The auditor learning curve

THE AUDITOR LEARNING CURVE:

PROFESSIONAL DEVELOPMENT THROUGH LEARNING FROM ERRORS AND COACHING

Laura Hildegard Smeets

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Summary

Enhancing employees' professional development has become a top priority within the audit profession. To ensure audit quality and to keep up with the speed of changes driven by a growing complexity of processes and continuous regulatory and technological changes, audit firms face increasing pressure to facilitate their employees' professional development. Although professional development is an increasingly important topic on the strategic agenda of audit practice, there is little understanding on how to foster auditors' learning and development and how to support effective coaching of less experienced auditors. Studying auditors' professional development is relatively novel in the audit literature and has not received much attention to date. To address this gap, this dissertation focuses on professional development through learning from their errors, and on the factors that drive supervisors to professionally develop their less experienced colleagues through coaching.

The present dissertation took an interdisciplinary and multi-method approach to answer this research question and studied both the perspective of subordinates and supervisors. Chapter 2 explores how direct supervisors can effectively facilitate learning from errors besides creating a psychologically safe work environment. Chapter 3 investigates the relationship between perceived learning from error climate and professionals' engagement in error-related learning activities, and its underlying mechanisms. In both studies, auditors did not automatically learn from their errors; this process was fostered by psychological safety and learning opportunities afforded by the direct supervisor (chapter 2) and the perception of a supportive learning from error climate (chapter 3). Chapter 2 showed that supervisors can foster learning from errors by providing timely and elaborate feedback, being accessible and involved, and organizing joint evaluations. Chapter 3 shows that organizations can actively encourage professionals to learn from their errors by creating a supportive learning from error climate. Such a learning climate was found to reduce error strain (an affective mechanism), which in turn positively related to reflecting on errors (a cognitive mechanism). The results of chapters 2 and 3 advance our understanding of how audit firms, and particularly audit supervisors can foster learning from errors in staff auditors.

Complementary to the focus on the development of staff auditors, the second set of studies in this dissertation (chapters 4 and 5) explores when supervisors decide to coach their subordinates and to create opportunities for their learning and professional development. Chapter 4 explores the factors that drive and inhibit supervisors to professionally develop their subordinates through coaching. Chapter 5 experimentally investigates how two subordinate-specific factors, performance reputation, and likelihood to return on the engagement, affect the extent to which reviewers professionally develop

their subordinates. The results of chapters 4 and 5 provide clear evidence that reviewers' decisions to invest effort in coaching their preparers during the audit review process depend on their own characteristics, perceptions of preparer' attributes and contextual factors. Chapter 4 showed that reviewers tend to reduce their coaching efforts when preparers are dealing with a high workload, and a lack of physical proximity and low team staffing levels negatively impact reviewers' decision to coach their subordinates. Moreover, this chapter indicates that firms could promote the provision of effective coaching through four mechanisms, including the provision of formal trainings on coaching, the provision of on-the-job coaching for reviewers, assigning sufficient time for review and coaching, and designing a supportive firm culture for coaching. Chapter 5 revealed that reviewers are less focused on professionally developing preparers who are unlikely to recur on the engagement. This effect is strengthened when the preparer has a low-performance reputation. The results of chapters 4 and 5 provide a richer understanding of reasons for inadequate coaching in the review process and shed light on how audit firms can effectively support reviewers in their coaching role.

To conclude, the findings of this dissertation provide an important step toward understanding how auditors' professional development can be fostered, as well as how supervisors can be supported in professionally developing their subordinates. Our results indicate that firms play a vital role in facilitating effective coaching on audit engagements where preparers receive equal opportunities for learning and development: they can create the optimal conditions for promoting individual professionals' learning (from errors) by supporting both subordinates and supervisors. Last but not least, this dissertation emphasizes that enhancing auditors' professional development is a shared responsibility of subordinates, supervisors, and the firm alike; it requires commitment from all three levels.

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CHAPTER 1

General Introduction

1.1 Motivation

> "Making errors is part of life, but the accumulation of shortcomings in the audit sector goes much further. It is time to fundamentally improve a number of things, in order to restore the public confidence of an auditors' signature, which is worth so much in the course of trade" (Dutch Minister of Finance, Wopke Hoekstra, NRC 31-01-2020).

Financial statements are of great importance to society. Investors, banks, and other stakeholders must be able to rely on the information provided in these statements. When auditors check the reliability of financial statements, they 1) confirm that the financial statements comply with applicable laws and regulations, and 2) ensure that the information presented in the published accounts provides a "true and fair" view of the activities of the business and that the balance sheet provides a realistic assessment of the assets and liabilities of the business.

However, as Wopke Hoekstra's quote - when serving as Dutch Minister of Finance - above illustrates, the public confidence in auditors' judgements and reputation has been deeply eroded in the past decade. The well-known and widely publicized series of financial scandals such as Wirecard, Carillion, Imtech and, Steinhoff, significantly damaged public confidence in the global auditing profession. The financial crisis in 2008/2009 was a forerunner in revealing some inherent weaknesses residing with the audit profession. After the financial crisis, the audit sector has been repeatedly criticized for delivering audits that contain a significant number of deficiencies, defined as judgements based on insufficient evidence (AFM, 2010). In the first round of regular inspections, published in 2010, the Dutch regulator of the audit profession (AFM) found that 29 of the 40 statutory audits were classified as insufficiently supported by evidence. These findings are similar to the conclusions of the International Forum of Independent Audit Regulators published in 2015 (IFIAR, 2015), showing that audit firms in 47 % of the cases did not obtain sufficient appropriate evidence to support their audit opinion. These findings raised the question whether the profession lacked the willingness to improve or whether society's expectations were beyond what was possible by the profession.

To date, it seems that the audit sector is still dealing with similar challenges as identified a decade ago. IFIAR for instance observed that the audit deficiency rate has only declined from 47% in 2014 to 34% in 2020 (IFIAR, 2020), indicating little change. Similarly, based on the most recent report of the Commission Future Accountancy Sector (CTA, 2020), the Dutch minister of finance, Wopke Hoekstra, stated "The quality of statutory audits has insufficiently improved in recent years, as a significant number of audits still do not meet the quality standards. There is still a lot of work to be done".

To better understand and address the challenges described above, the audit sector has heavily focused on identifying ways to improve audit firms' performance. In this respect, the Royal Netherlands Institute of Chartered Accountants (NBA) for instance, published in 2014 a report in which they proposed 53 measures to increase performance and restore trust in the audit profession. In this report, much attention has been paid to the theme "learning capacity of the organization". This attention to learning does not come as a surprise. The NBA (2014) report expressed its concerns that the profession lacked sufficient ability to adapt the quality of its work to society's changing expectations. The audit sector responded to this critique by paying additional attention – on top of its ongoing schooling activities – by investing in continuous learning and development activities. Special attention was paid to learning from errors identified in the work. In particular, attention was devoted to how auditors interact in audit teams, how information is shared, and which information is collected. The audit sector recognized the importance of having an organization where the importance of connecting with other auditors' experiences and learning from errors made in the work is valued. The changing role of the auditor accelerated this process. Todays' auditors face an increasing pace of changes driven by a growing complexity of processes and systems, and continuous regulator and technological changes (Andiola et al., 2021; Westermann et al., 2015). To keep up with the speed of these changes and to continue meeting audit standards, auditors are required to continuously develop their professional knowledge and skills (Westermann et al., 2015). As a result, firms face increasing pressure to facilitate auditors' professional development.

Susskind and Susskind (2015, p. 15) define professionals as experts having specialist knowledge, whose admission depends on credentials, whose activities are regulated, and who are bound by a common set of values. Being a professional implies that professional development (schooling, certification, license to practice, and learning during the work) has become a top priority within current audit firms. The complexity of their work together with society's expectations about their performance requires audit firms to invest heavily in the quality of their people. This has also been recognized in recent reports from the Dutch NBA when concluding that the future of this profession also depends on their ability to adapt and learn. In 2019, the NBA published a report titled "root-cause analysis", in which seven factors are identified for driving sustained improvements in audit performance including (1) the learning organization with an open culture, (2) sufficient time for review and coaching by the audit team, (3) adequate process management, (4) quality of the audited organization, in combination with the risk of a service-oriented attitude of the auditor, (5) clarity about technical requirements and their practical application, (6) a professional identity and professional skepticism, and (7) a balanced and diverse audit team. The report shows that audit firms need to foster auditors' professional development by developing explicit learning and development policies. This dissertation will particularly focus on those organizational drivers that can be classified under the

umbrella term "professional development" including (1) "the learning organization with an open culture" and (2) sufficient time for review and coaching by the audit team. It will be analyzed how audit firms can create the necessary conditions allowing individual auditors to learn continuously and how audit firms can gain from this by improving collaboration. Below we will elaborate on these two factors.

The learning organization with an open culture

In several reports, the NBA repeatedly highlighted the importance of learning from errors as an important part of a learning profession. The NBA for instance wrote in their 2014 report that "sanctioning is really not the only, or most suitable way to better understand the objective reasons for a qualitatively inadequate audit and to improve audit quality. (…) To reach this understanding, learning from errors needs to be better institutionalized" (NBA, 2014, p.11). In a similar vein, the NBA chair, Marco van der Vegte reported the following in a letter to the Dutch minister of Finance: "what can be expected of us is that we stand for our principles and learn from the errors we make. Only then can sustainable change be achieved" (De Accountant, 2018). Both statements are based on the assumption that errors cannot be completely eliminated, despite all efforts being made to prevent them.

In their root-cause analysis report, the NBA (2019) indicated that in order to attain a sustainable improvement, "it is essential that the organization and the individual auditor detect errors in time, reflect on the underlying causes of errors and learn from them. This requires an open culture where auditors feel safe to provide and receive open and constructive feedback" (NBA, 2019, p. 18). Based on this report, the audit sector has taken several initiatives towards a more open and learning-oriented culture such as, setting up a platform to share (error-related) knowledge, conducting root-cause analyses (this may concern the analysis of systematically occurring errors at audit firms), developing a pilot with case materials containing information about past errors and incidents, and organizing a debate to discuss the importance of a constructive learning (from error) culture (de Vries & Herrijgers, 2020).

Six years after issuing the 53-measures reform plan, the Monitoring Committee Accountancy (MCA, 2020), an independent body implemented based on the NBA's 2014 report, observed that the auditing sector is doing much better compared to when the committee started its work in 2015. In the context of the learning profession, the report stated that there are positive developments towards a learning-oriented culture within firms (MCA, 2020). Yet, the concrete implementation of this culture is still in its infancy at many audit firms. Accordingly, the main challenge currently is to expand and deepen these initial positive developments. This requires more insights into how the learning capacity can be increased within the audit profession. In particular, having a deeper understanding of how auditors can be enabled to learn (from their errors) and improve

their performance is of key importance for the audit sector. As such, this dissertation aims to provide more insights into the mechanisms that support auditors' learning (from errors) and professional development.

Sufficient time for review and coaching by the audit team

Besides creating a more open and learning-oriented culture, the NBA declared in their 2014 report that in order to increase the learning capacity of the audit firm, investments must be made in education, training, and making sufficient time available for substantive coaching. It is stated that "investing in quality means primarily investing in people and in daily practice" (…) Both experienced and less experienced auditors indicate that the time and attention devoted by more experienced team members, including the partner, to the coaching of less experienced team members, is vital for the quality of the audit involved and for the learning curve of auditors. It is important that sufficient time is budgeted for this" (NBA, 2014, p.69).

With the objective of enhancing auditors' professional development in mind, audit firms have taken specific actions to better support coaching on-the-job. For instance, current reports of Deloitte LLP (2020), PwC LLP (2020), and KPMG LLP (2020) indicate that a series of actions have been implemented that focused on enhancing coaching on-the-job: involving the creation of small learning communities where auditors can explore auditing issues in a developmental way, monitoring review outcomes over time, and the provision of a coaching course focusing on effective review practices.

With respect to the actions taken to support professionals' learning, the national joint research report by Nyenrode Business University and NBA Young Professionals (2020) demonstrated that early-career professionals are more positive about the attention given to their professional development. Whereas in 2018, it was found that young audit professionals often experience a lack of coaching-on-the-job during audit engagements (de Vries & Herrijgers, 2018) two years later, de Vries and Herrijgers (2020) provide evidence that young audit professionals experience that there is more room for coaching on the job. Despite this improvement, it is emphasized that young professionals believe that there is still a lot to be done since the sector is not there yet (de Vries & Herrijgers, 2020). Especially the aspect of coaching auditors deserves further attention in the future. Hence, it remains a key question for audit firms how to facilitate effective coaching of less experienced auditors on audit engagements.

Taken together, enhancing auditors' professional development – including facilitating auditors' learning from errors and supporting effective coaching – has become a top priority within the audit sector. Consequently, there is a growing need for a better

understanding of how to facilitate auditors' learning (from errors) and support effective coaching of less experienced auditors on audit engagements.

While professional development is an increasingly important topic on the strategic agenda of audit practice, this particular topic has gained limited attention on the research agenda. In this dissertation, professional development is viewed as the acquisition of new knowledge and skills obtained through day-to-day experiences at work (Wallin et al., 2020). In a recent review study, Dierynck et al. (2019) show that only a few studies exist within auditing that explicitly focused on auditors' learning on-the-job and professional development (Andiola et al., 2020; Hicks et al., 2007; Westermann et al., 2015). Existing studies on learning have either focused on formal training (e.g., Bonner et al., 1997; Moreno et al., 2007; Plumlee et al., 2015) or on subordinate performance, where learning is an implicit concept and viewed as a by-product (Bonner & Lewis, 1990; Borthick et al., 2006; Libby & Tan, 1994). Moreover, very little research exists on the coaching role of more experienced auditors (e.g., reviewers) (recent exceptions are Andiola et al., 2021, 2020; Bol & Leiby, 2018; Gimbar et al., 2018). In particular, little attention has been devoted to which factors drive audit supervisors to engage in coaching (Andiola et al., 2021). Accordingly, we have little understanding of the determinants of coaching and how audit professionals can be enabled to further their professional development.

To address this void in audit research, the current dissertation explores how audit firms, in particular supervising auditors, can promote auditors' learning (from errors) and development on audit engagements. Findings will provide audit firms with targeted information on how they can support and promote the professional development of their employees better. In addition, this dissertation aims to uncover antecedent factors that drive supervisor auditors to invest time in coaching. Exploring which factors influence supervisors' engagement in coaching may provide audit firms with relevant insights into how they can leverage coaching for sustained performance improvements on audit engagements.

In summary, in this dissertation, it is intended to contribute to empirical knowledge on professional development within auditing. The central research questions are:

1) How do audit professionals develop professionally through learning from errors?
2) How can supervisors professionally develop their colleagues through coaching?

