships with the editorial board (Zaharie and Osoian 2016; Mahmić-Kaknjo, Utrobičić, and Marušić 2021).

3 | Literature Review and Hypotheses

Ohly and Schneijderberg (2021) used SDT to investigate the motivations of German professors serving as peer reviewers in accreditation and evaluation procedures. Their findings reveal that professors' intention to peer review is driven by identified and introjected motivation rather than intrinsic motivation. Zaharie and Osoian (2016) conducted a qualitative study involving 42 journal referees and identified two motivation patterns: the pursuit of self-achievement and a sense of obligation to the scientific community. These patterns align with the concepts of intrinsic and identified motivation within SDT. In a meta-study, Mahmić-Kaknjo, Utrobičić, and Marušić (2021) found that communal obligations and reciprocity were the most important internal incentives, while career advancement, recognition as an expert, and building relationships with journals and editors were the primary external incentives. In their research conducted in China, Wang et al. (2022) found that communal obligations were the most strongly pronounced motivation driving both early-career and senior researchers to participate in the peer review process. Communal obligations align with identified motivation in the SDT model, while reciprocity represents an important social norm. This reflects Gouldner's (1960) concept of the norm of reciprocity, emphasizing the social obligations within academic communities. This social norm also falls into the identified motivation category and suggests that academics who frequently submit journal manuscripts should ideally reciprocate by accepting at least an equivalent number of peer review requests. According to Horta and Santos (2023), altruism leads to a ratio of articles published to peer reviews conducted that is greater than 1, while selfish behavior leads to a ratio smaller than 1. Their study found an overall review ratio of 0.76, indicating that fewer peer reviews were conducted relative to the number of articles published. However, their multivariate analyses revealed a positive association between the number of journal articles published and the number of peer reviews conducted, while the number of citations was negatively associated. These findings partially corroborate Ortega's (2017) bibliometric analysis, which found a weak correlation between bibliometric indicators (*h*-index and citations) and peer review activity.

The intrinsic desire to learn something new also plays a role in motivation, despite not being explicitly mentioned in SDT. After all, research inherently involves the desire to acquire new knowledge. By reviewing others' work, professors can stay up-to-date on recent developments in their field, recognize novel research methodologies, and challenge their knowledge and critical thinking skills (Lee et al. 2013). This sentiment was also echoed in studies by Tite and Schroter (2007), Fox, Albert, and Vines (2017), and Schweigert and Geyer-Schulz (2020), highlighting learning as a key incentive for peer review participation. Another important area of research examines the effects of monetary and nonmonetary incentives on peer review behavior, which is part of external regulation. Hamermesh (1994) found that financial rewards can speed up the review process and ensure timely completion. This conclusion was supported by Thompson et al. (2010) and Chetty, Saez, and Sándor (2014), who found that such incentives do not compromise review quality. However, Squazzoni, Bravo, and Takacs (2013) cautioned that monetary incentives could reduce review quality and efficiency. This concern was shared by Deci, Koestner, and Ryan (2001), Heyman and Ariely (2004), and Liberman, Samuels, and Ross (2004), who argued that these incentives could undermine intrinsic motivations and social norms. In contrast, nonmonetary incentives such as gifts and awards may avoid these problems, as suggested by Frey (2007) and Gallus and Frey (2016). Nevertheless, Zaharie and Seeber (2018) in an experimental study conducted among Romanian academics in business and economics report that performance-based nonmonetary rewards may reduce the willingness to review among certain groups, including male, highly productive scientists, and those from private universities.

In summary, research shows considerable heterogeneity among academics in the motivations that underlie their engagement in peer review. For example, one professor may engage in peer review activities driven by intrinsic satisfaction and intellectual fulfilment, while another may be influenced by strategic considerations such as enhancing professional reputation or fostering reciprocal relationships with high-impact journals. These different motivational drivers collectively increase the propensity to accept peer review invitations. Therefore, we propose the following hypotheses:

H1. *The higher the intrinsic motivation to engage in peer review activities, the greater the number of accepted peer review requests.*

H2. *The higher the identified motivation (sense of obligation to the scientific community) to engage in peer review activities, the greater the number of accepted peer review requests.*

H3. *The stronger the perceived commitment to the norm of reciprocity due to having published articles, the greater the number of accepted peer review requests.*

H4. *The higher the motivation to discover new things, the greater the number of accepted peer review requests.*

H5. *The higher the external motivation to engage in peer review activities, the greater the number of accepted peer review requests.*

Besides motivational aspects, acceptance of review requests may also depend on other factors, such as the collaborative nature of professors' work. German professors typically operate within professorships and lead their own research teams (Wilkesmann and Wagner 2024; Enders 2001). If they receive assistance from their team in the review process, this may reduce their workload and increase the likelihood of accepting peer review requests. Although the manuscript to be reviewed is intended solely for the official reviewer, staff assistance in writing the review can still occur in several ways, including seeking a second opinion on methodological or theoretical aspects, socializing junior scientists, or facilitating the writing process. This last motive aligns the least with good scientific practice unless the staff member is

officially proposed as a reviewer for the journal. Therefore, our last hypothesis states:

H6. *The higher the level of support from the professor's staff members, the greater the number of accepted peer review requests.*

4 | Empirical Evidence

4.1 | Survey Design and Methods

This study utilized data from a nationwide online survey of all professors across four academic fields: business administration, biology, mechanical engineering, and sociology. This selection encompasses both soft and hard disciplines, with business administration and sociology representing the soft disciplines, and biology and mechanical engineering representing the hard disciplines (Biglan 1973). The survey was conducted from March to May 2022, and participants were contacted via email. All email addresses were manually retrieved from the respective homepages of the professorships, where a total of 2040 professors were identified. After inviting 2040 professors to participate in our study, we received a total of 233 completed questionnaires. Although two reminders were sent, in times of survey fatigue, the overall response rate of 10.0% is still considered good. It is important to note that the questionnaire covered a broad range of topics beyond just peer review activities. These topics included staff recruitment, leadership practices, publication behavior and strategies, third-party funding, work motivation, and conflict management. On average, completing the questionnaire took about 35 min.

