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Review Writing as Part of the Doctoral Qualification Process in Theses-By-Publication. Results of an Interview Study With Ph.D. Students in German Sports Science

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Although review writing is becoming increasingly relevant for theses-by-publication processes, the topic of review writing has hardly been empirically studied from the Ph.D. students' perspective. This paper addresses this desideratum by providing results of an exploratory study on review writing in German sports science. Based on a social constructivist approach and a socialization theory frame, the study investigated complexes of themes and knowledge that characterize Ph.D. students' review writing as part of sports science doctoral qualification processes within theses-by-publication. Between January and March 2021, 20 Ph.D. students from different sports science subdisciplines were interviewed using expert interviews. A structured-thematic qualitative content analysis identified six main experiential fields of review writing (type of review, individual significance of the review in the doctoral process, approach to writing the review, acquisition of review writing as a method, opportunities in elaborating and publishing the review, and challenges in elaborating and publishing the review). The topics of the category system highlight the diversity of review writing experiences, which can be bundled as content-related, social, and affective dimensions of socialization processes. At the same time, the topics of the category system allow specifying three dimensions of the socialization process for (sports) scientific qualification processes. In this way, the perspective of Ph.D. students on review writing as a central scientific practice and part of the doctoral dissertation is fundamentally determined. This could represent a gain in knowledge for the future implementation of research projects on the doctoral culture within as well as outside of sports science.

Keywords: Ph.D. students, thesis-by-publication, reviews, doctoral studies, academic socialization

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INTRODUCTION

Starting in the 1970s, research literature reviews have been established as a systematically controlled form of organizing scientific bodies of knowledge and have gained massive importance (Ioannidis, 2016). While the beginnings of research literature reviews were limited to review methods considering quantitative effects of interventions, i.e., systematic reviews and meta-analyses

(Glass, 1976), from the 1990s, a variety of different review types developed to accommodate different objectives, empirical paradigms, and study designs, e.g., meta-syntheses, scoping reviews, rapid reviews, integrative reviews (cf. Grant and Booth, 2009; Gough et al., 2012; Snyder, 2019 for systematic overviews; Clarke, 2018; Hong and Pluye, 2018 for the historical development).

The increased importance and differentiation of research literature reviews have also left its mark on the doctoral dissertation culture. Doctoral dissertation pathways have been differentiating steadily over the past decades, e.g., the possibility to prove qualification achievement by monographic theses or theses-by-publication (Hockey, 1995; Hagen, 2010; Jowsey et al., 2020; O'Keeffe, 2020). Especially for theses-by-publication, it is of particular importance to divide a research project into several publications. Here, reviews offer an established format for publishing research statuses independently and providing foundational legitimacy for subsequent own empirical studies (Boote and Beile, 2005; Olsson et al., 2014; Pickering and Byrne, 2014; Mason et al., 2020). Within theses-by-publication processes, research literature reviews are therefore often standard as first publication and mark the start of professional scientific work. Review writing, i.e., working on a systematically controlled and independently publishable scientific genre, thus has great potential for an ever-growing group of Ph.D. students to influence their scientific socialization at a very early stage of their scientific career.

Despite the importance of literature reviews for scientific work and academic socialization of Ph.D. students, the topic of review writing has hardly been empirically investigated so far. This article elaborates on this desideratum. Results from a research project dealing with review writing as part of the doctoral process in German sports science are presented. Sports science (in Germany) is a comparatively young scientific discipline. It is not a fundamental science but a multidisciplinary science that comprises different subdisciplines, mostly oriented toward the corresponding "parent disciplines," such as sports pedagogy, sports sociology, sports psychology, or sports medicine (Krüger, 2018). As if under a "burning lens," sports science thus shows the different demands of scientific work and doctoral qualification of these "parent disciplines" and how these are negotiated among each other within multidisciplinarily oriented sports scientific research institutes. Furthermore, sports science addresses significant trends within the scientific system of multidisciplinary relevance. Review writing is likely to be one trend, whose exploration within the context of sports science may impact other subjects (especially concerning the doctoral and publication culture).

The goal of the study is to capture the subjective perspectives of Ph.D. students (as key stakeholders in the science system) on review writing. The focus on personal perspectives opens the view for the "inner" processing as well as construction processes of social reality, which by third parties can only be observed from the "outside" to a limited extent. Considering Ph.D. students seems worthwhile insofar as it can be assumed that this group is mainly involved in review writing through the doctoral process and shares similar academic socialization horizons. The study focuses on the following research question: Which complexes of themes and knowledge do Ph.D. students mark as relevant in review writing (as part of their doctoral process in German sports science). Reconstructing themes not only provides insights into the subjective construction of meaning within a selected scientific genre. It also provides insights into specific socialization processes within the scientific system in general.

LITERATURE AND PRECONCEPTUAL FRAMEWORK

Research Literature Reviews as Epistemic Practice and Research Methodology

Since Kant's Copernican Turn in epistemology, knowledge is no longer defined as knowledge of things in themselves, but always as a comparison of knowledge with knowledge (Kant, 1787, preface). This change has a central meaning for modern empirical science. Academic work and scholarly inquiry have since been inextricably tied to research knowledge (e.g., existing theories, evidence, and methods). Particularly for empirical study designs, a basic methodological pattern has developed on this basis. Research projects are embedded in existing research knowledge in more or less systematic ways and findings related back to this very knowledge toward the end of the research process (Webster and Watson, 2002; Green, 2009). The literature review thus has an instrumental meaning in the empirical research process, which ensures the necessary connection to the existing knowledge and at the same time ensures the legitimizing differentiation from the existing knowledge, e.g., by identifying gaps or needs for improvement in existing research and thus affecting the aim of the study or justifying its research questions. In addition, research literature reviews have developed into a distinct research methodology that identifies, evaluates, and synthesizes existing research knowledge in a systematic, explicit, comprehensive, and reproducible manner (Fink, 2020). Research literature reviews are thus a distinct genre to elaborate and publish scientific answers at a meta-level, e.g., to investigate relationships between variables, evaluate the state of knowledge on a particular matter, provide the basis for new conceptual models, or synthesize the current knowledge to guide professional practice (Tranfield et al., 2003; Snyder, 2019).