Specifying the research question and developing the theoretical framework requires an understanding of (1) the concept of professional development, (2) the concept of learning from errors and associated conditions that promote learning from errors, (3) the role of supervisor behavior in driving professionals' learning and development, and

(4) the concept of supervisory coaching along with an examination of antecedents and consequences of coaching. Drawing on workplace learning literature (within and outside auditing) and organizational behavior literature, this introduction addresses each point in turn before providing an overview of the studies reported in this dissertation.

1.2 Professional development

In the past two decades, many organizations have come to view professional development in the workplace as a key to survival and success (Eldor, 2017; Susomrith & Coetzer, 2019). Therefore, across professions, from teaching and nursing to engineering, there is an increasing pressure for employees to continuously update their knowledge and skills (Kyndt et al., 2009; Tynjälä, 2013). Accordingly, organizations face an ongoing need to enhance employee learning and knowledge development (Kyndt et al., 2009; Tynjälä, 2013).

The term professional development has been described in several ways. Traditionally, the field of professional development has been dominated by a training model through which the focus is on formal education and training courses (Wallin et al., 2020; Webster-Wright, 2009). In this respect, professional development is viewed as the acquisition of professional knowledge and skills – achieved through participation in formal training programs. In recent years, however, attention has shifted away from the traditional view of 'professional development', as something that is achieved only in formal training courses, towards an understanding of professional development that is achieved through participation in everyday work tasks (i.e., engagement in activities and interactions) (Wallin et al., 2020; Webster-Wright, 2009). Accordingly, professional development can be defined as the acquisition of new knowledge and skills obtained through day-to-day experiences at work (Wallin et al., 2020). This view on professional development is in line with prior studies on workplace learning, showing that the vast majority of professionals' knowledge is learned during the performance of daily work activities, outside the realm of formal training or education (Eraut, 2000; Marsick & Volpe, 1999; Tynjälä, 2013).

Professional development within the audit setting

Also, within the professional domain of auditing, there is a growing interest in promoting professionals' learning and knowledge development (Dierynck et al., 2019; Westermann et al., 2015). Todays' auditors are confronted with a continuously increasing pace of changes driven by the growing informational complexity, the continuously evolving needs of stakeholders, and regulatory and technological changes (e.g., Deloitte, 2015; EY, 2015; PwC, 2015). To meet the demands of the changing regulatory, economic and technological

environment, auditors are required to continuously develop their professional knowledge and skills (Dierynck et al., 2019; Westermann et al., 2015).

Nevertheless, it needs to be noticed that auditors do not become competent professionals overnight. In their pioneer study, Westermann et al. (2015) explained this as follows: "professional auditors are not born—rather they are developed through continuous and recursive professional work practices (p. 867). This statement illustrates that auditors' professional development needs to be continuously supported and promoted. In the following subsection, we will describe the role of the review process in auditor learning and professional development and describe how we conceptualize professional development within this dissertation.

Learning within the audit review process

The learning environment (e.g., the workplace in which employees learn) in the auditing profession is characterized as an apprenticeship model in which on-the-job learning is required to attain a requisite level of technical proficiency and to comply with audit standards (Westermann et al., 2015). A key component of the apprenticeship model is the hierarchically organized review process, where the work of less experienced auditors (preparers) is evaluated by progressively more experienced auditors (reviewers). The review process is organized in a 'cascaded' manner across multiple levels so that senior auditors review junior auditors, managers review senior auditors, and partners review managers. Reviewers have two essential roles in this process. First, they are required to detect and correct errors in the work of preparers to assure quality control. Second, reviewers are responsible for professionally developing preparers through coaching (Lambert & Agoglia, 2011; Trotman et al., 2015). That is, the audit review provides learning opportunities for preparers to reflect on what they have done and what they should be doing on future engagements. Within this structure, auditors at different ranks can learn the "craft" of auditing by discovering how audit methods and accounting standards acquired in the classroom are applied in practice (Westermann et al., 2015). As such, each audit engagement provides an opportunity for auditors at different stages to develop their knowledge and abilities. That is, a staff auditor typically learns from a senior, a senior learns from a manager, and a manager learns from a partner (Dierynck et al., 2019). Taken together, the audit review process plays a pivotal role in the learning and development process of auditors. In this dissertation, we are particularly interested in how and when supervising auditors, e.g., reviewers, support preparers in their learning and professional development.

Conceptualizing professional development for this dissertation

Within the audit literature, the concept of professional development has received limited and mostly implicit attention. The term professional development has been used in a broad range of topics and formats, including specified training, formal education, the

review process, and mentoring, all intended to help auditors improve their knowledge and skills. However, little attention has been paid within this particular context to define and describe the nature of the professional development concept. To the best of our knowledge, only Andiola et al. (2020) provided a formal definition for professional development and described it as follows:

> "Professional development, often referred to as "coaching" in audit practice involves improving employees' job performances and enhancing their capabilities by providing feedback, encouraging critical thinking, and stimulating future learning" (p.1).

This definition implies a focus on professional development as an input factor; it refers to the enactment of coaching behaviors aimed at helping less experienced auditors to develop their professional knowledge and skills. By contrast, we build on Tynjälä's (2013) 3P model of workplace learning to describe the concept of professional development, and view it as a learning outcome (e.g., professionals' acquired knowledge and skills). Tynjälä's (2013)3P model includes three interrelated components: presage, process, and product. Presage refers to individual learning factors, such as an individuals' motivation to learn and workplace context factors, which influence professionals' engagement in learning activities. The process component refers to learning-related activities taking place in the workplace, like seeking feedback from the supervisor, and directly determines the product. Finally, the product component comprises various learning outcomes, including knowledge, skills, and abilities, acquired as a result of engagement in learning activities. Based on Tynjälä's, (2013) 3P model, we classify professional development as a product component, referring to the knowledge and skills auditors acquired through engagement in learning activities.

Prior literature on professional learning and development suggested that professional development, as a learning outcome, is difficult to measure or identify in everyday work settings (Littlejohn et al., 2016; Tynjälä, 2013). Therefore, this dissertation focuses on the process component (e.g., professionals' engagement in learning activities in chapters 2 and 3) as the dependent variable. That is, professionals' engagement in learning activities is viewed as a proxy for professional development. In this dissertation, we are particularly interested in how and when supervising auditors, e.g., reviewers, enable preparers to engage in learning activities and further their professional development. For this purpose, we explore in this dissertation both the perspective of subordinates (e.g., preparers) and the perspective of supervisors (e.g., reviewers). Exploring both perspectives allows us to gain deeper insights into how and under which conditions audit professionals are enabled to learn (from their errors) and further their professional development.

1.3 Learning from errors

The past decade has witnessed a growing trend in viewing errors as a recurring outcome of organizational work (Dahlin et al., 2018). Organizations have become increasingly aware that completely ruling out errors is an illusion; where people work, errors are made. Especially when faced with a dynamic field of work involving high workload, time pressure, and frequent changes in relevant knowledge, the likelihood of making errors is high (Gruber & Mohe, 2012; Leicher & Mulder, 2016). Typical examples of such work environments can be found in domains such as healthcare, aviation, and auditing. In such professions, errors play a double-edged role: On the one hand, errors have negative consequences for the individuals making them (e.g., psychological stress, feeling incompetent), as well as for organizations (e.g., economic costs, damaged reputation) (Lei et al., 2016; Zhao, 2011). On the other hand, errors bear a significant learning potential, affording advantages for both the individual (e.g., knowledge development, career development) and for the organization (e.g., innovation, improved performance) (Bauer & Mulder, 2007; Leicher et al., 2013; Zhao et al., 2018). Accordingly, organizations have a vested interest in creating conditions that mitigate negative error consequences and that enable potential positive outcomes of errors. This requires that organizations support their employees in learning from errors. In the following subsections, we conceptualize learning from errors and elaborate on the conditions that organizations need to create for facilitating professionals' learning from errors.

The concept of learning from errors

Conceptualizing learning from errors at work necessitates first the clarification of the concept "error". Drawing upon action-directed approaches to errors, we define errors throughout this dissertation as individual actions that result in an unintended deviation from a desired goal and that endanger the attainment of higher-order goals, including both rule-based errors and deficiencies in available knowledge, which have a high potential for learning (Frese & Zapf, 1994; Rasmussen, 1987; Reason, 1995). In the present dissertation, we build on experiential learning theory's (ELT) activity perspective that frames learning as a self-directed and self-organized effort to improve performance (Kolb et al., 2001; Tynjälä, 2013). The theoretical basis of this activity perspective lies in theories of experiential learning that model learning as action-reflection-action cycles (Bauer, 2008; Leicher et al., 2013). Applied to learning from errors, an experiential learning cycle can be framed as the engagement in effortful learning activities involving (i) reflection on the causes of an error (ii), developing new work processes to avoid reoccurrence of the error, and (iii) the implementation of the new processes within the work context. The underlying idea is that through engagement in learning activities, professionals can realize learning outcomes, including the acquisition of (negative) knowledge and the development of professionals' skills and abilities (Tynjälä, 2013). Following this approach,

the present dissertation operationalizes learning from errors as engagement in learning activities involving reflection on the causes of an error and discussing future changes to avoid reoccurrence of the error (Leicher & Mulder, 2016; Leicher et al., 2013). Each of these learning activities may be performed individually or be socially shared with others in informal or formal situations (van Woerkom, 2003). Concrete individual learning activities encompass reflecting on the causes of errors and thinking about what to do differently next time. Concrete social learning activities may involve asking experienced colleagues for help and advice, jointly discussing and analyzing the error, considering ways of preventing the error from happening again, and planning and implementing the new strategy (Bauer & Mulder, 2007; Cannon & Edmondson, 2005; Meurier et al., 1997; Tucker & Edmondson, 2003)

The role of the work environment in fostering professionals' learning from errors

A key question facing not just audit firms, but all professionals working in dynamic work environments with a high risk of making errors, is how professionals can be enabled to learn from their errors. As such, a body of literature has evolved over the past two decades, which explored how professionals' learning from errors can be enabled. These studies share the basic conjecture that learning does not automatically follow from erring; rather it depends on how professionals perceive their work context (Frese & Keith, 2015; Grohnert et al., 2019; Harteis et al., 2008).

The organizational work context has been recognized as playing a key role in shaping professionals' responses to errors. (Edmondson & Lei, 2014;Frese & Keith, 2015). In his seminal work, Zhao (2011) explained that employees typically read their work context for signs about how errors are perceived and what they are expected to do about their errors. In light of this, substantial amounts of research have demonstrated that when professionals are encouraged to perceive errors as sources of learning instead of as embarrassing events, they are more likely to engage in learning practices such as asking for help and openly discussing underlying causes of errors, because it is safe to do so (Edmondson & Lei, 2014; Frese & Keith, 2015; Leicher et al., 2013; van Dyck et al., 2005). This notion is captured in the concept of learning from errors climate, defined as "the collective perceptions of the members of an organization or organizational unit concerning practices, processes, structures, and behaviors that support or hinder the benefits that organizations can draw from errors" (Putz et al., 2013, p.112). Based on an extensive review, Putz et al. (2013) developed the concept of learning from errors climate that is shaped by four components including (1) the behaviors of the direct supervisor, (2) behaviors of colleagues, (3) work procedures, and (4) the values shared by members of an organization. A supportive learning from error climate is, for instance, characterized by tolerance with regard to errors, upper management being positive towards sharing errors, and staff being encouraged to jointly analyze their errors (Gronewold & Donle,

2011). Studies across a wide range of professions confirmed the eminent role that an organizations' learning from error climate plays in fostering professionals' engagement in error-related learning activities. In the financial services setting, Leicher and Mulder (2016) have demonstrated that professionals who perceive their work context (e.g., their team) as tolerant towards errors, are less prone to cover up their errors and in turn are more likely to engage in social learning from errors activities. Similar evidence was found in many different domains, such as healthcare (Leicher et al., 2013), aviation (Catino & Patriotta, 2013), and education (Steuer et al., 2013). Taken together, a supportive learning from error climate is a dominant driver for professionals' engagement in error-related learning activities.

Studying the role of the work context on learning from errors within the audit setting

As stated before in this introduction, learning from errors - an aspect of professional development – has become a top priority on the agenda of the auditing profession. Enhancing employees' learning (from errors) has been recognized in the audit sector as an essential avenue towards improving performance. Accordingly, there is an increasing need to better understand how to enable auditors' learning from errors.

Despite this increasing need, learning from errors has gained limited attention on the audit research agenda. The limited research that is available predominantly investigated the direct link between learning from error climate and professionals' engagement in learning from errors activities (Gold et al., 2014; Grohnert et al., 2019; Gronewold & Donle, 2011). Grohnert et al. (2019) for instance, found that auditors' help-seeking from supervisors depends on their perceptions of the firms' learning from error climate. Auditors who perceived a supportive learning from error climate sought help more frequently after making an error than those who perceived a less supportive learning from error climate.

Although prior research has repeatedly highlighted that a supportive learning from error climate is a dominant driver for professionals' learning from errors, very little is currently known regarding the underlying mechanisms explaining the nature of this relationship (Ye et al., 2018; Zhao et al., 2018). Subsequently, it remains an empirical question of how the firms' learning from error climate fosters professionals' learning from errors. Accordingly, the present dissertation aims to add to limited existing audit research on learning from errors by exploring the missing link between professionals' workplace perceptions and their learning from errors behaviors (see chapter 3 for more details). Exploring this missing link can advance knowledge on specific intervention points that help firms increase the effectiveness of their learning from error climate, giving guidance to individual professionals and leaders alike.

1.4 The role of direct supervisor behavior in promoting learning from errors

Leader behavior has been recognized as one of the most important factors in fostering or inhibiting professionals' learning from errors. This does not come as a surprise, given that they hold a unique power position: they administer rewards, punishments and make decisions with regard to subordinates' promotions (Detert & Burris, 2007; Rodriguez & Griffin, 2009). Consequently, professionals are specifically attentive to their supervisors' attitudes and behaviors concerning errors. When a supervisor is perceived to be tolerant towards errors, professionals are more likely to openly discuss their errors because they believe it will have no further consequences for their image, status, and career (Edmondson, 1999). By contrast, when a supervisor is punitive towards errors, they rather react defensively and focus on covering up their errors than making an effort to learn from the event (Edmondson, 1996; Edmondson, 1999). Accordingly, supervisors can facilitate or inhibit professionals' engagement in learning activities, depending on their attitude and behaviors with respect to errors.

This viewpoint is expressed in the concept of psychological safety, a team-level construct that is defined as "the shared belief by members of the team that the team is safe for interpersonal risk-taking" (Edmondson, 1999, p.354). A growing number of review studies and meta-analyses have demonstrated that leaders, especially direct supervisors, can promote professionals' learning (from errors) through creating a psychologically safe work environment (Edmondson & Lei, 2014; Frazier et al., 2017; Nellen et al., 2019). Specific leadership behaviors that have been found to strongly influence professionals' perceptions of psychological safety include admitting own errors, continuous invitation of input, being accessible, and exhibiting openness (Edmondson, 2011; Edmondson & Lei, 2014; Nembhard & Edmondson, 2006; Zhao et al., 2018).