Overall, the sample consists of 27.0% female and 73.0% male professors. The average age is 52.3 years. Meanwhile, 22.7% belong to the field of business administration, 36.9% to biology, 22.7% to mechanical engineering, and 17.6% to sociology. Regarding the salary system, 22.0% belong to C3/W2 professorships (associate professors), 74.1% belong to C4/W3 professorships (full professors), and 3.9% indicated that they belong to another salary system. The C salary is the former seniority-based salary system for professors, while the W salary is the current performance-based salary system. In both systems, the C4 and W3 designations correspond to full professorships. The rationale for including both W2/C3 and W3/C4 professorships is that these positions represent the primary academic leadership positions within German universities (Wilkesmann and Schmid 2012).

According to available official statistics, the sample is representative of the population of German professors in the respective disciplines (in terms of age, gender, and salary system).

5 | Measurement

5.1 | The Dependent Variable: Number of Accepted Peer Reviews in the Last 12 Months

To measure the number of accepted peer reviews requests for journal manuscripts, we asked how many reviews the professor had accepted in the last 12 months (Figure 1). No distinction was made in the questionnaire as to whether the peer review requests came from national or international journals. However, the publication behavior of German professors in fields such as natural sciences and engineering has traditionally been oriented towards international standards, which leads to a higher volume of international publications. There has also been a significant increase in international publications in the humanities and social sciences, which have moved closer to the "natural science paradigm" (Schneijderberg, Götze, and Müller 2022). It can therefore be assumed that peer review requests from international journals predominate in the hard disciplines, while the proportion in the soft disciplines is now likely to be similarly high.

Three professors took no reviews last year, and eight professors took 50 reviews. This is a very wide range in the number of reviews taken by individual professors. The mean is 12.1 and the median is 10 reviews last year. Differentiated by disciplines,

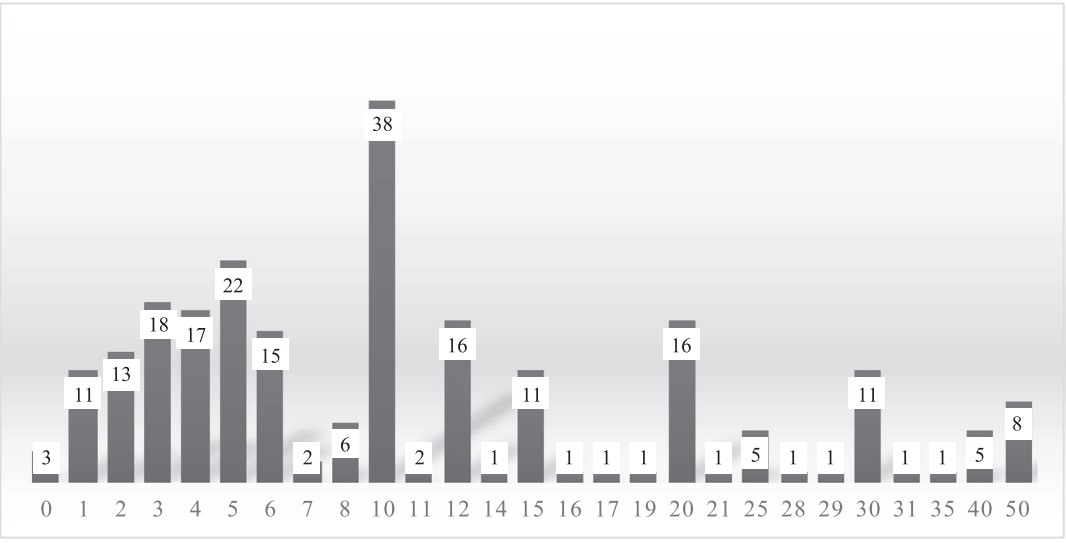

FIGURE 1 | Number of accepted peer reviews in the last 12 months ($n = 228$).

Table 1 shows the mean values of accepted peer reviews of journal articles within the last year.

With an average of 15.35 accepted peer review requests, professors stemming from mechanical engineering are at the forefront. Biology and business administration conduct slightly fewer peer reviews, 12.81 and 12.29, respectively. Meanwhile, sociologists accept an average of 6.33 peer review requests. In all disciplines studied, the high standard deviations are striking, indicating that there are professors across the disciplines who are active as peer reviewers, far more than the average, and who advance their disciplines.