Review writing, i.e., analyzing what is already known scientifically about a subject area, is essential to scholarly knowledge production and thus plays a significant role for Ph.D. students, who must demonstrate the basic skill of disciplined scholarly inquiry in their Ph.D. theses (Boote and Beile, 2005). Review writing representing a "crucial part of a good thesis" (Delamont et al., 1997, p. 59), on the one hand, is a scientific practice that establishes the connectivity of research projects in a methodologically controlled way and carries a not insignificant weight in the evaluation of the work (Holbrook et al., 2007). The systematic access thus requires methodological expertise and situates the actors in a particular community of scientific methods. Review writing, on the other hand, plays a significant

role in the academic socialization of Ph.D. students, e.g., insights into the historical and intellectual foundations of disciplines, the ability to extract information and synthesize it in a scientifically connectable way, or the grounding and legitimation of research in existing insights and findings (cf. Green, 2009 for a detailed summary). In addition, reviews are highly functional for theses-by-publication processes by offering a stand-alone publication format for research states.

In this way, review writing provides an early and relatively structured occasion for socializing "real scholarly activities" (Weidman and Stein, 2003, p. 653) and exemplifies the concurrency of being able to research and learning to research peculiar to theses-by-publication (Kressin and Paladines, 2015). At the same time, review publications in (sometimes highly ranked) journals also offer a variety of fundamental scientific socialization occasions, for instance, on the importance and consequences of journals for effective science communication, on bias tendencies of peer review processes and indicator-based quality attributions, or on special ways of presenting empirical evidence in journal publications (Merton, 1968; Hirschauer, 2004; Münch, 2010).

Review Writing as Scientific Everyday Practice in Ph.D. Theses

Based on the state of research to date, review writing can hardly be reduced to specific writing activities and individual scientific functions. Instead, it represents a complex social phenomenon related to a wide variety of activities and functions. Doing justice to this complexity, the present study will unfold a social constructivist approach and a socialization-theoretical frame. The social constructivist approach opens the view that actors function as constructors of social everyday realities and that those researched actively co-produce review writing themselves. On this basis, we understand review writing as an everyday scientific practice of Ph.D. students. Furthermore, the basic assumption is that those who are researched make their own experiences with review writing, which these persons interpret, process, and balance in a differentiated way (Schütz and Luckmann, 1973).

Based on theoretical considerations of the socio-phenomenological sociology of knowledge, knowledge is constitutive for social everyday actions and also for our perspective on the world (Berger and Luckmann, 1966; Schütz and Luckmann, 1973). This applies to all areas of daily actions and thus extends to review writing in doctoral dissertations. Methods textbooks (Tod, 2019; Fink, 2020) through techniques, rules, and procedures suggest that scientific writing processes are highly rational acts. They strongly build on formalized bodies of knowledge but—as complex social processes—also depend on other, rather informal bodies of knowledge, arising from the context of the scientific system (Weidman et al., 2001; Roads et al., 2017). Accordingly, the knowledge bases of action are not (only) of an apparent or trivial nature. This is especially true for knowledge about acting in doctoral phases, which for early-stage scholars are characterized by diverse social learning processes and mark a period highly fragile and prone to dropout in parts (e.g., Gardner, 2009; Ehrenberg et al., 2010; Schneijderberg, 2018).

Especially for the appropriation of the knowledge stock of review writing, review writing is thus not only to be understood as a writing activity at the desk but as social action in special contexts of the scientific system, which takes place, among other things, in confrontations with the expectations of fellow human beings (e.g., in feedback meetings, in workshops, etc.). Knowledge associated with action has hence a social dimension. Socially shared knowledge (about e.g., methodical procedures of text research) enters one's own subjective knowledge stocks and is used as the basis for one's actions within everyday reality of the science system. Thus, review writing as social action always takes place with recourse to objectively socially shared knowledge. However, in the form of a specific cut as subjective knowledge, it is not necessarily shared in the same form by the interacting persons. Instead, different subjective knowledge stocks can also be assumed here (Berger and Luckmann, 1966). Following this, one can expect (doctoral) review writers to have a specific body of knowledge. They acquire unique knowledge that makes them or at least allows them to become experts in the reality domain of review writing (Hitzler, 1994).

Dimensions of Review Writing as an Experiential Socialization Process

As has been suggested before, review writing as scientific everyday practice is also a socializing context for Ph.D. students. Processes of social integration and personal individuation can be linked by focusing on interactions as moments of the intertwining of person and environment and assigning them central importance for the completion of both processes (Grundmann, 2006; Hurrelmann, 2009). Academic socialization thus takes place primarily in the concrete everyday interactions and is expressed in unique experiences. Following empirical higher education socialization research (Sala-Bubaré and Castelló, 2016), three interwoven dimensions of experience emerge as characteristic experiences of interaction in which the intertwining of Ph.D. students and their academic environment occurs.

First, a content dimension refers to aspects of experience that can significantly influence the "academic mindset" (Gardner, 2007, p. 734) of Ph.D. students. Socially significant aspects in this context are primarily motives to engage in research, issues regarding organization of research and research procedures, experiences related to scientific writing, presenting, and publishing as well as the appropriation of basic research knowledge, e.g., considering scientific ethos, disciplinary theories research methods, and publication practices (Anderson and Louis, 1994; Weidman et al., 2001; Roads et al., 2017; Todd and Louw, 2019). Moreover, in review writing as a methodological tool of Ph.D. theses, it is always about socializing experiences that specifically relate to the value of genre in researching, and the acquisition of competencies that relate to the management of the review genre. Following Tardy et al. (2020), specific methodological knowledge (genre-specific knowledge), knowledge on how genres generally work (meta-awareness of genres), experience in the application of genres (recontextualization), knowledge of when and why knowledge on genres and the application of genre knowledge is relevant to a specific situation (conditional knowledge), and basic

metacognitive competencies are particularly important for this aspect.