Also, within the audit context, there is initial evidence available that shows that supervisors can shape perceptions of a safe work environment and, in turn, promote engagement in learning from errors activities, by modelling fallibility and by responding supportively towards subordinates' errors (Stefaniak & Robertson, 2010; Zhao et al., 2019). Despite this initial evidence, there is still little understanding of how audit supervisors can help professionals to learn from their errors.

To date, research has largely focused on psychological safety as the main condition through which supervisors can facilitate professionals' learning from errors. As a result, it remains an open question which other behaviors they can use to help individual professionals learn from their errors. It is essential to empirically address this question since extant research suggests that creating a psychologically safe environment is a necessary, but

insufficient condition to ensure learning from errors will occur (Baumgartner & Seifried, 2014; Edmondson, 2019; Edmondson & Lei, 2014). In her latest book, Edmondson (2019) used the metaphor of "starting a car" to describe why psychological safety is not enough for learning to occur; psychological safety helps "to take off the brakes" that keep professionals from engaging in risky learning behaviors, such as openly discussing an error, "but it is not the fuel that powers the car" (Edmondson 2019, p.21). Besides creating psychological safety, Edmondson (2019) theorizes that supervisors have the pivotal task of coaching and inspiring their employees and providing them with feedback. Until now, ample empirical evidence has been available that explores how direct supervisors' behaviors can promote learning from errors beyond creating psychological safety. Therefore, in order to provide a complete picture of the enabling role of supervisors, this dissertation explores which supervisor behaviors hinder and facilitate professionals' engagement in learning from errors activities, besides creating a psychologically safe work environment. We specifically focus on how direct supervisors in dyadic relationships can enable individual professionals to learn from their errors (see chapter 2 for more details). Findings from this dissertation extend prior audit research and contribute to workplace learning literature on learning from errors.

1.5 Supervisory coaching as a lever for professional development

In todays' increasing fast-paced world, supervisor behavior has been recognized as one of the most important factors in facilitating employees' professional development. Particularly, supervisory coaching – a management tool used to facilitate employee learning and development – has become a new hype in the workplace. Evidence for this can be seen in the growing number of books and practitioner-focused articles that recognize supervisor behavior as an essential means of helping employees to progress from marginal or good excellent or peak performance (Gilley et al., 2010). This growing popularity is also reflected in a study by the Human Capital Institute (HCI) and the International Coach Federation (ICF), which revealed that 80 % of organizations have a coach approach as part of their management or leadership strategy (HCI& ICF, 2016). The increased focus of organizations on coaching as a management strategy does not come as a surprise. One important trend that explains this increased focus relates to the fact that organizations face an ongoing need for employee learning and development, to remain innovative and competitive (Kim, 2014). Continuously developing the workforce has been identified as a fruitful way for organizations to stay successful in a gradually complex and competitive business context (Joo et al., 2012)). Moreover, extant organizational behavior literature has identified a range of benefits to be gained from supervisory coaching for both individual employees and organizations. At the individual level, supervisory

coaching has been associated with increased job performance (Pousa & Mathieu, 2014), job satisfaction (Kim, 2014), and employee retention (Eisenberger et al., 2002). At the organizational level, supervisory coaching has been related to increased organizational performance (Ellinger et al., 2011, 2003; Gilley et al., 2010), enhancement of the social capital of an organization (Ellinger et al., 2011), and cost savings (Ellinger et al., 1999). Given these beneficial outcomes, it is not surprising that organizations increasingly focus on coaching as a management strategy.

The concept of supervisory coaching

The concept of supervisory coaching has been defined in several ways. Traditionally, supervisory coaching has been viewed as a managerial tool to correct deficiencies in employees' performance (Yukl, 1994). Currently, supervisory coaching has been described as a means of enhancing employees' professional skills and knowledge (Hagen, 2012; Turner & Mccarthy, 2015). In the present dissertation, we use the specific definition of Gregory and Levy (2010) and define supervisory coaching as a "developmental activity in which an employee works one-on-one with his or her direct supervisor to improve current job performance and enhance his or her capabilities for future roles and/or challenges" (p.110).

Supervisory coaching needs to be distinguished from other forms of workplace coaching such as executive coaching and mentoring (Gregory & Levy, 2010). In executive coaching, a higher-level individual is being coached by an external professional coach to improve personal performance and effectiveness (Joo et al., 2012). By contrast, supervisory coaching takes place between a direct manager and his or her subordinate (Gregory & Levy, 2010). Mentoring, another form of workplace coaching, is described as a long-term process that is career-focused and covers all life structures (Ellinger et al., 2008). Coaching, in contrast, has been described as a "working partnership between an employee and his/her direct supervisor that is focused on addressing the performance and development needs of that employee" (Gregory & Levy, 2010, p.111).

Exploring supervisory coaching in the audit setting

Within the audit setting, the concept of supervisory coaching is not new at all. In fact, coaching has been recognized as a long-standing feature in the auditing professions' apprenticeship' model, where an experienced auditor shows a less experienced auditor how to perform a task and provides guidance that is gradually withdrawn as mastery is attained (Westermann et al., 2015). Within this particular context, coaching is often described as "guiding inexperienced auditors to discover the best way of doing something, by helping them to learn rather than instructing them" (Winograd et al., 2000, p.180). It is a day-to-day practice in which direct supervisors help improve subordinate performance through guidance, encouragement, and support (Andiola et al., 2021). Throughout this

dissertation, we will use the term coaching instead of supervisory coaching, because this is the common term used in audit literature (Andiola et al., 2021; Dierynck et al., 2019).

While coaching practices in working-paper reviews are long-standing features of the audit process, little empirical research has explored what entails effective coaching in auditing. So far, some early audit research focused on performance feedback, an element of coaching, and investigated how reviewers can help less experienced auditors to acquire the necessary professional knowledge (Bonner & Walker, 1994; Earley, 2001). These studies demonstrated that reviewers need to provide explanatory feedback, e.g., specific feedback that explains why something is incorrect, to promote preparers' learning.

Outside auditing, there exists a consistent view of effective supervisory coaching behaviors. Organizational behavioral literature has documented a number of key skills that managers should possess in order to coach effectively, including listening, analysis, interviewing, providing opportunities for reflection, and setting clear expectations (Hagen, 2012; Lawrence, 2017). However, within the audit context, it remains unclear how supervisors, e.g., reviewers, believe that coaching should be enacted such that it facilitates preparers' learning and development. In their most recent work, Andiola et al. (2021) argue that because the audit environment provides a unique work environment, characterized by a high workload and multiple role demands, in which subordinates work in temporary teams and are coached by multiple supervisors, coaching is possibly more challenging than in other work environments. Consequently, the coaching behaviors identified in prior organizational literature do not necessarily apply to the audit environment. Given the little understanding of what entails effective coaching in the audit context, this dissertation explores the coaching behaviors that reviewers perceive as critical in promoting preparers' learning. Exploring effective coaching behaviors from a supervisors' perspective not only advances the audit literature, it also advances managerial literature since studies that explore supervisors' perceptions on effective coaching behaviors are scarce (Dixey & Hill, 2015; Grant, 2010).

Antecedents and outcomes of coaching

The limited audit literature on professional development has documented several predictable beneficial effects of coaching (in the review process), including preparers' career development (Vera-Muñoz et al., 2006), performance improvement efforts (Andiola & Bedard, 2018), and increased performance when completing analytical procedures (Ismail & Trotman, 1995).

Despite these numerous benefits, regulators have expressed concerns over insufficient coaching and effectiveness of review on audit engagements (PCAOB, 2010, 2015, 2016). These concerns also resonate with research in organizational behavior, demonstrating

that supervisors often do not engage in their coaching role (Ellinger et al., 2008; Gilley et al., 2010; Steelman & Wolfeld, 2018). Already two decades ago, Goleman (2000) for instance, noted that the coaching manager remains a relatively rare species. While this is a recognized problem within both research and practice, a comprehensive picture of the reasons behind this infrequent engagement in coaching practices is still lacking (Andiola et al., 2021; Dierynck et al., 2019; Lawrence, 2017; Turner & Mccarthy, 2015).

So far, studies on supervisory coaching have predominantly focused on identifying effective coaching behaviors and associated beneficial outcomes (Hagen, 2012; Lawrence, 2017). Subsequently, there is little understanding on which factors impact a supervisors' decision to coach his or her subordinates. In particular, the perspective of supervisors themselves is missing (Dixey & Hill, 2015). Currently, only a few studies in organizational behavior (Hagen, 2012; Turner & Mccarthy, 2015) and auditing (Andiola et al., 2021, 2020) have explored which antecedent factors drive supervisors to invest time on coaching. In her review study, Hagen (2012) for instance, demonstrated that supervisors take multiple factors into account when deciding whether or not to coach their subordinates, and classified these factors into three categories: supervisor characteristics, perceptions of subordinate attributes, and contextual influences.

Concerning determinants of coaching, prior research mostly focused on supervisors' characteristics and consistently identified a supervisors' capability and motivation to coach as important drivers of effective coaching (Gilley et al., 2010; Turner & Mccarthy, 2015). Concerning subordinate characteristics and contextual factors, Hagen (2012) explicitly mentioned her surprise at how little evidence was available at the time of publishing. Evidence at the time pointed to contextual factors such as support from the organization to professionally subordinates, and time available for coaching (Beattie, 2006; Pousa & Mathieu, 2010; Turner & Mccarthy, 2015). The author concludes that while several antecedents impacting supervisors' decision to engage in coaching have been identified, research in this area is still in its infancy nine years later. To advance understanding on antecedents of effective coaching, this dissertation explores which factors drive or impair supervising auditors to professionally develop their subordinates through coaching. Adding to limited audit literature (Andiola et al., 2021), we specifically focused on the supervisors' (e.g., reviewers') vantage point.

1.6 This Dissertation

This dissertation reports on four empirical studies that examine the role of firms and in particular direct supervisors in fostering or hindering professionals to learn (from their errors), and to explore which antecedent factors drive supervisors to professionally

develop their subordinates through coaching (illustrated by Figure 1.1). The studies are presented in two parts. Part 1 focuses on the perspective of subordinates. It explores the role that errors play in promoting professionals' learning in the workplace and how audit professionals can be supported in learning from their errors at work. Part 2 builds on part 1 by focusing on supervisor perspectives and explores which factors determine whether supervisors invest time in professionally developing their subordinates. Part 1 is written from a workplace learning perspective (studies 1 and 2), and part 2 (studies 3 and 4) is written from an auditing perspective, reflecting this dissertations' interdisciplinary research question and approach. Given the interdisciplinary approach of this dissertation, it needs to be noticed that both the terms direct supervisor and reviewer are used. The term direct supervisor is used in part 1, where it is focused on the perspective of subordinates, and chapters are written from a workplace learning perspective. In part 2 of this dissertation, it is focused on supervisor behaviors in a specific role: e.g. the reviewer role in the audit review process. Accordingly, the term reviewer is used in part 2.

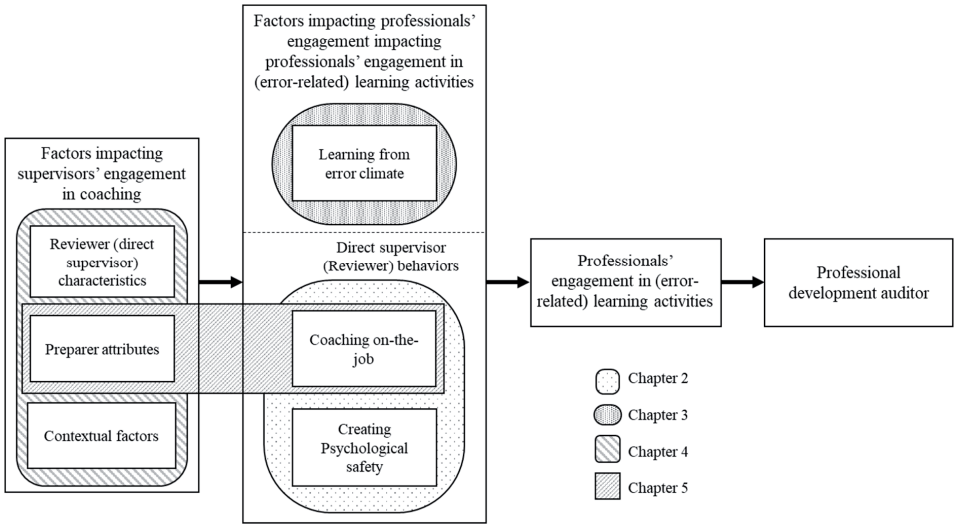

Figure 1.1. The overall model for this dissertation

Part 1: The role of firms and direct supervisors in fostering or hindering professionals to learn from their errors

In Part 1 we use two empirical studies: a qualitative study (chapter 2) and a quantitative study (chapter 3), to increase our understanding of how audit professionals can be enabled to learn from their errors at work. Both studies in this section focus on professionals' engagement in error-related learning activities as outcome variable,

encompassing professionals' reflection on the underlying causes of an error and the development of strategies to avoid similar errors in the future (Bauer & Mulder, 2007). We explore professionals' engagement in individual as well as social learning activities after making and discovering an error. In both studies, participants were asked to describe a recent situation in which they made an error during their work. Participants could think of a situation in which their supervisor detected an error and communicated the error in the form of feedback to them. Through using their own error experience as a prompt, we explore whether and to what extent professionals engage in error-related learning activities after committing an error. In chapter 2 we conducted semi-structured interviews among audit professionals across all function levels and working for different audit firms in the Netherlands. Chapter 3 was conducted with a sample of junior auditors who are in the first three years of their career and work for different audit firms in the Netherlands.

In the first study (Chapter 2) we interview audit professionals across all ranks from different audit firms to explore how direct supervisors in dyadic relationships can enable professionals to learn from their errors. Extant research has predominantly focused on psychological safety, as the main condition for learning from errors to take place. Our study extends prior research on learning from errors by exploring how direct supervisors can effectively facilitate learning from errors besides creating a psychologically safe work environment (see Figure 1.2). Moreover, chapter 2 contributes to prior research by further specifying how the immediate social context – that is the direct supervisor- plays a significant role in enabling professionals to learn from their errors.