To illustrate the difference between accepted and requested reviews, Table 2 shows the number of reviews requested. It is clear that many more reviews are requested per professor than are actually accepted, especially in mechanical engineering and biology. Thus, the demand for reviews is greater than the supply. On average, the acceptance rate of reviewing journal manuscripts is 51.3% for biology, 64.6% for business administration, 53.4% for mechanical engineering, and 62.4% for sociology. Again, the high standard deviation across disciplines is striking, reflecting the fact that some professors are frequently asked to review and others are rarely asked.

Finally, Table 3 is intended to show how the various areas of responsibility of a professor affect their day-to-day work in percentage terms. While mechanical engineering professors spend the least amount of time on research at 16.70%, they are proportionately the most involved in peer review activities at 9.62%. Sociology professors report the lowest percentage of peer review activities at 8.17%. The high percentage of teaching and examination duties across the disciplines is noteworthy because in international comparison the teaching load for a full professor in Germany is quite high at 9 h per academic semester (equivalent to four lectures), making it the most time-consuming task (Wilkesmann and Lauer 2020).

TABLE 1 | Average numbers of accepted peer review requests by discipline.

Disciplines	M (SD)
Biology ($n = 86$)	12.81 (11.19)
Business administration ($n = 51$)	12.29 (12.05)
Mechanical engineering ($n = 51$)	15.35 (13.61)
Sociology ($n = 40$)	6.33 (5.22)

TABLE 2 | Average numbers of requested peer reviews by discipline.

Disciplines	M (SD)
Biology ($n = 86$)	31.75 (27.11)
Business administration ($n = 51$)	23.88 (27.13)
Mechanical engineering ($n = 51$)	32.38 (26.57)
Sociology ($n = 40$)	11.12 (10.20)

TABLE 3 | Proportion of working time in %.

	Overall	Biology	Business administration	Mechanical engineering	Sociology
Research (incl. publications and talks)	20.62%	20.12%	23.68%	16.70%	22.80%
Teaching and examinations	22.62%	20.76%	25.38%	20.38%	25.85%
Peer review (journal manuscripts and funding proposals)	**9.25%**	**9.59%**	**9.15%**	**9.62%**	**8.17%**
Supervising students and doctoral students	15.75%	17.79%	14.81%	15.75%	12.68%
Third-party funding	11.61%	11.45%	7.45%	17.08%	10.24%
Management/administration	17.23%	17.38%	16.60%	16.60%	18.54%
Other	2.55%	2.62%	1.98%	3.77%	1.59%

6 | The Independent Variables

6.1 | Motivation

To measure the motivation to peer review journal manuscripts, we operationalized each dimension with the following items (1 = "totally disagree" – 5 = "totally agree"). Intrinsic motivation was measured with the item "I enjoy writing reviews for journal manuscripts". Identified motivation was measured with the item "I feel obligated to write peer reviews for my scientific community". The factor of liking to discover new content and methods was captured with the following items: "I gain interesting insights into the latest methodological developments in my field", "I gain interesting insights into the latest thematic developments in my field", "I become aware of recent literature in my field", and "I gain knowledge about my competitors". External strategic motivation was measured with the following items: "I feel obligated to accept peer review requests because I am a member of the editorial board", "A high journal impact factor (JIF) is important to me in requests for peer review", "I feel obligated to accept peer review requests because I know the members of the corresponding editorial board", and "I accept requests from journals in which I would like to publish myself someday".

A principal component analysis (PCA) with varimax rotation, a KMO-Value 0.745, and an explained variance of 69.44%, restricted to four factors, revealed the following four factors (Table 4): discover new things (Cronbach's $\alpha = 0.85$), external strategic motivation (Cronbach's $\alpha = 0.62$), identified motivation, and intrinsic motivation.

The norm of reciprocity has been operationalized with the number of submitted journal manuscripts within the last 2 years (Table 5). As can be seen in Table 6, the claim to authorship varies significantly between soft disciplines (business administration and sociology) and hard disciplines (biology and mechanical engineering) according to our data, which corresponds to the higher number of submitted journal manuscripts in the hard disciplines. This also explains why, on average, the number of co-authors in the hard disciplines is usually higher than in the soft disciplines (Wuchty, Jones, and Uzzi 2007), resulting in more publications.

Figure 2 shows the distribution of responses regarding what motivates professors to write peer reviews for journal manuscripts. For better readability, categories 1 (="do not agree at all") and 2 (="tend to disagree") and categories 4 ("tend to agree") and 5

TABLE 4 | PCA with varimax rotation of motivation items.

	Discover new things, $\alpha = 0.85$	External strategic motivation, $\alpha = 0.62$	Identified motivation	Intrinsic motivation
I feel obligated to write peer reviews for my scientific community	0.050	0.069	**0.866**	0.077
I enjoy writing reviews for journal manuscripts	0.259	0.219	0.194	**0.805**
I gain interesting insights into the latest thematic developments in my field	**0.877**	0.061	0.103	0.143
I gain interesting insights into the latest methodological developments in my field	**0.878**	0.142	0.074	0.160
I become aware of recent literature in my field	**0.879**	0.008	0.070	0.030
I gain knowledge about my competitors	**0.657**	0.117	−0.360	−0.028
I feel obligated to accept peer review requests because I am a member of the editorial board	−0.082	**0.663**	0.226	0.101
A high journal impact factor (JIF) is important to me in requests for peer review	0.125	**0.731**	−0.121	0.186
I feel obligated to accept peer review requests because I know the members of the corresponding editorial board	0.057	**0.562**	0.368	−0.543
I accept requests from journals in which I would like to publish myself someday	0.183	**0.710**	−0.021	−0.089

(="fully agree") are combined. Here, it is particularly striking that only 13.5% of the professors say that they enjoy writing peer reviews, thus intrinsic motivation is the least pronounced. The strongest motivation (83.2%) is the commitment to the scientific community.