Second, a social dimension addresses the formal and informal social agents that influence the content dimensions of experience. Critical socialization instances include direct supervisors (Rosen and Bates, 1967; Lovitts, 2008; Schneijderberg, 2018), other scholars in the everyday academic vicinity (e.g., department chairs and qualifiers in the workspace), researchers from different departments and research institutions, structural embeddings and specifications (e.g., qualification regulations, structured programs), disciplinary and methodological communities, and the scientific community itself (Bragg, 1976; Weidman and Stein, 2003; Gardner, 2007, 2010; Todd and Louw, 2019).

Third, an affective dimension refers to the emotional coloring associated with qualifying experiences and assigns affective value to individual experiential domains and the social agency that accompanies them (Martinsuo and Turkulainen, 2011; McAlpine, 2013).

METHODOLOGY

Review writing in the context of the sports science doctoral process is thus a particular process of researching and publishing that combines specific methodological socialization potentials with general aspects of the academic qualification experience and academic socialization. To reconstruct relevant complexes of themes and knowledge on review writing as part of the scientific qualification process in theses-by-publication, open guideline interviews were conducted. The interviews were implemented following the expert interview method (Bogner et al., 2009). The interview guide was based on the theoretical-empirical considerations formulated above. The initial question served to elucidate the framework of the dissertation and the review (e.g., the topic of the dissertation, review type, work status of the review). A first block of topics addressed the significance of the review as part of the doctoral process. In this context, aspects concerning the meaning of the review in relation to the entire dissertation and to particularities, challenges, opportunities, and limitations of the review publication were addressed. A second block of topics targeted statements about the concrete review process and focused on planning, writing, publishing the review, working methods, and instances of the acquisition of the method. Finally, the participants were asked whether they would like to add anything they did not have the chance to mention.

The sampling strategy was based on two criteria. The first criterion was related to the research object: All interviewees conducted their doctorate on a sports science topic and edited a research literature review as part of their dissertation project. Work on this review had at least started at the time of the interview. The second criterion was based on the multidisciplinary structure of sports science: The sample significantly covers the diversity of sports science subdisciplines (Krüger, 2018). Potential interviewees were identified in a snowball procedure and verbally gave their informed consent to participate in the study. A total of 20 Ph.D. students (response rate: 80%) who met the criteria were interviewed in German language between January and March 2021 (see **Table 1**). Due to the pandemic, the interviews took place digitally via Zoom and WebEx. The audio recordings were subsequently transcribed verbatim using F4 and anonymized. The length of the interviews ranged from 20 to 73 min, with an average of approximately 40 min.

In order to structure the knowledge about review writing and to identify thematic foci, the data were analyzed by applying qualitative content analysis. The procedure was a structured-thematic qualitative content analysis, according to Kuckartz (2014), with research categories that were developed using a deductive-inductive coding process. The coding frame was initially developed deductively at the level of main categories. The development of the main categories was based on the theoretical-empirical foundations formulated above (Sala-Bubaré and Castelló, 2016). The resulting coding frame included six main categories, each of which was defined for coding and given a reference example from the material: (a) review type, (b) individual importance of the review in the doctoral process, (c) approach to writing the review, (d) acquisition of review writing as a method, (e) opportunities in the process of writing and publishing a review, and (f) challenges in the process of writing and publishing a review (see **Table 2** for an example; see **Supplementary Files** for a general overview). Subsequently, the main categories were inductively differentiated by reviewing the entire data material to represent the various aspects of meaning addressed by the interviewees as thoroughly and appropriately as possible through sub-categories.

The analysis of the material was computer-assisted (MAXQDA) with two independent coders. The codes were validated via interrater reliability and consensual validation (Gläser-Zikuda et al., 2020). In case of discrepancies during the coding process, consensual decisions were made in all cases. The deductive-inductive analysis process began with a first pass through the material using the main categories deductively. First, two interviews (10% of the total material) were sample coded by both coders, and the degree of agreement between the coders was statistically determined. Cohen's kappa coefficient (Cohen's κ) served as a measure of agreement. The category system was revised, checked against a second sample coding, and coded

TABLE 1 | Participant information (n = 20).

Dimension	Sub-dimension	*N*
Sex	Female	11
	Male	9
Sports science sub-discipline	Humanities	11
	Sciences	9
Dissertation type	By thesis	19
	Monograph	1
Review type	Systematic review	12
	Scoping review	4
	Narrative review	2
	Qualitative review	2
Review status	Work in progress	6
	Published	14

TABLE 2 | Illustrative example for the elaboration of the categories.

Category	Definition	Reference sample
Review type	This category includes all statements in which the interviewees name and describe the type of review selected and give reasons for the selection.	"It was supposed to be a systematic review. The title—which you probably saw—is a scoping review. That is because I found the systematization extremely difficult. Furthermore, we did not find that a meaningful systematization was possible at the time, because first, there is only a tiny number of relevant studies after all. So, I think there were only eleven studies that we included at all, and second, those studies were super heterogeneous."