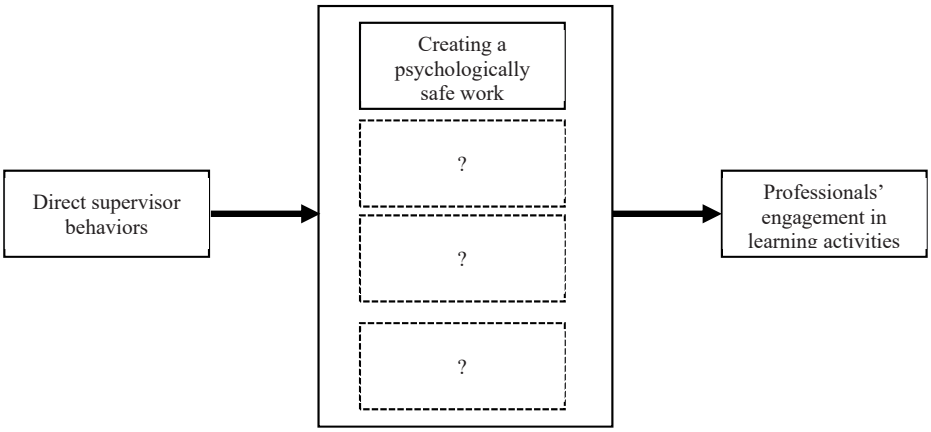

Figure 1.2. Conceptual Model for chapter 2

The second empirical study (Chapter 3) explores the relationship between perceived learning from error climate and professionals' engagement in social learning activities

after committing an error. Engagement in social learning activities is measured through Bauer and Mulder's (2013) Engagement in Social Learning Activities (ESLA) scale, focusing on joint reflection on the causes of an error, and developing new work processes to avoid similar errors in the future. Furthermore, Putz et al.'s (2013) was used to assess professionals' perceptions of a learning from error climate shaped by (1) the behaviors of the direct supervisor, (2) behaviors of colleagues, (3) work procedures, and (4) the values shared by members of an organization. It is hypothesized that the perceived learning from error climate is positively associated with engagement in social learning activities after committing an error. The link between the perceived learning from error climate and engagement in social learning activities is expected to be sequentially mediated by two underlying mechanisms:

(1) Error strain as an affective mechanism, referring to negative emotions such as fear and anxiety, that results from having committed an error (Rybowiak et al., 1999). It is expected that perceptions of a supportive learning from error climate, such that professionals believe it is safe to discuss their errors and to ask for help without fear of humiliation or reprimands, reduces the level of error strain and in turn, stimulates professionals to engage in social learning activities.

(2) Reflecting errors as a cognitive mechanism, involves a solo learning activity and refers to professionals' reflection on causes of errors on one's own (Rybowiak et al., 1999; Zhao et al., 2019). It is hypothesized that the perceived learning from error climate facilitates the undertaking of individual and social learning activities to learn from errors in a sequential order.

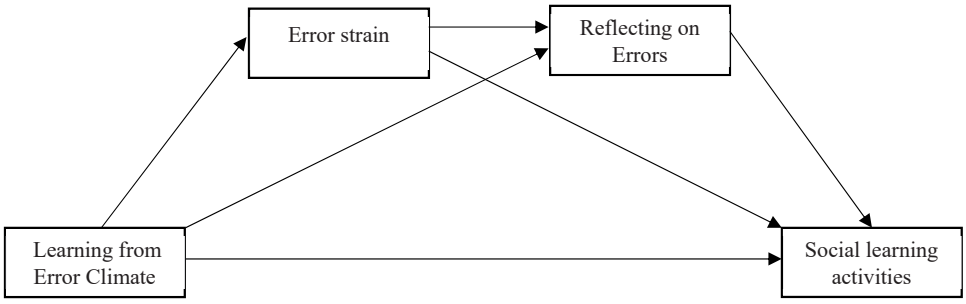

Figure 1.3. Conceptual Model Chapter 3

To explore these hypothesized relationships, we designed a questionnaire consisting of previously validated measures for the variables specified in Figure 1.3 below. The empirical findings in chapter 3 of this dissertation will provide a new understanding of the underlying mechanisms of the relationship between perceived learning from error

climate and professionals' engagement in social learning activities. This study extends prior research on learning from errors by investigating the sequential effects of engagement in error-related learning activities performed individually and in social interaction.

Part 2: Factors that determine whether direct supervisors invest time in professionally developing their subordinates

A key finding of the studies presented in part 1 is that direct supervisors play a key role in enhancing or hindering professionals' learning from errors. Supervisors need to create a psychologically safe work environment in which errors are perceived as a fruitful learning opportunity, instead of something to be hidden or blamed. Besides fostering psychological safety, supervisors need to create an opportunity for professionals to engage in error-related learning activities through providing timely feedback, providing guidance and elaborate feedback, being accessible and involved, and organizing joint evaluations. While part 1 focuses on how supervisors can help professionals to learn from their errors, part 2 builds on this work and explores when supervisors decide to create an opportunity for professional development (e.g., provide guidance and elaborate feedback) such that their subordinates can learn from their errors and acquire new knowledge. Exploring which factors facilitate or impair supervisors to professionally develop their subordinates, addresses calls for future research to gain a deeper understanding of when supervisors decide to make an effort to coach their subordinates (Dierynck et al., 2019). Especially in the audit context, this is an important question to investigate, given that regulators expressed repeatedly concerns over insufficient supervision in the past years.

Part 2 encompasses a qualitative study (chapter 4) and a quantitative study (chapter 5). Chapter 4 explores multidimensional factors that drive and inhibit supervisors to professionally develop their subordinates through coaching. Chapter 5 investigates how subordinate attributes (e.g., a subordinate's performance reputation and likelihood to stay on the team), affect the extent to which reviewers professionally develop their subordinates. For chapter 4 we conducted semi-structured interviews among senior and manager audit professionals working at three different Big 4 audit firms within the Netherlands. Chapter 5 is conducted in collaboration with one Big 4 audit firm. An experiment was designed to investigate how subordinates' attributes influence the extent to which supervisors focus on professionally developing their subordinates. Access was granted to a sample of senior auditors at several offices in the Netherlands.

The third empirical study (Chapter 4) focuses on the supervisor perspective and explores which supervisor characteristics, subordinate characteristics, and contextual influences facilitate or impair supervisors to professionally develop their subordinates through

coaching. In addition, it is explored what supervisors consider to be effective coaching and how firms can better support supervisors to effectively perform their coaching role (see Figure 1.4). As the starting point of – and guidance for- the interview, participants are asked to describe one recent example in which they consider their coaching as effective, and one example in which they consider their coaching as ineffective. We extend the limited research stream on the coaching role of the reviewer by uncovering a range of antecedent factors of effective coaching. To the best of our knowledge, this is the first study that considers the perspective of reviewers on which factors drive them how they coach. Moreover, findings of this study shed light on sources of regulator concerns and provide rich insights into how audit firms can leverage coaching for sustained improvements in audit quality.

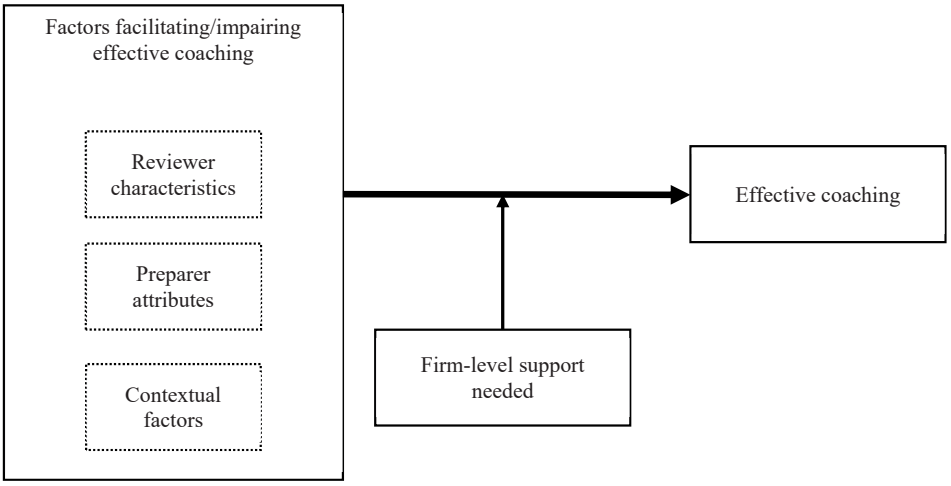

Figure 1.4. Conceptual Model for chapter 4

The last empirical study (Chapter 5) investigates whether two subordinate characteristics, e.g., the preparers' likelihood to recur and the preparers' performance reputation affect the extent to which reviewers focus on professionally developing the preparer in their review comments (see Figure 1.5). We conduct an experiment in which audit seniors and managers of a Big-4 firm are tasked with completing a workpaper review of a hypothetical preparer who performed a year-inventory count. We manipulate the preparers' performance reputation (low or high) and the preparer's likelihood of recurring on the engagement (likely or unlikely). Building on findings in chapter 4, this study measures in real-time how preparers' attributes affect the degree to which reviewers make an effort to professionally develop preparers in their review comments. We assessed reviewers' focus on professionally developing preparers in two different ways: (1) through reviewers' own perceptions and (2) through text analysis of written review comments. This study builds

on limited previous work regarding the reviewers' development function by examining the interactive effects of preparers' recurrence and the preparers' performance reputation on reviewers' focus to professionally develop their preparers. Findings of this study will provide an important step toward understanding which factors drive reviewers to professionally develop their preparers, and hence offer a foundation for future research in this area.

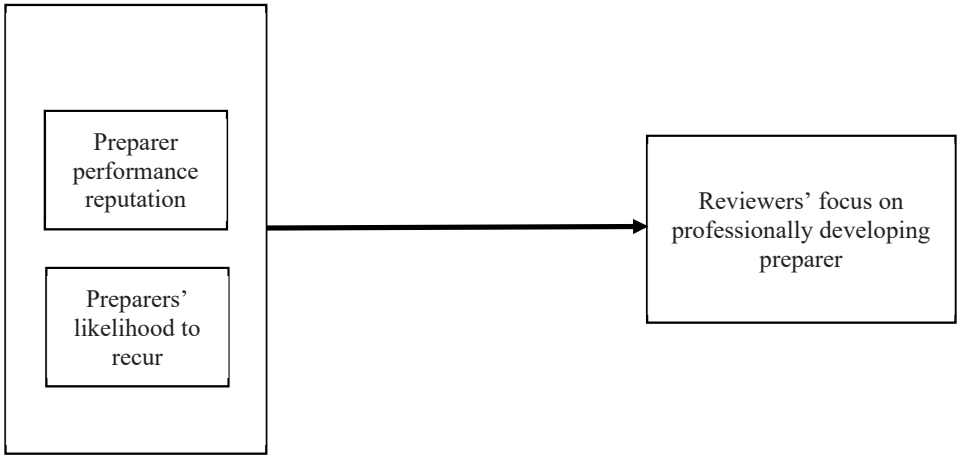

Figure 1.5. Conceptual Model for chapter 5

Outline and Notes

Chapter 6 provides an integration and discussion of the key findings of the four studies and discusses limitations, recommendations for future research, and practical implications related to how audit professionals can be enabled to learn (from errors) at work and to further their professional development.

Please note that this dissertation contains a collection of closely related studies. Since each study is written to be read on its own and as they are geared towards audiences from different academic fields, repetition, and overlap between the chapters is inevitable.

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CHAPTER 2

2

Beyond Psychological Safety – the Role of Direct Supervisor Behavior in Fostering Learning from Errors at the Workplace

This chapter is based on Smeets, L. H., Gijselaers, W. H., Meuwissen, R. H. G., & Grohnert, T. (2021). Beyond psychological safety – the role of direct supervisor behavior in fostering learning from errors at the workplace. Vocations and Learning,14(3), 533-558. https://doi.org/10.1007/s12186-021-09272-6

Abstract

This study explores how direct supervisors can hinder or enhance how professionals learn from their errors. Extant research has often focused on psychological safety as the main condition for this kind of learning to take place. We expand prior research by exploring which behaviors of direct supervisors effectively facilitate learning from errors in concert with psychological safety. We conducted semi-structured interviews among 23 professionals to gain detailed insights into their thoughts, needs, and the difficulties they encounter. Through content analysis, we identified four critical supervisor behaviors that participants viewed as facilitating learning from errors next to fostering a psychologically safe work environment: (1) providing timely feedback, (2) guidance and elaborate feedback, (3) being accessible and personally involved, (4) organizing joint evaluations. Based on our findings, recommendations are formulated for supervisors that aim to facilitate professionals' learning from errors and their professional development.

2.1 Introduction

Human errors are a recurring outcome of organizational work (Dahlin et al., 2018; Reason, 1995; Seifried & Höpfer, 2013), despite all efforts being made to prevent them (Keith & Frese 2011; Zhao and Olivera 2006). Once these errors occur, they can result in a set of negative consequences affecting the person (stress or feeling incompetent) or forcing an organization to modify its procedures (Zhao 2011; Lei et al. 2016). In the worst-case scenarios, errors can even lead to severe outcomes causing the death of a patient during surgery, a plane crashing, or overlooking crucial corporate information during financial audits. Whatever the consequences are, in most cases, it requires organizations and individuals to search for root causes, to modify behavior and procedures, and to learn from these errors such that in the near future, prevention is possible.

Learning from errors requires that organizations and individuals develop a better understanding of the underlying causes of the error situation. Research has consistently demonstrated that errors can be considered as a key factor enabling professionals to acquire essential professional competence and expertise (Bauer & Mulder, 2007; Leicher et al., 2013). Errors – under the condition that they result from deficiencies in the available knowledge – can trigger professionals to initiate learning, because they provide negative but informative feedback on what still needs to be learned (Frese & Keith, 2015; Keith & Frese, 2011). In the present study, we define learning from errors as engagement in learning activities involving the reflection on the causes of an error and developing new work processes to avoid reoccurrence of the error (Bauer & Mulder, 2007; Leicher & Mulder, 2016; Leicher et al., 2013). Engagement in learning activities can be individually or socially shared with others such as supervisors and colleagues (Bauer & Mulder, 2007). Individual learning activities enable professionals to develop a deeper understanding of why the error occurred (Hetzner et al., 2011). Social learning activities facilitate the development of shared knowledge and help to create solutions and strategies to prevent similar errors (Leicher & Mulder, 2016; Leicher et al., 2013). Engagement in social learning activities creates not only an opportunity to analyze an error in retrospection, it also helps the individual to challenge one's own (limited) perspective and to understand the causes of an error in the broader organizational context (Grohnert et al., 2019). These benefits exceed those of individual learning activities, as professionals may gain insights that would have been difficult to realize without external input (Bauer, 2008). This study focuses on both individual and social learning activities, which are part of workplace learning (Billett, 2004; Eraut et al., 1998).