6.2 | Other Independent Variables

Support in the peer review process was measured by the frequency with which staff members are asked to help with peer review (1 = "never"–5 = "very often"). Here, 50.2% of the professors indicate that they never ask their staff for assistance, 16.0% seldom ask, 19.5% sometimes ask, and 14.3% often or very often ask. Table 7 shows the mean values of the responses (1 = "strongly disagree"–5 = "strongly agree") from 115 responses on what the concrete support looks like.

The mean responses show that while facilitating the writing process is the least agreed upon (M = 2.48), socialization of junior scientists is one of the main reasons professors ask their staff for support (M = 4.11) (Table 7). Finally, four control variables are added: whether the budget depends on the number of publications (1 = "yes", 0 = "no"), gender (1 = "female"), academic discipline, and age (in years). For the German academic profession, Schneijderberg, Götze, and Müller (2022) found a positive association with the number of published peer-reviewed journal articles when higher education institutions emphasize performance, both through its organizational research performance orientation and its performance-based allocation of funding. This can also affect the total number of accepted peer review requests. The role of gender in predicting the willingness to become a reviewer has been examined, but the results are mixed. For instance, Ortega (2017) and Zhang et al. (2022) analyzed Publons data and found that male reviewers report conducting more reviews than female scholars. In contrast, Lerback and Hanson (2017) found that although women receive fewer invitations to review, the proportion of men and women who decline these invitations is similar.

TABLE 5 | Average submitted journal manuscripts by discipline.

Disciplines	M (SD)
Biology ($n = 86$)	14.74 (10.71)
Business administration ($n = 51$)	10.94 (8.44)
Mechanical engineering ($n = 51$)	19.44 (15.15)
Sociology ($n = 40$)	6.81 (4.82)

7 | Results

We begin this section by presenting the bivariate results, followed by the multivariate results. Given the observed differences in review and publication behaviors (e.g., the number of submitted journal manuscripts and authorship claims) across the examined disciplines, we conducted the multivariate analyses separately for soft disciplines and hard disciplines, as categorized by Biglan (1973). An overall model with discipline as control variable is also included.

7.1 | Bivariate Analysis

As shown in Table 8, the bivariate analysis reveals that the majority of metric independent variables positively correlate with the number of accepted peer reviews, with the strongest correlation observed with the total number of peer review requests ($r = 0.696$, $p < 0.001$). Additionally, external (strategic) motivation shows weak significant correlations with all other independent variables.

7.2 | Multivariate Analysis

Table 9 summarizes the empirical results from the negative binomial regression models with the number of accepted journal peer reviews as a dependent variable. The use of negative binomial regression for the analysis of accepted peer reviews by professors is justified by the nature of the data and its

TABLE 6 | Claim to authorship.

Claim to authorship	Soft disciplines ($n = 93$)	Hard disciplines ($n = 138$)
Writing of the text	94.3%	79.0%
Conception of the study on which the text is based	63.2%	83.1%
Preparation of the data	29.5%	73.2%
Analysis of the data	65.9%	92.0%
Acquisition of third-party funding	6.8%	32.8%
Interpretation of the data	50.6%	78.7%
Advising role	1.1%	8.7%
Data collection	19.5%	59.1%
Leadership role	1.0%	9.6%
Doctoral supervisor of the co-author(s)	5.7%	32.6%