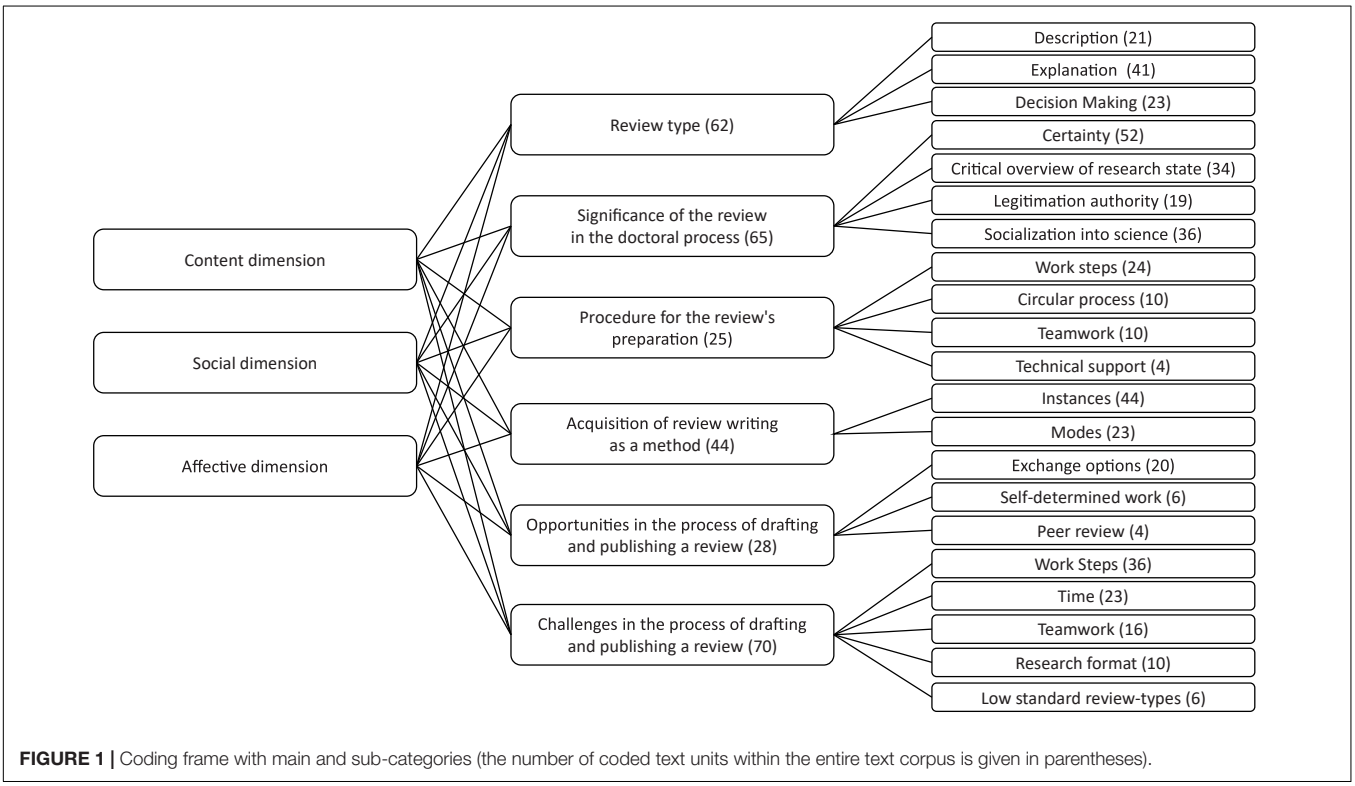

FIGURE 1 | Coding frame with main and sub-categories (the number of coded text units within the entire text corpus is given in parentheses).

all material following the sample coding. Coefficients of the agreement for the two-sample coding were Cohen's $\kappa_1 = 0.81$ and Cohen's $\kappa_2 = 0.91$ and thus can be estimated as almost perfect agreement (Landis and Koch, 1977). Subsequently, each main category's previously coded text units were summarized in terms of content via paraphrase, and the main categories were successively differentiated inductively by sub-categories. For validation, all text units assigned to single or multiple main categories were sub-categorized by both coders and compared with each other. All discrepancies in sub-coding were resolved consensually. The agreement measures for the sub-categories ranged from Cohen's $\kappa_1 = 0.70$ to Cohen's $\kappa_2 = 0.92$ and thus had substantial to almost perfect agreement values (Landis and Koch, 1977). **Figure 1** shows an overview of the complete coding frame of the content analysis.

FINDINGS

The structural basis for presenting the results are the evaluated thematic main categories, which are shown for each category as a condensed abstraction of the variety of descriptions and statements in the material.

Review Type

This category includes statements in which the interviewees name and describe the type of review they edited and give reasons for their selection. The interviewees edited four different review types (see **Table 1**). The distinct distribution favoring systematic reviews reflects the current (sports-) scientific distribution of review types. When describing and justifying their review, the interviewees differentiated between reviews in general and the specific review type they implemented.

For the interviewees, reviews in general, i.e., as a systematic method independent of a specific review type (e.g., systematic review, scoping review, etc.), represent a secondary analytical research and publication method, characterized by a systematized execution of relatively standardized work steps and an at least partly collective working method. Characteristic for this method is the functional option for theses-by-publication to both work up the state of knowledge on a research topic in a

structured, exhaustive and comprehensible way, and generate a (primarily first) publication for the prescribed cumulus of publications. In this context, the essential justification to write a review is oriented toward the instrumental value of one's doctoral project: For all interviewees, reviews are essentially helpful for achieving further objectives within the doctorate (e.g., systematic entry into the research field, identifying research gaps to legitimize one's dissertation project, developing technical or methodological points of contact for subsequent empirical studies, or implementing the first publication).

In addition, the interviewees comment on specific individual review methodologies. The focus of the statements here is the individually chosen review type. In some cases, the rationale of one's review type is given in contrast to other types of reviews.

- Systematic reviews are referred to as the gold standard for the systematic ordering of quantitative studies by the interviewees. The high level of evidence of systematic reviews is guaranteed by the orientation toward guidelines, the intersubjective working method, and the included studies' quality assessment. Necessary conditions for a systematic review are a concrete research question, a finite research field, and a relatively comparable methodology to the included studies.

- Scoping reviews are for the interviewees more suitable for relatively coarse insights into the state of research in a topic area, for heterogeneously explored research fields, or for review questions that are not empirically oriented (e.g., an overview of theories, models, or constructs used in a research field).

- Narrative reviews are considered to be comparatively low-systematic reviews for the interviewees, characterized by greater design flexibility and improved selectivity. Often, some design elements of systematic reviews are borrowed for pragmatic reasons (esp. increasing the likelihood of a successful peer review process). However, in principle, the *modus operandi* is much more qualitative and requires expertise in the reviewed research field.