Enabling professionals to learn from their errors requires that social conditions have been met to deal with negative emotions such as shame and fear (Cannon & Edmondson, 2005). Research has pointed out that if the negative consequences of errors keep being

emphasized, professionals do not consider this as a fruitful opportunity to learn and improve their performance (Grohnert et al., 2019; Harteis et al., 2008). Not surprisingly, learning does not follow automatically from erring, because it requires professionals to talk openly about their errors and ask for help without fear of ridicule or reprimands made by their peers and supervisors. Edmondson's seminal work has consistently shown that it requires trust and safety within an organizational unit to overcome the negative connotations caused by errors (Edmondson, 2011; Edmondson, 1999). Otherwise, professionals will cover up their errors, deny what has happened, or persist in what they have done out of fear to get penalized in their work or career (Edmondson, 1999).

Research by Edmondson (1999) and Frese and Keith (2015) have demonstrated that if the work environment is not perceived as psychologically safe, professionals try to avoid acknowledging that errors have been made or share their experiences with their colleagues or supervisors. Traditionally, psychological safety is a team-level construct and defined as "the shared belief held by members of the team that the team is safe for interpersonal risk-taking" (Edmondson, 1999, p.354). In their review Edmondson and Lei (2014) conclude that psychological safety is contingent with 1) performance, 2) learning behaviors at different organizational levels, and 3) with speaking up to supervisors who authorize the work being done. A meta-analysis by Frazier et al. (2017) identified a strong positive effect of psychological safety on triggering learning behaviors at both the individual and the team level. Taken together, a substantial body of research suggests that psychological safety is a dominant driver of learning from errors.

A growing amount of review studies and meta-analyses focus on how psychological safety can be created in work settings, and what behaviors are necessary to achieve it (Edmondson & Lei, 2014; Frazier et al., 2017; Koeslag-Kreunen et al., 2018; Nellen et al., 2019). This research has repeatedly highlighted that leaders, especially direct supervisors, play a key role in shaping the perceptions of psychological safety. These supervisors role model desirable attitudes and behaviors when confronted with errors by demonstrating specific leader behaviors such as tolerating errors, admitting their errors, and exhibiting openness (e.g., Hirak et al., 2012; Zhao et al., 2018). While prior research has primarily focused on how leaders can create team psychological safety (Carmeli et al., 2012; Nembhard & Edmondson, 2006), research has focused less on how leader behaviors are perceived and interpreted by supervisees for learning, specifically in a hierarchical context (for reviews, see Edmondson & Lei, 2014; Newman et al., 2017). This paper focuses on the degree to which individuals experienced psychology safety in an error situation involving interactions with their supervisor, placing the individual at the center of understanding which conditions facilitate learning from errors.

To date, it remains an open question which other behaviors supervisors can use to enhance or hinder professionals' learning from errors. It is important to empirically address this question because extant research suggests that creating a psychologically safe work environment is a necessary, but not a sufficient condition for learning from errors (Baumgartner & Seifried, 2014; Edmondson, 2019; Edmondson & Lei, 2014). Though direct supervisor behavior has been recognized as an essential factor in learning from errors, little is known about how direct supervisors can help individual professionals to learn from their errors besides creating a psychologically safe work environment. Even less is known about how direct supervisors in dyadic relationships can enable professionals to learn from their errors. In this respect, Edmondson and Lei (2014) suggest that more research is necessary, providing insight into how psychological safety unfolds in asymmetric employee – supervisor relationships.

The present study focuses on how direct supervisors enhance or hinder professionals' learning from errors. By conducting semi-structured interviews, we explore which behaviors of direct supervisors can facilitate professionals' learning from errors in concert with creating a psychologically safe work environment. Exploring these questions adds to prior research in three ways. First, it provides an overview of learning activities that professionals use individually and socially shared to learn from their errors. As participants are asked to report which learning activities they used in reality, potential obstacles that hinder engagement in learning activities can be identified. Second, we expand research on learning from errors by developing new insights into how the immediate social context- that is the direct supervisor- plays a significant role in explaining whether and to what extent professionals learn from their errors. Third, it contributes to our understanding of how supervisors can help professionals to learn from their errors besides creating psychological safety. The remainder of this paper is organized as follows. First, we provide a theoretical overview in which we conceptualize learning from errors as engagement in learning activities. Next, we provide an overview of contextual conditions that have been found necessary for learning from errors to occur. After describing the research context and methods, we report our findings, including a discussion and implications for practice and future research.

2.2 Theoretical framework

Learning from errors as engagement in learning activities

Conceptualizing learning from errors at work first requires the clarification of the concept "error". Drawing upon action-oriented approaches, we define errors as individual actions that result in an unintended deviation from a desired goal and that endanger the attainment of higher-order goals, including knowledge and rule-based errors, which

have a high potential for learning (Frese & Zapf, 1994; Rasmussen, 1987; Reason, 1995; Bauer & Mulder, 2007; Leicher et al., 2013). In this study we take errors as the starting point. It is the moment in which an individual has recognized he or she made an error either by the professional themselves or through negative feedback received by the direct supervisor. In contextualizing learning from errors for this study, we build on experiential learning theory's (ELT) activity perspective that frames learning as a self-directed and self-organized effort to improve performance and focuses on learning in terms of the engagement in learning activities (Bauer, 2008; Bauer & Mulder, 2007; Bauer, 2008; van Woerkom, 2003). Based on ELT's conceptualization of learning as reflection-action cycles, learning from errors can be framed as the engagement in effortful learning activities involving (i) reflection on the causes of an error (ii), developing new work processes to avoid reoccurrence of the error, and (iii) the implementation of the new processes within the work context. Following this framework, we operationalize learning from errors as engagement in learning activities, involving professionals' reflection on the underlying causes of an error and the development of strategies to avoid similar errors in the future (Bauer and Mulder 2007).

Engagement in learning activities may take place individually or be socially shared (Bauer & Mulder, 2007; Leicher & Mulder, 2016; Leicher et al., 2013). Individual learning activities involve activities that are performed on one's own without input from others, such as reflecting on the underlying causes of errors (Harteis et al., 2008; Rybowiak et al., 1999). Literature on workplace learning highlights that engagement in individual learning activities provides opportunities to develop a deeper understanding of why a particular error occurred (Gartmeier et al., 2008; Hetzner et al., 2011) and to acquire (negative) knowledge (Gartmeier et al., 2008). At the same time, the role of social exchange for learning to occur has been emphasized in theories of workplace learning and professional development (Billett, 2004; Eraut et al., 1998). Workplace learning literature suggests that interaction with other people at work constitutes one of the most significant sources of learning at work (Bauer & Mulder, 2013; Billett, 2004; Marsick & Watkins, 2003). Engagement in social learning activities- such as jointly developing strategies to avoid similar errors - deliver opportunities to co-construct knowledge and to draw conclusions for future actions (Bauer & Mulder, 2013; Cannon & Edmondson, 2005). Professionals can benefit from social exchanges with knowledgeable others, as it might help them to extend their own perspectives, and gain insights that would be difficult to realize without external input (Bauer & Mulder, 2013; Grohnert et al., 2018). Previous research that explored professionals' engagement in learning activities, focused on error experiences described by experts, and aimed to identify what professionals should do ideally to not repeat a similar error (Bauer & Mulder, 2007). Adding to Bauer and Mulder's (2007) study, the present study explores what professionals explicitly have done after discovering their error to avoid reoccurrence in the future. The present study explores engagement in both

individual and social learning activities after discovering an error, leading to our first research question:

Research Question 1. What type of individual and social learning activities do professionals engage in after discovering an error?

Beyond psychological safety

Although errors can be potentially fruitful for learning they are often associated with sanctions such as reduced career opportunities and the possibility of being fired (Keith & Frese, 2011). Not surprisingly, these negative error connotations may result in dysfunctional reactions such as ignoring the error, rather than engagement in learning activities (Edmondson, 1999; Frese & Keith, 2015; Seifried & Höpfer, 2013; Zhao & Olivera, 2006). To overcome this barrier, professionals need to perceive their interpersonal work environment as tolerant towards errors – a psychologically safe working environment (Edmondson, 1999; Edmondson & Lei, 2014). As such, psychological safety involves beliefs about how supervisors and team members will respond when one puts oneself on the line, for example by openly admitting an error, or asking for help (Edmondson, 1999; Nembhard & Edmondson, 2006). It reduces the perceived costs of engaging in learning activities (Edmondson, 1999; Edmondson & Lei, 2014).

However, researchers have begun to suggest that the perception of a psychologically safe work environment is a necessary, but insufficient condition to ensure learning from errors (Baumgartner & Seifried, 2014; Cannon & Edmondson, 2005; Cusin & Goujon-Belghit, 2019; Ye et al., 2018). In a review by Edmondson and Lei (2014), the authors argue that psychological safety is not a panacea for learning (from errors) to occur. More recently, Edmondson (2019) used the metaphor of "starting a car" to describe why psychological safety is not enough for learning to occur; psychological safety helps "to take off the brakes" that keep professionals from engaging in interpersonal risk behaviors such as seeking help from their supervisor, "but it is not the fuel that powers the car" (Edmondson, 2019, p. 21). Besides creating psychological safety, Edmondson (2019) argues that leaders have the vital task to coach and inspire their employees and to provide them with feedback. To date, Zhao et al.'s (2018) study is one of few examples of studies that explicitly look beyond psychological safety for promoting learning from errors. Therefore, it remains empirically underexplored which other supervisor behaviors impact professionals' learning from errors. This leads us to our second research question:

Research Question 2. Which supervisor behaviors foster the engagement in individual and social learning from errors activities, besides creating a psychologically safe work environment

The role of supervisor behavior for learning from errors

According to Cannon and Edmondson (2005), psychological safety is not implemented through top- down command, but is created through attitudes and behaviors of local managers, supervisors, and unit leaders. Research has identified specific leadership behaviors that strongly influence professionals' perceptions of psychological safety, including admitting own errors, being accessible, and exhibiting openness (Cusin & Goujon-Belghit, 2019; Edmondson, 2011; Edmondson & Lei, 2014; Zhao et al., 2019). Leaders hold this unique position due to their social power: they control subordinates' job assignments and promotions, influencing their subordinates' attitudes and perceptions (Cannon & Edmondson, 2005; Rodriguez & Griffin, 2009; Detert & Burris, 2007). Consequently, leaders are a central lever for creating a psychologically safe learning environment.

Next to the research on leadership and psychological safety, studies on learning (from errors) have also highlighted the importance of direct supervisor behavior. Existing theories and research highlight that learning from errors greatly depends on how leaders exert their leadership role (Bligh et al., 2018; Cannon & Edmondson, 2005; Deng et al., 2010; Farnese et al., 2019; Rodriguez & Griffin, 2009). For example, Grohnert et al. (2018) found that young professionals are more likely to seek help and to learn from their errors when their direct supervisor engages in learning behaviors themselves. Moreover, studies by Keith and Frese (2005) and Zhao (2011) found that professionals pay attention to their supervisors' behaviors and attitudes with regard to errors. Findings indicated that professionals who perceived their manager to be intolerant of errors were more likely to have strong negative emotional responses to errors and to be reluctant to engage in learning behaviors, such as discussing errors with their supervisor. These studies illustrate that supervisors' behaviors beyond creating psychological safety can both foster and inhibit professionals' learning from errors. Building further on this limited extant research and the central role that direct supervisors play for both psychological safety and learning from errors, we explore which specific direct supervisor behaviors hinder engagement in individual and social learning activities of supervisees, leading to our third research question:

Research Question 3. Which supervisor behaviors hinder the engagement in individual and social learning from errors activities, besides creating a psychologically safe work environment?

2.3 Methods

Setting and sample

The present study was conducted in the field of auditing. The audit profession is characterized by its high stakes, high societal relevance, and high complexity (Gronewold

& Donle, 2011; Seckler et al., 2017). This field was chosen for two reasons. First, there is a substantial likelihood when making errors in judgement and decision-making which can have significant consequences. Second, auditors work in a proceduralized work environment requiring them to use standards and to rely on rules and regulations during an audit. Regulators assess whether audit work is in compliance with these regulations, and do not accept that errors occur because of ignoring these regulations (Grohnert et al., 2019; Gronewold et al., 2013). Auditors assess organizations' financial statements and provide assurance that the financial statements are in accordance with laws and regulations. The audit firm environment is hierarchically organized and relies on teamwork to cope with task complexity (Ater et al., 2019). These teams commonly comprise four ranks who are evaluated and receive feedback from the next higher rank (Jeppesen, 2007; Trotman et al., 2015). At the lowest rank, associates collect and explore evidence, mostly through standardized tasks and structures and document the audit work and findings in an audit file. Next, seniors review the work of the associates and provide them with feedback and help; they take on tasks that bridge different routine tasks and prepare information for decisions at higher ranks. Above the senior level, a manager is in charge of reviewing the work prepared at lower levels, followed by a final (more aggregate) review performed by the partner. The partner is responsible for eventually signing the audit opinion, issuing a judgment about the 'true and fair' view of the client's financial statements. Work in audit teams is thus characterized by cascading dyadic reviews throughout all hierarchical ranks, in which multiple team members are in supervisory roles. Consequently, we refer to seniors, managers, and partners as supervisors in this study. Within this hierarchical review structure, the role of supervisors can be described as formal leadership that is determined by work experience, training, and expertise enabling them to detect errors in the work of auditors in lower ranks (Gibbins & Trotman, 2002).

Twenty-three professionals working in the domain of auditing participated in this study. First, we asked six professionals at the highest rank (partners) working at different audit firms to participate. When they agreed, these partners were asked to provide three or four additional names of colleagues working in lower ranks (e.g., managers, seniors and associates) to participate. Working this way, enabled us to get a sample representing all hierarchical layers. Therefore, the intended and realized sample in this design is identical. Our sample includes both male (n=17) and female (n=6) auditors across all hierarchical ranks (5 associates, 6 seniors, 6 managers, 6 partners), working for five different audit firms in the Netherlands. Work experience ranges from 2 to 32 years. By interviewing all hierarchical ranks, we develop a comprehensive understanding of how direct supervisors can help professionals to learn from their errors

Interview guideline and procedure

In the present study, we used a semi-structured interview approach to explore our theoretical framework along with leaving room for inductive findings. The interview guideline was developed based on Flanagan's (1954) Critical Incidents Technique (CIT). A critical incident has been described as an observable complete human activity that can be used to predict behavior (Flanagan, 1954). Following the application of the CIT in prior studies on learning from errors (Anselmann & Mulder, 2018; Bauer, 2008; Gartmeier et al., 2008), we asked interviewees to describe a recent situation in which they made an error that was either detected by themselves or through negative performance feedback by the direct supervisor.[1] We decided to use the CIT as it allows to explore real error situations and subsequent engagement in learning activities (Mulder, 2015). This approach supplements studies that used vignettes (Bauer & Mulder, 2013), where subjects need to be able to identify with a described error case and where it is unsure whether answers about the engagement in learning activities are valid for actual behavior.