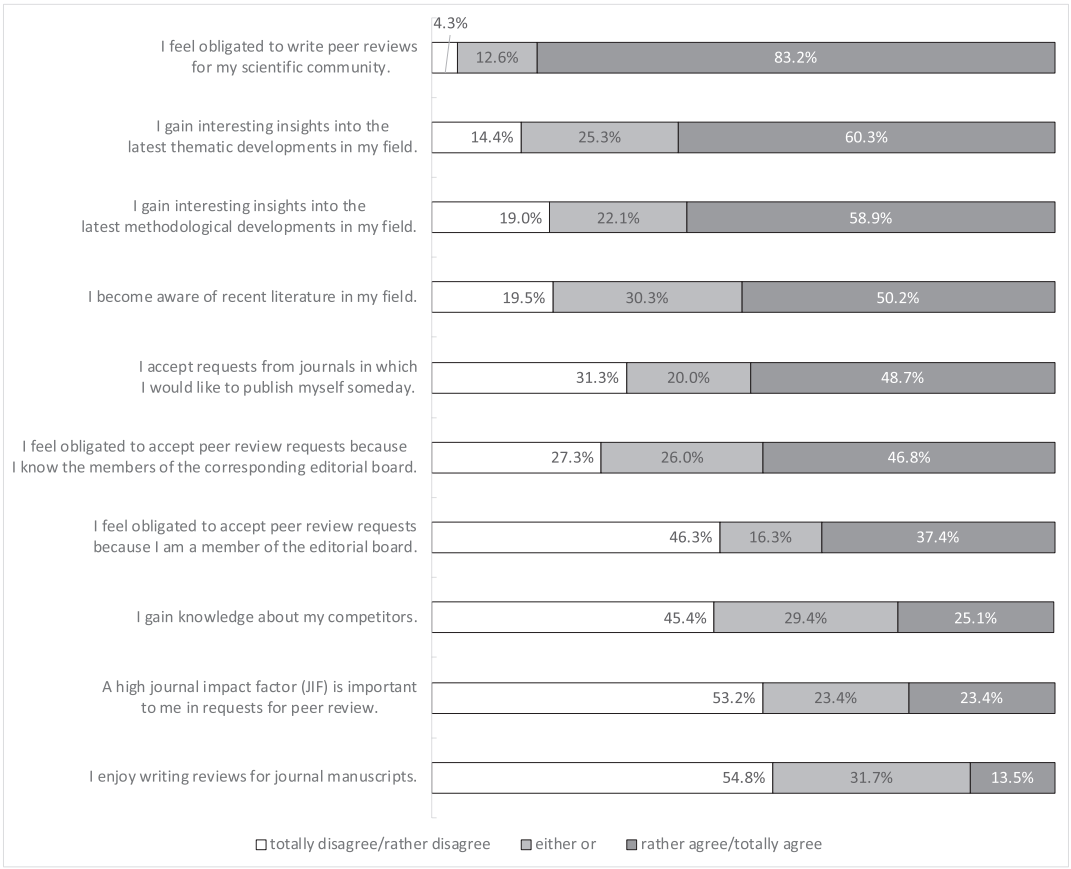

FIGURE 2 | Motivation to perform peer reviews for journal manuscripts.

TABLE 7 | Support during the peer review process for journal articles by staff members.

I ask my staff for support	M (SD)
... to get a second opinion on methodological aspects (e.g., special procedures or methods)	3.20 (1.31)
... to get a second opinion on theoretical aspects	2.81 (1.28)
... to get a second opinion on unclear content	2.88 (1.34)
... to teach my junior staff to write peer reviews.	4.11 (1.04)
... to make the writing process easier for me.	2.48 (1.48)

characteristics. When examining the number of peer reviews accepted, it is common to encounter over-dispersion, where the variance exceeds the mean. This over-dispersion is due to the inherent variability in the review process, where some professors may have a higher or lower acceptance rate than others. By using a negative binomial regression model that accounts for the over-dispersion, we can accurately capture the variability and provide more reliable estimates of the effects of different factors on peer review acceptance. This approach allows us to overcome the limitations of the traditional Poisson regression model, which assumes equal mean and variance, and it provides a more appropriate and robust analysis of the acceptance of peer reviews by professors (see, e.g., Cameron and Trivedi 1998; Hilbe 2014). The standard deviations of each coefficient are displayed in parentheses below each coefficient.

The results indicate that nearly all of the hypothesized associations with SDT are positively related to the number of accepted peer reviews, although notable discipline-specific differences exist across the models calculated for all disciplines (M1), soft disciplines (M2), and hard disciplines (M3). Intrinsic motivation (H1) exhibits a positive and significant relationship in both M1 ($\beta = 0.136$, $p = 0.005$) and M2 ($\beta = 0.187$, $p = 0.006$), while no significant relationship is observed in M3. Identified motivation, or the sense of professional duty (H2), shows significant coefficients in M1 ($\beta = 0.119$, $p = 0.022$) and M3 ($\beta = 0.199$, $p < 0.001$), but no significant association is found in M2. Reciprocity (H3), measured by the number of submitted peer-reviewed journal articles in the last 2 years, yields mixed results. H3 is not confirmed for M1 and M3, but a significant relationship is found in M2 ($\beta = 0.025$, $p = 0.011$). The motivation to discover new things (H4) shows a significant, yet contrary to the hypothesis, negative relationship in M2 ($\beta = -0.191$, $p = 0.003$), while it remains insignificant in M1 and M3. External strategic motivation (H5) is positively associated with the number of accepted peer reviews in M1 ($\beta = 0.144$, $p = 0.002$) and M2 ($\beta = 0.317$, $p < 0.001$), with no effect in M3. Support, which is measured by the frequency of staff members being asked to help with peer review (H6), is only significantly associated with the outcome variable in M2 ($\beta = 0.151$, $p = 0.018$). Among the control variables, the number of peer review requests consistently shows a positive and significant association across all models: M1 ($\beta = 0.020$, $p < 0.001$), M2

TABLE 8 | Correlation of the dependent variable with all independent variables (Sig. **0.01 and *0.05 [bold]).

	1	2	3	4	5	6	7	8
(1) Number of peer reviews	1							
(2) Intrinsic motivation	**0.188****	1						
(3) Identified motivation	**0.158***	**0.143***	1					
(4) Reciprocity	**0.329***	−0.022	0.016	1				
(5) Discover new things	**0.145***	**0.338****	0.056	−0.069	1			
(6) External motivation	**0.335****	**0.155***	**0.205****	**0.206***	**0.165***	1		
(7) Support by staff	**0.275****	0.027	0.041	**0.253****	0.052	**0.147***	1	
(8) Total requests	**0.696****	0.124	0.056	**0.446****	0.087	**0.280****	**0.197****	1
(9) Age	−0.081	−0.128	−0.121	−0.006	−0.113	**−0.274****	**0.146***	−0.082

TABLE 9 | Determinants of accepted journal peer reviews: Estimates of negative binomial regression (Sig. **0.01 and *0.05 [bold]).