- Qualitative reviews (e.g., meta-synthesis and meta-summary) are linked to the same claims of validity as systematic reviews. However, they seem to be comparatively unknown and rather low methodologically elaborated, so that here, too, the systematicity of quantitative research-oriented systematic reviews is sometimes readily adopted, and the epistemic peculiarity of qualitative research is thus at least partially abandoned.

In many cases, the statements on the justifications for the chosen review type are linked to reflections on the decision to write a (specific) review within the dissertation. Here, the choice to design the thesis-by-publication with a published review is unquestionable for the interviewees and attests to an incorporated design culture for theses-by-publication. Appropriately, for a considerable number of interviewees, the review is determined by the respective disciplinary publication culture, specifications by supervisors, and structural specifications (e.g., a doctorate in a third-party-funded research project that requires a review). In contrast, the choice of the specific review type is much more reflexive and less rigidly designed. In cases where the review type is not externally prescribed, interviewees sometimes grapple with different review types. The decision for a specific review type is usually made in an exchange process with the methodological literature and the scientific community, but sometimes also as a completely independent debate with the subject matter and consideration of various factors (e.g., nature of research field, publicity of review type, intended use of review).

The Individual Significance of Reviews in the Doctoral Process

In this category, the synthesized statements address the individual significance of the review for the entire dissertation. Overall, the interviewees rated the importance of the review in the doctoral process almost entirely positively. For very few interviewees, the evaluation is slightly undecided, in that individual critical aspects somewhat weaken the fundamentally positive value (e.g., the ambivalence between scientific beginner position and high value of reviews in the evidence pyramid). One interviewee's (with a qualitative review) evaluation was negative due to many rejections in the peer review process leading to a considerable delay in the doctoral phase and the decision to pursue a monographic dissertation.

For the interviewees, an important explanation of the individual significance is gaining security in a (occupational-) biographical life phase characterized by many uncertainties due to the entry into doctoral process and the science system:

- *Orienting entry point*: Reviews offer a methodologically systematic, highly structured work process that can be navigated step by step. In this way, there is always a well-known next step that one can adhere to. At the same time, one quickly gets a clear and comprehensive overview of the findings, the inventory of research methods, and the experts in the research field of one's doctoral project.

- *Scientific-cultural integration potential*: Reviews are established research practices in many (sports-) scientific sub-disciplines, to which one can tie up unproblematically as an early-stage scholar without (at the beginning partly unconsciously) getting into contradiction with open and hidden discipline-, institute-, and publication-cultures.

- *Increased probability of publication*: Reviews, especially systematic reviews, are a well-established means of publication. Due to their highly schematized methodological approach, they offer scholars and reviewers in the peer review process a step-by-step approach to the drafting and publication process. In contrast to the degrees of freedom often associated with uncertainty and more subjective judgment in primarily analytical empirical studies, (systematic) reviews, therefore, offer a certain probability of a self-serving work process and successful publication. The successful publication (prospect) is always accompanied by a substantial reduction of the publication pressure present from the beginning of theses-by-publication processes.

Many interviewees also explicitly state the positive role of reviews in the doctoral process for their research topic. Reviews offer a specific opportunity to obtain a critical overview of the relevant state of research and, on this basis, a high evidence to legitimate and design subsequent empirical studies (e.g., identifying research gaps, knowing appropriate theoretical

foundations or methodological instruments, avoiding critical aspects of previous research approaches). Review writing thus always indirectly enhances the quality of one's empirical studies and the quality of the entire dissertation.

Another, frequently rather implicit pattern of explanation for the positive value of reviews in the doctoral process is review writing's multidimensional significance for scientific socialization. In addition to concrete modes of methodological socialization (e.g., the importance of and approach to reviews, the controversy of various empirical methods in the included studies), the interviewees also cite many more general dimensions of socialization in science (as an organizational and social system), such as the organization of scientific knowledge, the structure of empirical studies and publications, paper-based scientific communication, the epistemic perspectivity of scientific knowledge, or (primarily due to the at least partly collective way of working) the meaning and practices of social capital (and its acquisition) in science.

Procedure for Preparing the Review

This category bundles interview statements that concern the procedure for preparing the review. In preparing the review, the interviewees are mainly oriented toward different work blocks, mostly presented chronologically in the interviews, sometimes toward some work steps of the process, which are marked as subjectively significant.

- A first block is focused on reviews in general and refers to practices that prepare the concrete review. The phase is shaped by fundamental engagement with the method and non-specifically reading into the research topic. The focus is mainly on sounding out the market for the planned review and developing a feeling for the methodological approach, key authors, and possible search criteria (e.g., terms, wording, keywords).

- From the second block on, the interviewees deal with a specific type of review. The work process is necessarily based on the formulated objective, which must be defined at the beginning of the specific review writing, the guidelines selected for the review, and the quality assessment (e.g., *Cochrane*, *PRISMA*, *GRADE*). Strikingly, with one exception, the theoretical location of the review project does not play any role.

- The second block combines the work on the search strategy and eligibility criteria (i.e., search string, databases, inclusion criteria). In a few interviews, the preparation and registration of the review project are marked for this phase of work. Often this marking is done as an expression of quality and as a distinguishing feature from the multitude of reviews currently being produced.

- The third block refers to study selection, data extraction, and analysis (i.e., literature search, stepwise screening process, methodological quality assessment and critical appraisal, definition, and extraction of target data, contact authors for missing texts/data). The work process is almost exclusively done in tabular form. In a few cases, additional specific software solutions are used (e.g., *Covidence*).

- The fourth block presents the results descriptively, synthesized in terms of content, and discussed. The discussion is mainly oriented toward interpreting the results and drawing conclusions for the state of research and own empirical connections.

- The fifth block is focused on the publication process, but only very few respondents explicitly mention it as part of the review preparation.