We used a semi-structured interview approach, asking interviewees to describe a recent error situation. We focused on three overall themes including: perceptions of psychological safety, engagement in learning activities after error discovery, and perceptions on how direct supervisors helped professionals to learn from their errors (see Chapter 6.Appendix I). To explore participants' perceptions of psychological safety we asked questions such as "how safe do you feel to openly discuss your errors with your direct supervisor?" To explore engagement in learning activities, we mirrored Bauer and Mulder's (2007) interview guideline and asked interviewees to describe what they specifically have done to prevent the same error. The interview questions were formulated in such a way, that using the term "learning" was avoided, because people tend to respond using the notion of formal learning and might not be aware how engagement in learning activities leads to the construction of new knowledge (Bauer & Mulder, 2007; Simons & Ruijters, 2004). To test the interview guideline for clarity and completeness, a pilot interview was conducted with two experts in the field of auditing who both had more than ten years of experience and worked in a supervisor role (in line with Bauer & Mulder, 2007; Leicher et al., 2013). Based on the pilot, we provided definitions and examples for errors to participants and were able to use professional jargon to ask more precise and relevant questions within the audit context. The full interview guideline is reported in the Chapter 6.Appendix I.

Interviews were conducted between May and July 2018. They lasted one hour on average and were carried out at the workplace of the interviewees. Before each interview started, interviewees were given a short introduction to the research topic (see Chapter 6.Appendix I) and permission was obtained from all interviewees to audiotape the interview. We

1 The majority of our interviewees reported an error which they described as a consequence of their way of working (i.e., the audit review process). Consequently, we are unable to contrast findings for self-detected and supervisor detected errors.

assured anonymity to the interviewees and their employing organization by removing identifying data (e.g., interviewees' names and their employing organization). Following Francis et al. (2010), we decided that the point of saturation had been reached when after 10 interviews, the next five further interviews in the analysis showed no new emergent themes. After the first twenty interviews, we reached saturation: auditors converged in their views, without adding more information emerging from, the remaining interviews.

Analysis

Interviews were transcribed verbatim and analyzed through directive content analysis (Hsieh & Shannon, 2005), relying on both deductive and inductive coding. In this study, the meaningful unit of analysis consisted of a "multiple chunk" (Miles & Huberman, 1994) and represented a sentence, a part of a sentence, or a set of related sentences. Interviews were coded and analyzed using the ATLAS.ti 8 program in three successive steps. First, transcripts were coded deductively based on the interview themes (see Chapter 6.Appendix I). Second, segments that could not be coded were analyzed and were inductively assigned to a new code or sub-code. Third, intercoder reliability was tested. Following Miles and Huberman (1994), a peer researcher was trained to independently code 10% of the randomly selected meaningful segments per transcripts through blind coding (Schreier, 2012). After each transcript, differences were discussed until agreement was reached, and modifications were made. The process resulted in a high level of intercoder reliability (Cohen's kappa = .84). Data for this study have been collected in Dutch, therefore the quotes that appear below were translated into English[2].

2.4 Results

The present study focused on one category of errors: knowledge and rule-based errors. Concrete examples of this category include collecting incomplete audit evidence, not employing the appropriate audit procedure, and errors in interpreting evidence. These errors typically occur due to a deficiency in the available knowledge, and as such are mostly detected by the direct supervisor. All participants described errors that were detected in time and therefore could be corrected before threatening audit quality. The described errors contained little variation in terms of causes and consequences. Consequently, we did not make subcategories for the described errors but treated them as one category in the analysis.

Research question 1: Individual and social learning activities

2 Quotes in the original Dutch can be obtained from the author.

The first research question explores what type of activities professionals engage in to learn from errors, and to what extent those strategies are performed individually or socially shared (see Table 2.1). We observed that most interviewees described individual learning activities (38 out of 65 statements): (1) thinking of alternative approaches, (2) recognizing error recurrence, and (3) revisiting prior work. Social activities were mentioned fewer times (27 out of 65 statements): (1) joint identification of alternatives, (2) interaction with supervisor, and (3) sharing the error with colleagues. We observed this trend across all ranks.

Engagement in individual learning activities

The most frequently mentioned strategy that interviewees used includes *thinking of alternative approaches* at the individual level (25 out of 65 statements, n=16). This involves drawing an appropriate conclusion on what to do differently next time through reflective activities like paying more attention to the correct documentation of client-specific information. One interviewee explicitly referred to keeping a notebook in which she wrote down what went wrong and what should be done differently next year to avoid the same error from occurring. In this case, the auditor also applies the method of thinking backward to formulate ways about what to do differently next time. None of these sixteen interviewees mentioned during the interview what kind of drawbacks the strategy of thinking of alternative ways at the individual level can have. Concerning differences in rank, our results show that higher-ranking auditors tend to formulate process-wise learning activities, while lower-ranking auditors tend to formulate technical activities. Example quotes for this first individual learning activity across ranks can be found in Table 2.1 Panel A.

The second most commonly identified strategy by interviewees, concerns the individual effort to remember the error situation to be able to *recognize a similar situation in the future* (13 out of 65 statements, n=9). Professionals across all ranks indicated that they try to remember what went wrong and how they have corrected the error. All interviewees stressed that this effort entails recording the errors, as this enables them to remember what went wrong and to identify what they need to pay attention to in the future. Additionally, two of the nine interviewees specifically mentioned that they memorize what went wrong by remembering specific task characteristics. This enables them to recognize specific task characteristics when performing similar tasks for other clients. Our results suggest that there are no differences between higher and lower ranks with regard to this strategy. Quotes illustrating this second individual learning activity are reported in Table 2.1 Panel A.

The individual learning activity encompasses an individuals' effort to *revisit his or her work* (5 out of 65 statements, n=3). Three higher-ranking auditors described examples of instances

in which they revisited their prior work after correcting for errors. All three interviewees emphasized that it was aimed to check whether other work files did not contain the same errors. One interviewee explained that after his supervisor discovered an error in his work, he doubted whether he had performed well on other audit engagements. As a result, the person checked their prior work for other clients to ensure that they did not make the same error (see Table 2.1 Panel A).

Engagement in social learning activities

The most frequently mentioned learning strategy performed in social interaction involves *joint identification of possible alternatives* for future action (12 out of 65 statements, n=9). This includes jointly thinking and formulating strategies about what to do differently next time in a similar situation. Interviewees across all ranks described instances in which they jointly identified alternatives for future action. All nine interviewees indicated that this took place in an informal evaluation session, including all team members. In most cases, an evaluation session's goal was to focus on what went wrong during the audit, and how to improve for next time. One interviewee indicated that the evaluation session took place in the daily team meeting, where the supervisor created room for discussing issues and asking other team members for help. Illustrative quotes can be found in Table 2.1 Panel B.

The second most commonly used social strategy that interviewees identified includes *joint analysis (*8 out of 65 statements, n=7). This activity includes a shared discussion with the direct supervisor on why an error occurred and how the individual can improve for the next audit. Six of the seven interviewees reported having initiated this conversation themselves. This learning activity was reportedly used mostly by lower-ranking auditors (see Table 2.1 Panel B).

The third social activity involves *sharing the error with other colleagues* to make sure that they can learn something too from one's error experiences (four out of 65 statements, n=4). This activity pertains to colleagues at the same rank so that they would not make the same error. One interviewee explained that they specifically shared the error with colleagues who had just started their career within auditing to prevent them from making the same errors (see Table 2.1 Panel B).

Table 2.1. Individual and social learning activities interviewees engaged in after discovering an error

Activity	Example statements	n/s
Panel A. Engagement in Individual Learning from Errors Activities		
(1) Formulating alternative approaches	"And now, I know for the next time that I do not have to include certain attachments to the client. Moreover, I learned that I need to formulate that sentence somewhat differently and that I need to pay attention to the confirmation" (Associate, 018).	16/25
(2) Recognizing error recurrence	"The next time something like this comes up again will most likely be next year at the same client. Because I report changes in the file, I have a guarantee that I will remember it. When I open the file again in the upcoming year, I can see how the process went and what kind of feedback comments were made. This is an automatic guarantee for myself, on that specific audit engagement. Like, please be aware, you need to pay special attention to this" (Manager, 009).	9/13
(3) Revisiting prior work	"I went through my other prior work to see whether I made a similar mistake elsewhere. Those are things that need to be done." (Manager, 005).	3/5
Panel B. Engagement in Social Learning from Errors Activities		
(1) Joint development of new action strategies	"We had a team evaluation. We discussed the process. Moreover, we discussed what went wrong this year and how we can do better next year" (Senior, 014).	9/12
(2) Joint analysis	"I sat together with my supervisor, in which he explained why something was wrong. In that sense, he has trained me" (Senior, 014).	7/8
(3) Sharing the error with colleagues	"I have pointed out my error to other novices. Like, you must also explain this and this with everything you have done. So, if you execute audit work at the customer, make sure that you pay attention to this, otherwise, you will get the same feedback as I did" (Associate, 015).	4/4

Note: n number of answering interviewees, s number of statements

Research Question 2. Which supervisor behaviors foster the engagement in individual and social learning from errors activities, besides creating a psychologically safe work environment?

The second research question explores which behaviors of direct supervisors can impact the engagement in learning from errors activities. Focusing on factors that enhance learning from errors, we explore which behaviors participants mentioned in relation to creating psychological safety and beyond. Interviewees described a psychologically safe work environment as an environment that encourages professionals to speak openly about their errors and to use their errors for learning. Fourteen interviewees described situations of high psychological safety, and we identified four elements that characterize a psychologically safe work environment: (1) being tolerant towards errors, (2) exhibiting openness, (3) modeling fallibility, and (4) physical presence (see Table 2.2 Panel A).

Beyond psychological safety, we identified four main behaviors that foster engagement in learning from errors activities: (1) timely feedback, (2) providing guidance and elaborate feedback, (3) being accessible and showing personal involvement, and (4) organizing joint evaluations (see Table 2.2 Panel B). Below, we describe each behavior in turn.

Direct supervisor behavior for psychological safety

The most frequently mentioned direct supervisor behavior that enhances psychological safety is *being tolerant towards errors* (17 out of 38 statements, n=12). Twelve interviewees perceived their supervisor to be tolerant towards errors, rather than sanctioning. Those interviewees believed that they will not be humiliated or penalized by their supervisor when making an error. One manager described an episode in which an error was communicated to the supervisor, who reacted by being understanding and acknowledging that the error was reported so that the error could be resolved together as soon as possible. This reaction encourages the supervisee to show fallibility and to communicate their errors (for quotes, see Table 2.2 Panel A). With regard to co-occurrences, being tolerant towards errors co-occurs more often with social learning activities (21 co-occurrences) than with individual learning activities (10 co-occurrences).

The second direct supervisor behavior was *exhibiting openness* (5 out of 38 statements, n=5). Interviewees in a supervisory position, pointed out that they intend to exhibit openness by making statements such as "I have an open-door policy". Also, three interviewees in a non-supervisory position mentioned that their supervisor created psychological safety by exhibiting openness (see Table 2.2 Panel A). Regarding the co-occurrences, data showed that exhibiting openness predominantly promotes engagement in social learning activities (8 co-occurrences).

Next, *modeling fallibility* was identified as an effective behavior for enhancing psychological safety (6 out of 38 statements, n=4), mostly by higher-ranking interviewees. Supervisors display fallibility when admitting their errors and revealing their limitations. One senior explained that they feel safe to admit to errors under the condition that supervisors also display fallibility and openly admit their errors (see Table 2.2 Panel A). Concerning co-occurrences, data reveal few co-occurrences for both individual (4 co-occurrences) and social learning activities (1 co-occurrence).

Lastly, *physical presence* was highlighted by interviewees in supervisory positions (10 out of 38 statements, n=7). The interviewees explained that being physically present lowered the barrier for supervisees to approach their supervisor for help (for illustrative quotes, refer to Table 2.2 Panel A). The data on physical presence also illustrated few co-occurrences for both individual learning activities (3 co-occurrences) and social learning activities (5 co-occurrences).

Table 2.2. Direct supervisor behaviors that enhance engagement in learning errors activities

Leader Behavior	Example statement	n/s
Panel A. Leader behaviors enhancing psychological safety		
(1) Being tolerant towards errors	"Yes, it is accepted in any case. People do not react weirdly when it occurs" (Senior, 020).	12/18
(2) Exhibiting openness	"I simply tell people that the door is open. This lowers the barrier to approach me" (Partner, 012).	5/5
(3) Modeling fallibility	"I think it is important to show at certain moments that I do not know certain things myself. It is about demonstrating that I cannot do everything better myself" (Manager, 021).	4/6
(4) Physical presence	"I always try to be physically present. I need to show my face to the team. I often ask my team members "how is everything going?", because this lowers the threshold for people to ask questions. Otherwise, people often do not dare to ask anything" (Manager, 019).	10/7
Panel B. Leader behaviors enhancing learning from errors		
(1) Timely feedback	"The most effective feedback is provided immediately when something is going wrong" (Partner, 007).	8/10
(2) Being accessible and showing personal involvement	"According to my experience, some supervisors should spend more time with the team, just as I do. This does not happen very often" (Manager, 021).	7/11
	"More time needs to be planned for presence with the team. It does show commitment when the supervisor makes the effort to be present for two days a week" (Senior, 024).	
(3) Providing guidance and elaborate feedback	"In my role, I need to guide younger professionals by ensuring that they can do a good job. Not perfect, but good enough. When one spends more time on guidance, it also means that the quality of the work will improve" (Senior, 001).	7/8
	"During the assignment, I know that there is a lack of time. But as a supervisor, I try to make time for guiding my supervisees. During the busy season, it is very difficult for supervisors to provide effective guidance" (associate, 023).	
(4) Organizing joint evaluations	"What you need for evaluating is being together and evaluating what could be improved. It can provide relevant input" (Manager, 021).	4/5

Note: n=number of answering interviewees, s=number of statements

Direct supervisor behavior for engagement in learning from errors activities

The most frequently mentioned direct supervisor behavior that fosters engagement in learning activities was the *provision of timely feedback* (10 out of 35 statements, n=8). All interviewees agreed that performance feedback is most effective for learning when it is given promptly. Particularly lower-ranking interviewees emphasized this behavior (n=5). In our study, performance feedback refers to information on discrepancies between

the present and desired situation. One interviewee explained that timely performance feedback allowed supervisees to correct their errors immediately, and allowed other colleagues to potentially learn from the feedback too. From the supervisor's perspective, three supervisors commented that timely feedback is vital for learning, but that this issue requires more work (for quotes illustrating this behavior, refer to Table 2.2 Panel B). Regarding co-occurrences, our data demonstrated that timely feedback seems to be equally important for engagement in individual (9 co-occurrences) and social learning activities (6 co-occurrences).