	M1 All disciplines	M2 Soft disciplines	M3 Hard disciplines
	Coefficient (SD)	Coefficient (SD)	Coefficient (SD)
H1: Intrinsic motivation	**0.136** (0.049)**	**0.187** (0.068)**	0.090 (0.066)
H2: Identified motivation (sense of professional duty)	**0.119** (0.052)**	−0.050 (0.083)	**0.199** (0.057)**
H3: Reciprocity: *Submitted* peer review journal articles last 2 years	0.006 (0.005)	**0.025** (0.100)**	0.001 (0.006)
H4: Discover new things	−0.040 (0.046)	**−0.191** (0.064)**	0.059 (0.062)
H5: External strategic motivation	**0.144** (0.047)**	**0.317** (0.086)**	0.035 (0.069)
H6: Support: Frequency staff members asked to help with peer review	0.051 (0.038)	**0.151** (0.064)**	0.041 (0.046)
Control variables			
Number of peer review requests	**0.020** (0.002)**	**0.014** (0.004)**	**0.018** (0.002)**
Budget dependent on publications (1 = yes)	0.179 (0.092)	0.219 (0.133)	−0.112 (0.110)
Age	−0.006 (0.006)	−0.010 (0.010)	0.001 (0.008)
Gender (1 = female)	0.145 (0.106)	0.259 (0.133)	0.117 (0.135)
Discipline (1 = soft disciplines)	−0.142 (0.105)	—	—
Discipline [*Soft Sciences*, 1 = sociology, *Hard Disciplines*, 1 = mechanical engineering]	—	−0.147 (0.124) —	— −0.083 (0.134)
Constant	0.902 (0.492)	1.496 (0.793)	0.577 (0.515)
N	209	94	115
LR χ^2 (11)	149.535	92.715	65.298
$p > \chi^2$	< 0.001	< 0.001	< 0.001
Log likelihood (adjusted)	−547.649	−177.291	−319.762

($\beta = 0.014$, $p < 0.001$), and M3 ($\beta = 0.018$, $p < 0.001$). Other control variables, such as budget dependency on publications, age, gender, and discipline, do not exhibit significant relationships.

8 | Discussion

This study aimed to investigate which factors are associated with the number of accepted peer reviews of journal articles by German professors in the disciplines of biology, business administration, mechanical engineering, and sociology. Most of the hypotheses were derived from SDT, which has been applied qualitatively by previous research on peer review behavior.

In line with the literature (Ohly and Schneijderberg 2021), the descriptive findings on the motivations of German professors to engage in peer review confirm that a sense of duty and the opportunity to stay informed are primary drivers to engage in peer review. This sense of duty, whether to the wider scientific community or because of personal connections, underlines a strong community ethic within the research community. The rather low percentage of professors who enjoy the process, however, points to potential challenges in maintaining the sustainability of peer review if it is primarily driven by a sense of duty rather than intrinsic motivation. The low importance attached to a journal's impact factor could indicate that professors are more interested in the content and relevance of the manuscripts that they review than in the prestige of the journal. This could be seen as a positive indicator of the integrity and focus on quality within the peer review process.

Both bivariate and multivariate analyses were used to study the relationship between motivation and the number of reviews conducted. The bivariate results of the correlation analysis show that external motivation, reciprocity, and the total number of perceived requests are the strongest predictors of peer review activity. Intrinsic and identified motivation also contribute, but to a lesser extent. Staff support is also positively associated with peer review acceptance, highlighting the role of available institutional resources at chairs. The weak positive correlations between the number of peer review requests accepted and discovering new things, and the nonsignificant correlation with age suggest that curiosity and age are less important factors in determining peer review engagement in this sample.

Finally, the multivariate results from the negative binomial regression models indicate that the confirmation of the hypotheses (H1–H4) derived from SDT, as well as H5 regarding staff support, varies across disciplines. For the soft disciplines, intrinsic motivation (H1) positively predicts peer review acceptance, which is in accordance with the results of Zaharie and Osoian (2016), while no significant association can be found for the hard disciplines. The internalized norm of obligation to the scientific community (H2) is strongly positively associated with the number of accepted peer reviews in the hard disciplines, while remaining statistical insignificant in the soft disciplines, which confirms the results of Ohly and Schneijderberg (2021). The norm of reciprocity (H3) suggests that the number of journal articles submitted within the last 2 years is positively associated with the number of accepted peer reviews, which is in line with Mahmić-Kaknjo, Utrobičić, and Marušić (2021) and Horta and Santos (2023). However, this relationship appears to be weaker or nonexistent in the hard disciplines. One possible explanation for this is the greater abundance of journals in the hard disciplines compared to the soft disciplines, leading to a higher volume of manuscript submissions. This abundance may reduce the perceived need for strict reciprocity in peer reviewing because researchers in the hard disciplines may feel less pressure to reciprocate reviews due to the wider array of available publication venues. Consequently, the motive for nonreciprocity is reinforced—researchers may feel that they can submit to many journals without feeling equally obligated to review for them. Contrary to the findings from the bivariate analysis and to the results of Schweigert and Geyer-Schulz (2020), for the soft disciplines the motive to discover new things (H4) is negatively associated with the acceptance of peer review requests while having a weak, though statistically insignificant, positive effect in the hard disciplines. While one might assume that professors who have a strong drive for exploration and novelty would be more actively involved in the peer review process, the reality seems to suggest otherwise. This lack of association could be attributed to various factors. First, the time and effort required to conduct original research and pursue new discoveries may leave professors with limited availability to dedicate to peer review tasks. Their focus may be primarily directed towards their own research endeavors rather than participating extensively in the reviewing process. Additionally, professors who prioritize novelty may be more selective in the reviews they accept, opting to review articles that align closely with their own research interests and groundbreaking areas. Consequently, their overall number of accepted peer reviews may not be significantly influenced by their enthusiasm for discovering new things. The hypothesis on the external strategic motivation (H5), which implies personal career development aspects (Zaharie and Osoian 2016) and which includes factors such as being a member of the editorial board, the importance of a high JIF, familiarity with members of the corresponding editorial board, and the desire to publish in specific journals, can only be confirmed for the soft disciplines, where it is the strongest predictor. In contrast, such external strategic motivations play no significant role in the hard disciplines. This could be due to differing research norms given that these disciplines are often more focused on objective measures defining research quality, such as the novelty of the findings and the methodological rigor. Consequently, factors such as JIF or editorial board membership may have less influence on peer review engagement in these disciplines.