In addition, the procedure for preparing the reviews for the interviewees is essentially characterized by three features:

- *Procedural circularity*: The drafting of a review is carried out in a multitude of coordinated steps. At the same time, the process contains many time-consuming starting points for carrying out individual steps several times to meet the requirements of the method (e.g., setting of objectives, search strategy, search in databases, updating of the database over time, extracting dimensions). The circular loops contradict a linear approach (mainly simulated by the guidelines and checklists) and are comparatively surprising for many interviewees. For more quantitatively socialized Ph.D. students, the circularity of review writing often contradicts the linear habit of thinking and practicing research.

- *Teamwork*: At some points in the process, review writing is oriented toward working with other persons (especially stepwise screening, quality assessment). In addition, due to the integration of the review in the doctoral process, at least the supervisors and other persons (e.g., colleagues, external experts) are involved. Within the review team, Ph.D. students take on a very delicate role: As lead authors, they are responsible for the process (i.e., management, organization, instruction), but in most cases, they are also the team members who are at the end of the scale in professional and hierarchical terms.

- *Technological practice*: Review writing is linked to an essentially technology-based research method (e.g., database-supported literature search, software support for literature management, screening and data extraction, submission of the manuscript) and therefore always presupposes specific technical knowledge and skills.

Acquisition of Review Writing as a Method

This category summarizes all statements that address the acquisition of review writing (as a scientific method). Following the interviewees, the acquisition of the method is a straightforward learning process, which is firmly directed toward acquiring knowledge and competence through a mixture of artificial, personal, and structural instances. Artifacts (e.g., guidelines, methodological literature, published reviews) take on a tremendous significance for more standardized review types, whereby the guidelines as a kind of "schema F" or "cookbook instructions" are preferred here, especially at the beginning. At the same time, the often assumingly formulated guidelines constantly provoke follow-up questions, for the clarification of which further artificial and personal instances are necessary. In the case of less standardized review types, existing original publications and the exchange with supervisors and colleagues offer the interviewees help in acquiring the methods. Structurally controlled acquisition possibilities (e.g., method workshops,

advanced training) are mentioned by only a few interviewees and even there do not play a major role in acquisition.

The interviewees' statements on the relevant modes of acquisition also reveal a mixture of cognitive engagement with artifacts and personal exchange. Acquisition through artifacts occurs when the interviewees engage with relevant artifacts (esp., guidelines, published reviews) and absorb, understand, and process the associated information. Most of the students' engagement with the artifacts takes the form of step-by-step learning by doing. However, it is noticeable that many interviewees tend to aim to imitate these models for their (first) review, i.e., to comply with a particular standard pattern. In very few interviews the reported practices go beyond imitation. In these cases, the increased degree of reflection is then expressed primarily in modifying the models adapted to the discipline or the research object. The personal exchange is essentially directed toward exchange with significant others from the immediate scientific environment. In almost all interviews, the interaction partners are indicatory persons, i.e., persons endowed with advanced review expertise or power of evaluation (e.g., supervisors, experienced colleagues, external experts). Interactive acquisition processes with other Ph.D. students are relatively rarely addressed.

Opportunities in the Review's Drafting and Publication Process

This category includes all statements that, in the interviewees' view, create favorable conditions for a successful process of drafting and publishing a review. All interviewees see the collective character of the review writing process as the essential condition for success in drafting and publishing their review. The collective character is classically manifested through exchanges (e.g., input, feedback, revision loops) with advanced review participants, other Ph.D. students working on a review, or blinded reviewers in the peer review process. Beyond these comparatively non-specific aspects, which also apply to other research methods, the interviewees assign a specific collective character to review writing. The specific collectivity is rooted in the intersubjectivity and consensuality that is methodologically obligatory in some steps of the review process.

As a further condition for success, some interviewees emphasize the possibilities for self-determined scientific work and the potentials of review writing for a self-directed scientific unfolding process. While the work on empirical studies always depends on others (e.g., participants, laboratory heads, ethics committees), the process design, time management, and decision-making power in reviews are more in the individual's own hands.

Challenges in the Review's Drafting and Publication Process

This category includes all statements addressing difficulties and problems for a successful process of writing and publishing a review. Many of the interview statements refer to concrete challenges in specific steps of the review writing process. Here, in addition to individual difficulties with single review steps (e.g., choice of review type, search and screening, quality assessment), a problematizing reference to the synthesis of the results, i.e., the work period after completing data extraction, is evident in all interviews. In this period, an often extensive, sometimes contradictory, and difficult to compare set of data is built, which now must be ordered and written down in a comprehensible way. The primary irritation in this phase lies in the change of working mode. While the previous steps are time-consuming but can be worked through in a comparatively mechanical way, the synthesis requires a much more creative effort on one's part, for which there are a few clues and examples in published reviews and examples of methods, but not a kind of recipe that one could follow.

Another pervasive group of challenges of review writing relates to the time factor. Reviews are a research method in which the potential for circular process design is inherent in many work steps, and some potential for delay is structurally inherent (e.g., dependence on others, waiting for literature). For many interviewees, this time intensity is surprising. Supported by the ostensible linearity of the method, many interviewees have significantly underestimated the complexity and workload of review writing and often even initially situated it as a sidekick to the empirical studies. For this reason, their empirical doctoral projects, which often already started parallelly, can be delayed, or the initiated review is put aside in favor of the empirical study and thus can no longer fulfill its preparatory and legitimizing function.

In addition to many opportunities, the interviewees also see some challenges that work in a team brings with it (e.g., unequal workload in the group, waiting times, dependencies on others, miscommunication). Here, the interviewees are mainly responsible for the successful review process, but at the same time, they often have the least methodological and technical expertise and the least decisional authority in the team. In concrete terms, this problem becomes particularly apparent in team constellations in which several locations and disciplines are represented and in situations in which deadlines are not met and must be called in within authoritative dependencies (e.g., when the supervisor delays the work process).