The second most frequently mentioned direct supervisor behavior involves *being accessible and personally involved (11 out of 35 statements, n=7)*. Accessibility refers to the availability of the supervisor and being easy to reach. Lower-ranking interviewees explained that supervisors who make an effort to be regularly present, show involvement to the team and at the same time lower the barrier for approaching them to ask for help or feedback. One associate highlighted the need for verbal statements and behaviors to match: even when a supervisor encourages asking questions or requesting help, being physically absent decreases the chance that supervisees will actually engage in these social learning activities. From the supervisor's perspective, three interviewees claimed that supervisors need to make an effort to be physically present, show their involvement, and provide timely and effective feedback. The need for being accessible and involved is thus a shared perception across ranks (see Table 2 Panel B). Regarding co-occurrences, data revealed few co-occurrences for both individual learning activities (1 co-occurrence) and social learning activities (2 co-occurrences).

The third direct supervisor behavior that enhances learning from errors is *providing guidance and elaborate feedback (8 out of 35 statements, n=7)*. Interviewees across ranks explicitly stated that it is the role of the supervisor to invest sufficient time in providing elaborate feedback and to guide supervisees in their learning process. One supervisor explained that there are two ways of providing feedback: information on 'what' is wrong and taking the time to provide in-depth explanations on why something went wrong. The first approach is highly efficient in the short term, but the second approach actively improves the competence and performance of supervisees over time. A manager emphasized that it only takes three minutes to provide elaborate feedback that can contribute to his supervisees' learning and professional development (see Table 2 Panel B). Analysis of co-occurrences revealed that providing guidance and elaborate feedback is important for both individual learning activities (9 co-occurrences) and social learning activities (6 co-occurrences).

The final direct supervisor behavior that enhances learning from errors is organizing joint evaluations (6 out of 35 statements, n=5). Joint evaluation refers to the effort to

bring together the team to discuss what worked well and what did not work well, and what needs improvement for next time. Mostly higher-ranking interviewees stated that bringing together the team for reflective activities and to share (error) experiences is crucial to learn from each other's experiences. One supervisor explained that having a joint evaluation helps team members to comply with regulations and to meet quality requirements (for quotes see Table 2.2 Panel B). Concerning co-occurrences, our data revealed that organizing joint evaluations is crucial for both engagement in individual (7 co-occurrences) and social learning activities (4 co-occurrences).

Research question 3: Which supervisor behaviors hinder the engagement in individual and social learning from errors activities, besides creating a psychologically safe work environment?

The third research question focuses on direct supervisor behaviors that hinder psychological safety and engagement in learning from errors activities. First, we identified two supervisor behaviors that hinder psychological safety: (1) being intolerant of errors, and (2) creating a threshold to sharing errors (see Table 2.3 Panel A). Second, we distilled four behaviors that hinder learning from errors directly, which are the opposite of those behaviors enhancing learning from errors: (1) lack of guidance and elaborate feedback, (2) lack of accessibility and personal involvement, (3) lack of timely feedback, and (4) lack of joint evaluation (see Table 2.3 Panel B). We describe these behaviors in turn.

Direct supervisor behaviors hindering psychological safety

Being intolerant of errors was identified by interviewees of lower ranks as the main behavior that hinders psychological safety (12 out of 17 statements, n=6). This behavior was associated with the fear of receiving sanctions from their supervisor when making errors. A senior explicitly described that their supervisor tends to react very angrily when hearing about an error. This interviewee observed the supervisor to have a hierarchical attitude and to not show any fallibility. As a result, the supervisee is afraid to make and share errors (illustrative quotes in Table 2.3 Panel A). For co-occurrences, data demonstrated a few co-occurrences for both individual learning activities (5 co-occurrences) and social learning activities (3 co-occurrences).

The second direct supervisor behavior hindering psychological safety was *creating a threshold to sharing errors* (5 statements out of 17, n=3). This threshold makes lower-ranking interviewees afraid of being thought of as incompetent or ignorant, because the same supervisor will later assess their performance and decide whether they will get a promotion or not. Analysis of co-occurrences revealed few co-occurrences for both individual learning activities (4 co-occurrences) and social learning activities (4 co-occurrences). For illustrative quotes on this behavior, please refer to Table 2.3 Panel A.

Direct supervisor behaviors hindering engagement in learning from errors activities

Engagement in learning from errors activities was perceived by interviewees to be most hindered by a *lack of guidance and elaborate feedback* (16 out of 68 statements, n=10), the opposite of enhancing safety. This behavior was discussed by interviewees of all ranks. Five lower-ranking interviewees reported that they receive insufficient guidance and feedback, which they felt was due to their supervisors' high workload. Three interviewees mentioned that their supervisor only indicate in their feedback what needs to be improved (in terms of specific instructions for correction), but not why it needs to be improved. As a result of this, supervisees were less likely to develop new insights on the causes of their errors. Three supervisors recognized their colleagues' needs and confirmed that their high workload and focus on clients were reasons. One supervisor explained that due to insufficient capacity, they are too busy with executive activities, even though they would like to provide more guidance. For illustrative quotes, refer to Table 2.3 Panel B. Concerning co-occurrences, we found that a lack of guidance and feedback is detrimental for both individual learning activities (19 co-occurrences) and social learning activities (8 co-occurrences).

The second most-frequently mentioned direct supervisor behavior that hinders learning from errors was identified to be a *lack of timely feedback* (18 out of 68 statements, n=12). Mostly lower-ranking interviewees provided examples of instances in which they received delayed feedback from their supervisor, up to one month later. Delayed feedback was considered a barrier for learning, as it limits professionals to remember how they have performed certain tasks, which in turn limits their ability to ask substantive questions and engage in an in-depth analysis of the underlying causes of errors. Supervisors acknowledged that it is their task and responsibility to provide their supervisees with timely feedback, however, this lack of timely feedback was due to the same reasons as for the lack of guidance and elaborate feedback: time pressure, workload, and a client focus (see Table 2.3 Panel B). Analysis of co-occurrences demonstrated that a lack of timely feedback more often co-occurs with individual learning activities (18 co-occurrences) than social learning activities (14 co-occurrences).

Thirdly, direct supervisors who are *inaccessible and uninvolved* also hinder learning from errors (10 out of 68 statements, n=9). Mostly lower-ranking interviewees stated that their supervisor makes insufficient effort to be regularly physically present, preventing them from seeking help. One senior commented that their supervisor does not show any personal involvement at all and provided the example of the supervisor not picking up the phone when called. Consequently, the senior described preferring to solve issues herself, not due to fear of the supervisor, but out of convenience. Again, time pressure and a focus on client were revealed to impede accessibility and involvement at higher ranks (see

Table 2.3 Panel B). Regarding co-occurrences, data showed that a lack of accessibility and involvement more often co-occurs with individual learning activities (8 co-occurrences) than social learning activities (4 co-occurrences).

Table 2.3. Direct supervisor behaviors that hinder engagement in learning from errors activities

Leader Behavior	Example statement	n/s
Panel A. Leader behaviors hindering psychological safety		
(1) Being intolerant of errors	"If you make such errors more often, you will hear about this during your annual performance interview. And in turn, it affects your overall performance evaluation and even your salary". (Senior, 006)	6/12
(2) Creating a threshold to sharing errors	"Sometimes there are things that I think I should know about by now, so I do not want to ask about those. In those cases, I experience a small threshold" (Senior,022).	3/5
	"One of my supervisors has a very hierarchical attitude. Everything seems to go well in his work. When I make an error in my work, he becomes angry and responds in an intimidating manner. As a result, I feel a barrier to approach my supervisor" (Senior, 020).	
Panel B. Leader behaviors hindering learning from errors		
(1) Lack of guidance and elaborate feedback	"So, if I ask my supervisor something, he responds that he has five deadlines tomorrow. Then I try as much as I want, but I do not get help. I have once told my supervisor that this time pressure also hinders those who work for him in their development, because he cannot give them the attention they deserve" (Associate, 018).	18/34
(2) Lack of timely feedback	"Especially when they execute something for the first time, I should already provide them with feedback the next day. In that case, the learning effect will be the greatest for them, and it enables them to apply immediately what they have learned" (Senior, 020).	12/18
(3) Lack of accessibility and personal involvement	"For example, I have a supervisor who is really hard to reach, he never answers his phone, does not respond to his email. I find this very annoying" (Senior, 008).	
(4) Lack of joint evaluation	"Each time after an assignment, we need to sit together to discuss what went well and what did not go well. This is not done often enough. Due to time pressure, people forget about it and start working on the next assignment. An evaluation should be done more often. We need a mirror to do this. Often, people think that evaluations should rather be done at a later time" (Manager, 019).	7/10

Note: n=number of answering interviewees, s=number of statements

Finally, a *lack of joint evaluation* with a direct supervisor hindered learning from errors (10 out of 68 statements, n=7). One partner explained that he recently organized a joint evaluation with the whole team to discuss how to prevent similar errors from occurring the following year. The partner highlighted that this joint evaluation contributed to

his team members' learning, but acknowledged that they should be done more often. This interviewee and four other interviewees confirmed that due to a lack of time and placing less priority on a joint evaluation, it is performed less often than it should be done. Concerning differences in rank, it was found that only higher-level auditors identified a lack of joint evaluations as a barrier for learning (see Table 2.3 Panel B). Regarding co-occurrences, data suggested that a lack of joint evaluations is detrimental for both engagement in individual learning activities (6 co-occurrences) and social learning activities (8 co-occurrences).

2.5 Discussion

The present study explored in detail how and when supervisors in dyadic relationships, enhance or hinder professionals' engagement in individual and social learning from errors activities. Through semi-structured interviews with professionals across ranks in the field of auditing, we addressed three research questions: which individual and social learning activities do professionals engage in after discovering an error, which behaviors by direct supervisors impact this engagement either directly or through psychological safety, and which behaviors hinder engagement in learning activities. Below, we discuss our key findings, along with limitations and implications for future research and workplace practice.

Regarding our first research question, we found that most interviewees reported engaging in individual learning from errors activities, such as formulating alternative approaches, recognizing error recurrence, and revisiting prior work. Social learning activities, such as shared brainstorming of alternative approaches and sharing errors, were mentioned fewer times throughout the interviews. This finding is in contrast with previous studies that emphasize the need for social activities over individual activities for effective learning from errors (Bauer & Mulder, 2007; Harteis et al., 2008), Particularly, professionals in the early stages of their careers can profit from social exchanges with knowledgeable supervisors, because they may lack necessary knowledge for understanding the causes of their errors and how to learn from them (Bamberger, 2009; Shute, 2008). This finding may be context-specific as interviewees working in audit firms may encounter more direct supervisor behaviors that hinder learning from errors because of high time pressure, and client focus at the supervisor level, making it less likely that they engage in social learning from errors activities after making an error. Future research may benefit from comparing the engagement in individual and social learning activities across contexts to specify environmental drivers and barriers to learning from errors.

Our second research question focused on the direct supervisor behaviors that participants identified to enhance the engagement in learning from errors activities. For enhancing learning, our results confirm the important role that supervisors play in enabling professionals' learning from errors through creating a psychologically safe work environment by tolerating errors, exhibiting openness, modeling fallibility, and being physically present. These results corroborate the findings of previous research on psychological safety (for a review, see Edmondson & Lei, 2014), making specific leader behaviors explicit. Beyond fostering psychological safety, direct supervisors can enhance learning from errors by providing timely feedback, being accessible and involved, providing guidance and elaborate feedback, and organizing joint evaluations. Our findings resonate with prior research by Goodman et al. (2004) and Mulder (2013), indicating that supervisors who provide specific information about performance facilitate a willingness to learn and engagement in learning activities. Furthermore, our findings support the notion that feedback becomes valuable for learning when it is provided in a timely fashion (van der Rijt et al., 2013). Additionally, participants reported that supervisors who made the effort to be regularly physically present, enabled professionals to engage in learning activities by being informed on errors promptly (Tucker & Edmondson, 2003). Moreover, supervisors who organize joint evaluations have been found to foster professionals' learning from errors (Bligh et al., 2018). Based on our findings, we conclude that supervisors can enable engagement in learning activities directly as well as through psychological safety.

Our third research question focused on the supervisor behaviors that participants viewed as hindering engagement in learning from errors activities. In line with theoretical notions by Edmondson (2019) and Edmondson and Lei (2014), our findings confirm that the mere existence of psychological safety is not enough to initiate professionals' engagement in learning activities. When direct supervisors behave in ways that hinder learning activities, a perception of psychological safety is insufficient for effective learning from errors, mirroring extant findings on leader behavior in the wider learning literature. Supervisors who do not provide guidance and elaborate feedback hinder their supervisees' engagement in learning from errors activities by withholding necessary information. This finding echoes reviews by Hattie and Timperley (2007) and Shute (2008), which illustrate that simple performance feedback only becomes useful for learning when it provides learners with specific information on how and why the current task performance deviates from desired goals and/or standards. Similarly, supervisors who provide only delayed feedback impair learning through memory biases (Villado & Arthur, 2013), and through the inability to connect feedback messages to existing knowledge (Bindal et al., 2011). Furthermore, supervisors who are inaccessible and uninvolved hinder engagement in learning activities such as help-seeking (Grohnert et al., 2018; van der Rijt et al., 2013). Finally, supervisors should organize joint evaluations of errors, because a lack of evaluation

has been found to limit the impact of feedback on individual learning and professional development (Govaerts et al., 2013). We conclude that supervisors not only play a key role in enabling role professionals' learning from errors via creating a psychologically safe work environment, but they also need to actively create the opportunity for professionals to engage in individual and social learning from errors activities.

Limitations and implications for future research

This study is subject to several limitations that impact the interpretation and generalizability of our results. First, this study was conducted within a single professional environment: auditing. Although our sample included audit professionals from different organizations and ranks, it is difficult to generalize our results to other contexts, due to the strict hierarchy, regulated activities, and the professionalized certification, training, and role expectations. Future studies may explore whether our findings can be replicated in work settings that differ in the degree of hierarchy. Second, our study is based on self-reported statements of participants. Therefore, when processing the interview data, the presence of participants' self-reporting biases and inaccuracies cannot be excluded, despite combining different perspectives and validating the coding scheme and application. Moreover, due to the self-report nature of the data we are unable to test for causal effects. Longitudinal and experimental research designs should be used in future research to reduce concerns regarding self-reporting biases and to help establish causality. Third, this study provides an overview of direct supervisor behaviors that relate to psychological safety and engagement in learning from errors behaviors. This study did not explore environmental constraints or enablers, and we did not test the effects of these behaviors on outcomes of learning from errors. These issues, along with the interaction of environmental factors and leader behaviors, are promising avenues for future research. Future research should examine whether supervisors' behavior in response to errors changes over time and across different subordinates, and under what conditions supervisors tend to invest time in providing elaborate feedback that helps professionals learn and develop their skills and knowledge. Moreover, future research should explore the role of supervisors' skills for providing helpful feedback and guidance in professionals' learning from errors. Literature suggests that supervisors might be experienced in their field of work, but might lack skills in giving feedback and guidance that help subordinates to learn from their errors (Mulder, 2013).