All of the factors mentioned in H1 to H5 theoretically serve to overcome this cooperation's dilemma, as Bianchi et al. (2018) theorize peer review, and are accordingly consistent with their findings. In a recent publication, Lindebaum and Jordan (2023) conclude that, in addition to strengthening identified motivation, reviewer motivation can be increased through external incentives, such as recognition awards from journals as well as the explicit recognition of reviews as workload by their universities. However, the effect(iveness) of such nonmonetary awards on motivation to peer review and peer review engagement is still subject to future studies.

The hypothesis regarding the frequency of how often professors ask their staff to assist with the peer review (H6) can only be confirmed for the soft disciplines. Since good scientific practice

actually requires that the manuscripts to be reviewed be treated in strict confidence, it is still positive that half of the professors prepare their reviews alone. Nevertheless, the extent to which the response behavior of the professors in the hard disciplines was influenced by social desirability cannot be assessed at this point.

In terms of control variables, the total number of peer review requests within the last year is positively associated with the number of accepted peer reviews for both soft disciplines and hard disciplines. However, the institutional environment (i.e., if the budget of the professorships depends on publications) is not significantly associated with the number of accepted peer reviews. Similar to findings in academic teaching (Wilkesmann and Lauer 2020), monetary incentives have no impact in this context. Likewise, age, academic discipline, and gender play no role in the acceptance of peer reviews within the sample. While our study found that gender does not significantly influence the acceptance of peer review invitations, existing research presents a more nuanced picture. For example, using Publons data, Ortega (2017) and Zhang et al. (2022) reported that male reviewers tend to review more than female reviewers, although the number of female reviewers has increased over time (Fox et al. 2019). This could suggest a higher acceptance rate among male academics, which could be due to differences in career stage, workload, or other contextual factors not captured in our study. On the other hand, research by Lerback and Hanson (2017) provides a different perspective. Their findings indicate that although women receive fewer invitations to review, the proportion of men and women who decline these invitations is similar. This suggests that when given the opportunity, women are just as likely as men to accept peer review assignments, which challenges the notion that gender has a significant impact on review acceptance rates. These mixed results highlight the complexity of gender dynamics in peer review and suggest that factors such as frequency of invitations, career stage, and institutional support may play a more important role than gender alone. The lack of significant findings in our study could be due to the sample size, the specific academic context, or other variables not accounted for in our analysis.

9 | Conclusion

In summary, this study enriches our understanding of how motivation drives peer review engagement among German professors and highlights the need to consider disciplinary differences in peer review behavior and motivations. As a theoretical contribution, it links peer review engagement to the SDT framework, providing scholars with a basis for further theory refinement and development.

While intrinsic and external motivation drive peer review engagement in the soft disciplines, these factors appear less influential in the hard disciplines, where identified motivation—a sense of professional duty—plays a more significant role. This divergence suggests that a one-size-fits-all approach to incentivizing peer review engagement may not be effective. Tailoring incentives to align with the specific motivations prevalent in different disciplines could enhance peer review participation rates and quality. However, creating effective incentives—especially for established researchers such as professors—is challenging because research on nonmonetary incentives has shown limited success in influencing peer review behavior. In academia, selective incentives generally play a minor role, as evidenced by similar findings in academic teaching (Wilkesmann and Lauer 2020). The negative association between the motive to discover new things and peer review acceptance in the soft disciplines highlights a potential conflict between research priorities and peer review duties. This suggests that time management and selective engagement strategies might be necessary for highly exploratory researchers. The findings also point to the need for institutional policies that support peer review activities due to the on average low intrinsic motivation among professors. First, universities could recognize peer review work as an integral part of the academic workload, offering formal acknowledgment and potentially linking it to career progression for younger academics. Such measures could address the cooperation dilemma by providing a structured incentive for faculty to engage in peer review. Second, professors could proactively train their junior faculty in the art of peer reviewing from an early stage in their careers, especially in the soft disciplines. This approach leverages several advantages inherent in the hierarchical structure of German academia, particularly the close working relationships and long-term availability of academic staff within a professorship. By integrating junior faculty into the peer review process early on, professors can foster a collaborative environment where responsibilities—beyond the core tasks of research and teaching—are shared and expertise in critical evaluation can be collectively developed. One practical way to implement this is through co-reviewing, as defined by McDowell et al. (2019), which would help the junior faculty to gain valuable experience in critical assessment, improving their own research through exposure to diverse methodologies and approaches. Moreover, co-reviewing could help junior academics become visible to journal editors and publishers. This supports Horta and Santos's (2023) argument that peer review should be a key part of doctoral education. Without teaching its importance and ethical responsibilities early on, one cannot expect new researchers to engage with peer review seriously or understand its value.