Many of the interviewees' statements revolve around the research format of the review, i.e., around the essential characteristics of reviews as a specific type of scientific knowledge production. Of particular relevance for the interviewees is the claim of completeness, i.e., the claim to include all relevant publications on a research topic. Of great importance is also the risk of existing reviews on the topic, i.e., the risk of investing too much time in a review that may already exist because, in contrast to empirical studies, which always have certain peculiarities in their design that justify publication, a review tends not to be published twice. Finally, the lack of methodological knowledge, i.e., the lack of knowledge on the review method, which is hardly available during the studies compared to empirical method trainings, is also worthy of attention.

For review types other than predominant systematic reviews (e.g., narrative reviews, integrative reviews, qualitative reviews), the interviews reveal some specific pitfalls that exemplify the difficulties in dealing with social phenomena outside

standardized tracks. Here, a comparatively smaller number of orienting models, guidelines and tools, methodological literature, or original publications) are available. In addition, in the peer review process, peer reviewers are often only marginally aware of the specific review types, which partially leads to an (negative) evaluation based on standards of systematic reviews.

DISCUSSION

The study's starting point was the question of which complexes of themes and knowledge characterize Ph.D. students' review writing as part of sports science qualification processes in theses-by-publications. The topics included in the category system paint an overall multilayered picture and identify reviews as key research activities, essential methodological skills, and fundamentally orienting entry points for Ph.D. students' theses-by-publication. The publication-based design of the dissertation and the associated access to a (mainly systematic) review thereby follow a fundamental trend in (sports) science and reaffirm the academic discipline as the "home and central reference point to the graduate student" (Gardner, 2007, p. 724). At the same time, reviews offer a promising method for early-career scholars to satisfy the ever-increasing expectation to publish during the Ph.D. process (Pickering and Byrne, 2014). In this context, review writing is strongly oriented toward schematic guidelines and procedural rules and seems to be underpinned by a rather "positivist" research idea. Practical aspects of review writing highlight the circularity of the work process and its methodologically applied collective nature. The methodological acquisition takes place as varying reflexive learning by doing and is strongly oriented toward artificial models (esp., guidelines, published reviews) and significant others.

When abstracting the empirical findings of the study, the complexes of themes and knowledge in review writing within theses-by-publication reveal various areas of experience, which in turn can be assigned to the content-related, social, and affective dimensions of academic socialization processes (Sala-Bubaré and Castelló, 2016). At the same time, this makes it possible to specify these socialization processes for sports science. Review writing as part of (sports) science qualification processes is co-determined in its content-related and social dimension by the affective dimension, which tends to be understood as a transverse area of experience.

Content dimension: As a social field, the science system (as an organizational and social system) depends on intergenerational social reproduction. In this context, the essential medium for ensuring social permanence and further development is socialization, in other words, the fundamentally social practice that combines processes of social integration and personal individuation (Grundmann, 2006; Hurrelmann, 2009). In drafting and publishing reviews, several interactions emerge in the interviews that are significant for the academic socialization of the interviewed Ph.D. students. On the one hand, review writing seems to be an essential practice for methodological socialization (Roads et al., 2017). In review writing, Ph.D. students can gain essential knowledge, skills, and values of an important research method, e.g., identify existing scholarship located within a field of research, legitimate new research within existing bodies of knowledge (Boote and Beile, 2005; Pickering and Byrne, 2014). The themes from the two categories "Review type" and "Individual significance of the review in the qualification process" show, among other things, how differentiated Ph.D. students are informed about the forms and functions of review writing. In this context, especially the body of knowledge about the genre of the review seems to have an action-relevant meaning, which makes the specialized knowledge about the research genre accessible and further expands it (Grant and Booth, 2009; Tod, 2019; Fink, 2020). Formal dimensions (e.g., content, organization) and process dimensions (e.g., composition, distribution) of genre-specific knowledge, and recontextualization, i.e., the process through which Ph.D students draw on and adapt existing genre knowledge (Tardy et al., 2020) seem to be particularly relevant in this context. In addition, the practice of review writing is considered offering the opportunity to combine experiential learning of the research process with general academic socialization (e.g., develop a role as academic agent, learn the written and unwritten academic values, norms and attitudes acquire increasing levels of independence, interact and connect with relevant social agents). At the same time, however, the vital standardization of review writing, the often "positivist" foundation of reviews, and the often-unquestioning access to the method can stand in the way of developing an independent research personality (Hirschauer, 2004; Schneijderberg, 2018).

Social dimension: The doctoral phase essentially aims to create scholars who can independently produce original research (Lovitts, 2005, 2008; see Gardner, 2007, to affirm the motif from a Ph.D. student perspective). Here, review writing offers several explicit opportunities for the interviewees to follow this path "from apprentice to colleague" (Laudel and Gläser, 2008, p. 387), for example, critical engagement with the existing literature, early visibility with a first successful publication, responsibilities as the first author. At the same time, however, there seem to be some aspects inherent in review writing that can counteract the transition from dependent to independent research. In particular, the often externally determined decision to write the review, and the often merely illustrative access to the guidelines and checklists, have a particular risk potential of limiting the Ph.D. students' ability to shape the process, leading to a kind of "congruence and assimilation orientation" (Antony, 2002, p. 349). In particular, the categories "Procedure for writing the review" and "Appropriation of review writing as a method" underline the importance of the social reference group for review writing. In the review-related research and publication process, not only do the existing social relationships and power structures become apparent, but new contacts are established and networks formed on the occasion of review writing. This can include contact to researchers who already have experience of review writing.