Future research should continue to explore the impact of nonmonetary rewards on peer review motivation and engagement across different disciplines, especially addressing factors such as academic rank and gender. It would be particularly interesting in future studies to examine the peer review activities of early-career researchers, focusing on their motivations and the role that peer reviewing plays in their career development. In addition, future studies could examine peer review workload in the broader context of administrative burden in academia (Herd and Moynihan 2019) and suggest strategies for more effective workload distribution among professors. One potential approach, as noted above, is to involve junior faculty in the peer review process, which could help to redistribute tasks more equitably and reduce the overall burden on senior academics. This strategy not only reduces the burden on established professors but also provides valuable training and experience for emerging scholars. Finally, given the ever-increasing number of scientific journals and the growing

trend towards faster and lower-threshold publication opportunities, it is vital to investigate how this rapid dissemination of research results affects the current state of peer review in terms of maintaining rigor and consistency in the evaluation process, as well as the availability and recruitment of qualified reviewers.

In conclusion, enhancing peer review engagement demands a nuanced understanding of disciplinary differences and the implementation of tailored incentives that align with the diverse motivations of researchers across various fields. For instance, while intrinsic motivations such as intellectual curiosity may drive scholars in some disciplines, others may be more responsive to recognition or career advancement opportunities. By acknowledging these distinctions and designing incentive structures that reflect them, such as offering professional development opportunities, recognition programs, journals, and academic institutions can foster a more robust and effective peer review system. Moreover, such strategies could help to address existing challenges, such as reviewer fatigue (Tite and Schroter 2007; Fox, Albert, and Vines 2017) and declining participation rates.

9.1 | Limitations

While this study provides valuable insights into the factors influencing peer review acceptance among German professors, it is not without limitations. First, the sample is restricted to professors of specific disciplines (i.e., biology, business administration, mechanical engineering, and sociology) and a specific geographical region (i.e., Germany), which may limit the generalizability of the findings to other fields and countries. Additionally, the reliance on self-reported data could introduce bias because the participants may respond in a socially desirable manner, particularly regarding the involvement of staff in the review process.

Another significant limitation of this study arises from the nature of the survey data that we employed, particularly regarding the timeframe covered for peer review and publication activities. Our data on peer review acceptance are limited to the activity of a single year, while publication activity is captured over a 2-year period. This relatively short and specific timeframe presents challenges when attempting to compare our findings with those of other studies, such as the one conducted by Horta and Santos (2023), which utilized data from Publons. Horta and Santos (2023) benefitted from a comprehensive dataset that encompassed all registered peer review activities and publications over an extended period, providing a more holistic and long-term view of academic engagement in peer reviewing. In contrast, our study's restricted timeframe may not have fully captured the variability and trends in peer review behavior and publication output, potentially leading to a less robust understanding of these activities. Moreover, the limited scope of our data collection could result in an underestimation or overestimation of the true extent of peer review engagement among the surveyed academics. Peer review and publication activities often fluctuate due to various factors, including project cycles, academic obligations, and institutional demands, which a 1- or 2-year snapshot may not adequately reflect. This temporal limitation makes it difficult to draw definitive conclusions or to generalize our findings, especially when comparing them to studies that utilize more extensive and continuous datasets, such as those from Publons. As a result, our findings should be interpreted with caution, acknowledging that they provide insights into a specific timeframe rather than being a comprehensive overview of peer review and publication behaviors. Future research would benefit from longer-term data collection to more accurately assess trends and compare results across studies, thereby enhancing the reliability and comparability of findings in the academic peer review literature. Moreover, the cross-sectional nature of this study does not allow for the examination of changes in peer review behavior over time. Longitudinal studies would be beneficial to understand how motivations and incentives evolve.

Another limitation concerns the measurement of motivation to peer review, where intrinsic and identified motivation were each assessed using only a single item. This approach may not have captured the full complexity and nuances of these motivational constructs. Single-item measures can lack reliability and fail to encompass the multidimensional nature of motivation, potentially leading to an incomplete understanding of the factors influencing peer review behavior. As a result, the findings might not fully represent the diversity of motivational drivers that could be impacting peer review engagement, thus limiting the robustness of the conclusions drawn. Finally, to better understand the motivation and uptake of peer review in our sample, it would have been useful to include questions about the reasons for declining peer review requests. Such questions could have provided a deeper understanding of the barriers and challenges faced by German professors, whether related to time constraints, lack of expertise, perceived prestige of the journal, or other factors. Despite these limitations, this study's findings highlight significant disciplinary differences in peer review motivation and suggest the need for tailored incentive strategies to enhance peer review engagement effectively.

Author Contributions

Sabine Lauer: conceptualization, methodology, investigation, formal analysis, funding acquisition, writing – original draft, writing – review and editing. **Uwe Wilkesmann:** conceptualization, funding acquisition, writing – original draft, writing – review and editing.

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Ethics Statement

The authors have nothing to report.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Research data are not shared.

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