Affective dimension: Reviews in theses-by-publications are first and foremost situated at the beginning of the doctoral phase. At this stage, several specific uncertainties accumulate,

e.g., transition to professional life, a new social environment, and a research process characterized by unpredictability and ambivalence (Weidman et al., 2001; Sigl, 2016; Nästesjö, 2021). In this risky life constellation, reviews seem to enable the interviewees to act in a strongly oriented and subjectively secure manner. The themes within the categories "Opportunities in the review preparation and publication process" and "Challenges in the review preparation and publication process" provide a good illustration of the affective side of the academic socialization process. In addition to dynamics in social relationships with other scientists (e.g., unfulfilled expectations of supervision), content-related aspects also ensure the emotionality of the events. Within the review process, the schematized methodology of (mainly systematic) reviews provides almost step-by-step guidance and thus a sense of security or control over one's own actions. Meanwhile, in the publication process, the high standardization of the review methodology can minimize a generally lower status bias of scientific novices in publishing. It further offers a comparatively high chance of thriving and sometimes producing highly ranked publications due to its pre-structured expectations (Hirschauer, 2004). Review writing offers a possibility of visualizing the work result, which can be associated with the feeling of pride. Unsurprisingly, the difficulties in the review process for the interviewees increase whenever contingencies have to be overcome, especially when schemata have to be abandoned or modified (e.g., synthesis of results, adapting guidelines or assessment tools, missing tools in less standardized review types).

CONCLUSION AND IMPLICATIONS

This study is situated in the rapidly expanding research field on academic socialization and doctoral studies (Bragg, 1976; Weidman et al., 2001; Ehrenberg et al., 2010; Andres et al., 2015; Schneijderberg, 2018). It focuses on review writing, an aspect that is central to the doctoral enterprise (in general and explicitly for theses-by-publication processes) (Bruce, 1994; Golde, 2007), but has been relatively neglected in research, especially with regard to the investigation of the subjective perspectives of Ph.D. students (Green, 2009). At the same time, (German) sports science is examined as research discipline that has hardly cultivated any science research itself. Consequently, studies on action in qualification phases or on the processes in theses-by-publication as well as the significance of review writing are missing.

A social constructionist approach and socialization theory frame that pre-conceptualizes review writing as an everyday practice of action and an experiential socialization process served as the basis for eliciting and evaluating subjective perspectives in an interview study. This provides the guiding frame for the study, but at the same time, must be noted as limiting what the analysis can make visible. The category system elaborated through qualitative content analysis points to various experiential areas of review writing. A strength of the study is that it can systematically describe complexes of themes and knowledge of Ph.D. students as cross-case commonalities with six main categories. In addition, these different complexes of themes and knowledge within review writing as part of sports science doctoral processes are also bundled on an abstract level in three dimensions of the academic socialization process (content, social, affective). Even though these dimensions have already been identified as relevant for the Ph.D. phase in other studies (cf. Sala-Bubaré and Castelló, 2016), they can clearly show that in review writing not only writing as a desk activity is important. In addition to a wide range of topics related to review-related research and publishing, scientific working methods, social employment, and interpersonal relations as well as ideas about "proper" research in general are marked as relevant by the study. Accordingly, the dimensions fundamentally determine Ph.D. students' perspectives on review writing as a central scientific practice, which may represent a gain in knowledge for the future conduct of research projects on the culture of doctoral studies inside and outside of sports science.

In the present study, 20 Ph.D. students from various sports science sub-disciplines were interviewed about collective complexes of themes and knowledge in review writing. Finally, to frame the study, it should be explicitly noted that the findings offer the potential for generalization but do not claim to be a complete generalization. In particular, the focus on review writing in theses-by-publication processes in sports science holds some potential for generalization at this point. As a multidisciplinary cross-sectional science, sports science combines an extensive range of scientific disciplines, paradigms, and methods (Krüger, 2018). Collective statements based on such sampling are therefore comparatively broader in scope than studies conducted in a single scientific discipline. Against this background, the results can certainly be attributed a certain generalization power for content-related, social and affective methodological and academic socialization experiences, especially at the beginning of the scientific career (Bruce, 1994; Weidman et al., 2001). At the same time, however, it cannot be clearly decided whether the interviewees see themselves as sports scientists or as actors of the respective mother disciplines. Future research projects should therefore concern the main categories and dimensions of experience as well as their (possibly) different manifestations in different disciplinary scientific cultures. Against the background of diverse modes of contextualization, it also seems meaningful to highlight not only the collective experiences of Ph.D. students, but also their individual differences. Individual case analyses could reveal the variance of perspectives on review writing and describe, for example, typical ways of dealing with the three dimensions. Furthermore, it should be noted that review writing cannot only be described from Ph.D. students' perspective. Follow-up research can, for example, also explore their supervisors to compare perspectives. Especially concerning possible consequences for science policy, which should also address supervisors and result in concrete advice for supporting all involved actors in review writing, such perspective-contrasting research seems purposeful.

In addition to these scientific possibilities, the results also offer basal practical implications. Following the findings of the

study, practical challenges become apparent in particular for the "uncertain" topics and work steps of review writing. Here, a certain contingency prevails and comparatively independent solutions have to be found, especially for work phases around the presentation of the often confusing results, work phases that are characterized by little methodological support, schemes or models, or the processing of rather rare and not very strongly pre-structured review types apart from the systematic review. Academic practice can counter such uncertainties of Ph.D. students, which are equally colored by content, social and affective factors, by recognizing these as important topics, acknowledging them as relevant and creating spaces to make them a topic in scientific practice, e.g., in the supervisory relationship between Ph.D. student and supervisor, in the exchange between Ph.D. student and experienced experts, or within the framework of structured Ph.D. programs (Golde, 2007; Tardy et al., 2020). In this way, the best case scenario for review writing is not only to produce young academics who apply methods in a mechanically correct way but also to produce independent academic personalities who are self-confident and creatively capable of keeping the scientific system running and developing it further.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because the study contains sensitive interview data that cannot be completely anonymized. Requests to access the datasets should be directed to the DJ, d.jaitner@tu-braunschweig.de.

ETHICS STATEMENT

Ethical review and approval were not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

DJ conceived and designed the study. DJ and LG collected, organized and analyzed the data, and wrote most of the manuscript with substantial contributions from BZ. All authors provided feedback on drafts and approved the submitted manuscript.

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