Practical implications

The findings of this study have a number of practical *implications for direct supervisors* who want to promote professionals' learning from errors. Our findings confirm that supervisors have a direct influence on how safe their supervisees feel at work: the specific behaviors reported by our participants are concrete illustrations of how to create psychological safety. In accordance with Edmondson's (2019) metaphor of 'starting the car', supervisors

can directly affect the engagement of their supervisees in learning from errors activities. Underlying these behaviors need to be a core value of fostering supervisees' learning and development so that supervisors can communicate with integrity that their errors are worth reflective thinking and analysis (Tucker & Edmondson, 2003). We propose that supervisors need to assess the quality of their feedback and whether their feedback can contribute to professionals' learning and long-term work improvements. Supervisors can do this by asking their subordinates for feedback on their way of supervising. Asking subordinates for feedback helps supervisors evaluate subordinates' expectations regarding the frequency and developmental value of feedback, and it might provide supervisors with insights on how they can help their subordinates better realize their full learning potential (Baker et al., 2013). We recommend supervisors to evaluate how and to what extent their current organization enables or limits them in providing learning opportunities to their subordinates after they make an error in their work. As proposed by Nägele and Stalder (2019), this evaluation by supervisors can include a reflection on for instance the organizations' overall learning goals and the professionals' learning needs.

The results of our study provide some second-order *implications for organizations*. Organizations can encourage professionals in a supervisor position to provide timely and elaborate feedback to their subordinates by acknowledging its importance and actively rewarding this behavior. Moreover, organizations can support supervisors in creating learning opportunities for subordinates by allocating adequate learning resources (e.g., space and time) and prioritizing providing timely and elaborate feedback. A recent study by Westermann et al. (2015) in the audit setting concludes that coaching on the job is often not given priority over other competing demands (e.g., deadlines, client satisfaction) on a supervisors' time. To achieve this goal, organizations need to enable supervisors to acquire the skills necessary for providing valuable feedback that enhances professionals' learning from errors and to further their professional development (Milner et al., 2018; Mulder & Ellinger, 2013). To foster learning from errors, supervisors need to have an understanding of their subordinates' learning needs and current limitations, they need to be able to target their feedback at the most salient error causes, focusing on factors under the control of the subordinate (Steelman & Rutkowski, 2004). In addition, feedback needs to be given in a way that minimizes negative emotional reactions to feedback and to be able to mindfully process it, which may be achieved through different means for different subordinates (Steelman & Wolfeld, 2018). Furthermore, supervisors can help professionals to learn and make improvements on the job by providing feedback that is explanatory and future-oriented (Zhou, 2003). This requires that organizations build a strong leadership development and support system, so that learning-oriented leaders are recruited, developed, and promoted consistently throughout the organization. Leaders who value learning from errors and display enhancing behaviors can directly influence the competence and performance of individuals and organizations alike.

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CHAPTER 3

3

Exploring the Link between Learning from Error Climate and Professionals' Engagement in Social Learning Activities after Errors

This chapter is based on Smeets, L. H., Gijselaers, W. H., Meuwissen, R. H. G., & Grohnert, T. (conditional accept). Exploring the link between learning from error climate and professionals' engagement in social learning activities after errors. Baltic Journal of Management.

Abstract

Learning from errors is a complex process that requires careful support. Building on affective events theory, the purpose of this paper is to explore how a supportive learning from error climate can contribute to social learning from errors through affective and cognitive error responses by individual professionals. In the present study, 139 early-career auditors completed an online questionnaire consisting of validated survey scales, allowing for serial mediation analysis to compare direct and indirect effects. Findings revealed that learning from error climate was directly and positively related to engagement in social learning activities after committing an error. Furthermore, we found a double mediation by error strain (an affective error response) and reflecting on errors (a cognitive error response) on this relationship. Organizations can actively encourage professionals to learn from their errors by creating a supportive learning from error climate and holding professionals accountable for their errors. The present study enriches our understanding of the mechanisms through which learning from error climate influences engagement in social learning activities. It extends prior research on learning from errors by investigating the sequential effects of engagement in error-related learning activities performed individually and in social interaction.

3.1 Introduction

Human errors are ubiquitous in most, if not all, organizations, despite numerous efforts to avoid errors (Dahlin et al., 2018; Goodman et al., 2011; Zhao, 2011). On the one hand, errors have negative consequences for the individuals committing them (e.g., psychological stress, feeling incompetent), as well as for organizations (e.g., economic costs, damaged reputation) (Lei et al., 2016; Zhao, 2011). On the other hand, errors provide an important opportunity for learning, affording advantages for both the individual (e.g., knowledge development, career development), and for the organization (e.g., innovation, improved performance) (Bauer & Mulder, 2007; Leicher et al., 2013; Zhao et al., 2018). In this study, we focus on the social dimension of learning from errors, defined as engagement in learning activities involving shared reflection on the causes of an error, and discussing future changes to avoid reoccurrence of the error (Bauer & Mulder, 2007; Leicher et al., 2013; Leicher & Mulder, 2016). Besides analyzing an error in hindsight, social exchange helps the individual challenge one's own (limited) perspective and deepen understanding concerning an error's underlying causes (Grohnert et al., 2019). Extant research has repeatedly shown, however, that learning from errors does not occur automatically: the work context in which an error is committed can either foster or hinder learning from it (Lei et al., 2016; van Dyck et al., 2005; Zhao et al., 2018).

Previous workplace learning research has linked professionals' perceptions of a learning-oriented work environment to a broad range of outcomes including employee retention, employee innovative behavior, work engagement, and motivation to learn (Govaerts et al., 2011; Joo, 2010; Eldor, 2017; Susomrith & Coetzner, 2019). Susomrith and Coetzner (2019) for instance found that perceived support for learning from supervisors and colleagues enhanced employees' engagement in learning activities and work engagement. Recently, workplace learning literature has also established that how individual professionals perceive their work environment is a key determinant of whether or not (social) learning from errors is taking place (e.g. Edmondson & Lei, 2014; Frese & Keith, 2015). Learning from errors has been shown to be encouraged in an environment that does not place blame or punishment on those committing an unavoidable or novel error, where leaders value error analysis for future error prevention, and in which professionals receive support for sharing their error experiences (Bauer & Mulder, 2013; van Dyck et al., 2005; Edmondson & Lei, 2014; Frese & Keith, 2015). In this paper, we explore how a professional's engagement in social learning from errors is driven by the work context's learning from error climate. Learning from error climate is defined as "the collective perceptions of the members of an organization or organizational unit concerning practices, processes, structures, and behaviors that support or hinder the benefits that organizations can draw from errors" (Putz et al., 2013, p.112).

Although existing research has repeatedly highlighted that a supportive learning from error climate is a dominant driver for professionals' learning from errors (Anselmann & Mulder, 2018; Frese & Keith, 2015; Grohnert et al., 2019), very little is currently known regarding the underlying mechanisms explaining the nature of this relationship (Ye et al., 2018; Zhao et al., 2018). This study builds on affective events theory (AET, Weiss & Cropzano, 1996) to address this gap. AET proposes that a professional's behavior is driven by two kinds of responses to affective events, such as errors: by affective responses (e.g., emotions, stress) and by cognitive responses (e.g., reflection and learning). These two responses are influenced by the broader work context: professionals respond to affective events, such as errors, in line with the values and expectations of their workplace. This leads us to the formulation of our research question: we explore whether an affective error response (error strain) and a cognitive error response (reflecting on errors) mediate the relationship between a supportive learning from error climate and the professional's engagement in social learning activities. Error strain describes negative emotions such as fear, anxiety, stress, and embarrassment, that result from having committed an error (Rybowiak et al., 1999), and reflecting on errors describes an individual's efforts to understand error causes (Rybowiak et al., 1999).

The purpose of the present study is to deepen our understanding in practice, of how early-career professionals experience errors, behave after making errors, and which specific factors drive their learning from errors behaviors. This study contributes to workplace learning and error management literature by exploring the missing link between professionals' workplace perceptions and their learning from errors behaviors (Ye et al., 2018; Zhao et al., 2018). Moreover, we contribute to the scant literature on affective and cognitive error responses by exploring the mediating effect of professionals' emotions and reflection. These responses provide specific intervention points that can help organizations increase the effectiveness of their learning from error climate and enable professionals to learn from their errors.

3.2 Theory and development of hypotheses

Engagement in social learning activities

Errors are defined as individual actions that result in an unintended deviation from a desired goal, and that endanger the attainment of higher-order goals, including both rule-based errors and deficiencies in available knowledge (Bauer & Mulder, 2007; Frese & Zapf, 1994; Leicher et al., 2013; Rasmussen, 1987; Reason, 1995). In contextualizing learning from errors for this study, we draw on experiential learning theory (ELT; Kolb et al., 2001), which frames learning as a self-directed effort to improve performance and focuses on learning in terms of the engagement in learning activities (Bauer & Mulder, 2007; Bauer,

2008; van Woerkom, 2003). Engagement in learning activities after the experience of an error may take place individually or in social interaction with others such as supervisors or colleagues (Bauer & Mulder, 2007; Leicher & Mulder, 2016). The ELT models individual learning (from errors) as action-reflection cycles involving (i) reflection on the causes of an error (ii), developing new work processes to avoid reoccurrence of the error, and (iii) the implementation of the new processes within the work context. The ELT asserts that these cycles require outside input, such as additional analyses and insights, and support for the development and implementation of new work processes (Kolb et al., 2001). While individuals can learn from their errors without outside input, research on workplace learning has emphasized the need for social interactions for effective learning (from errors) for individuals (Bauer & Mulder, 2007; Billett, 2004; Eraut et al., 1998; Leicher et al., 2013). Engagement in social learning activities delivers opportunities to co-construct knowledge and derive meaning from a situation (Bauer & Mulder, 2013; Cannon & Edmondson, 2005). Examples of social learning activities after making an error include root cause analysis in conversation with the supervisor, and asking more experienced colleagues what to do differently to avoid similar errors (Bauer & Mulder, 2007). Particularly in the early stages of one's career, professionals can benefit from social exchanges with knowledgeable others, as it might help them to extend their own (limited) perspectives and gain insights that they would not be able to realize without external input (Bauer & Mulder, 2013; Frese & Keith, 2015; Grohnert et al., 2019). Following this argumentation, it can be inferred that learning in social exchange has significant benefits for professionals, making it vital to understand its antecedents. Therefore, this study focuses on engagement in social learning activities after making an error by individual professionals.

Learning from error climate

The work context plays a key role in shaping professionals' responses to errors (Edmondson & Lei, 2014; Frese & Keith, 2015). Professionals typically read their organizational context for signs about how errors are perceived and what they are expected to do about their errors (Zhao, 2011). Prior research consistently showed that when professionals are encouraged to perceive errors as sources of learning instead of as embarrassing events, they are more likely to engage in practices such as asking for help and openly discussing potential causes of errors with others, because it is safe to do so (Frese & Keith, 2015; Seifried & Höpfer, 2013). This notion is captured in the concept of learning from error climate (Putz et al., 2013), described as "perceptions of the members of an organization or organizational unit concerning practices, processes, structures, and behaviors that support or hinder the benefit that organizations can draw from errors". In line with Putz et al.'s description as well as Salancik and Pfeffer's social information processing approach (1978), we focus our study on the individual level of climate perceptions, referred to as a psychological climate that provides information on perception and interpretation of the work environment at the individual, rather than at the organizational level (Kundu, 2007).

This learning from error climate is shaped by (1) the behaviors of the direct supervisor, (2) behaviors of colleagues, (3) work procedures, and (4) the values shared by members of an organization. Studies across a wide range of professions have investigated the relationship between an organizations' learning from error climate and engagement in social learning activities (Grohnert et al., 2019; Horvath et al., 2020; Leicher & Mulder, 2016; van Dyck et al., 2005). The results consistently indicate that a supportive learning from error climate positively relates to professionals' engagement in error-related learning activities. In the auditing setting, Grohnert et al. (2019) found that the perception of a supportive learning from error climate drives professionals' learning from errors, such that professionals who perceive their work environment as tolerant towards errors, are more likely to seek help from their supervisor after making an error. Similar results were found in healthcare (Leicher et al., 2013) and financial services (Anselmann & Mulder, 2018; Leicher & Mulder, 2016). These findings suggest that the perception of a supportive learning from error climate is a key driver of professionals' engagement in social learning activities to learn from errors. Therefore, we expect a positive relationship between individual perceptions of learning from error climate and engagement in social learning activities by individual professionals, leading to our first hypothesis:

H1. Learning from error climate positively relates to social engagement in learning activities.

Bridging climate and learning activities – affective events theory

Despite the consistent evidence for a positive relationship between an organization's learning from error climate and professionals' engagement in social learning activities, little is known about the mechanisms through which climate translates into behavior in the context of learning from errors (Ye et al., 2018; Zhao et al., 2018). This study explores these mechanisms by building on affective events theory (AET, Weiss & Cropzano, 1996). Applying AET to learning from errors, errors are considered an affective event, an experience that is likely to produce negative emotions, such as shame, embarrassment, doubt, and frustration at the individual level (Edmondson, 1999; Frese & Keith, 2015). AET proposes that an affective event (e.g., an error) translates into behavior, such as engaging in social learning activities, in two ways: through affective responses, and through cognitive responses. These two responses drive professionals' behaviors more directly than the work context itself. We will discuss each error response in turn in the context of learning from errors.

The mediating role of affective error responses

First, the professional will have an affective response to the error, e.g., error strain - experiencing stress or shame (Edmondson, 1999; Rybowiak et al., 1999). This response is shaped by the work environment (Weiss & Cropzano, 1996): when colleagues have expressed stress or shame after making an error, an individual professional is more

likely to respond to an error with high error strain. Conversely, when colleagues frame their errors as learning opportunities and express gratitude, the professional's affective response might be milder with lower error strain (Anselmann & Mulder, 2018; Catino & Patriotta, 2013; Frese & Keith, 2015; Shepherd et al., 2011). For example, Shepherd et al. (2011) found that organizational members who perceive errors as highly normalized in their work environment have lower levels of negative emotions when making errors, than those who perceive errors as less normalized in their organizational environment. Similarly, Anselmann and Mulder (2018) provided evidence in the insurance industry that the perception of a safe work environment is a key factor for reducing error strain. These findings show that in line with AET, a supportive learning from error climate is negatively associated with error strain.

This affective response that follows from the error itself as well as from the work environment, in turn, then drives the professionals' behavior, i.e., their engagement in social learning activities (Weiss & Cropzano, 1996). In fact, AET posits that affective responses (e.g., emotions) are a more proximate predictor for employee behaviors than contextual factors (Weiss & Cropzano, 1996). Yet, extant research has explored the link between emotions/error strain with engagement in error-related learning activities that has resulted in a decidedly mixed picture (Anselmann & Mulder, 2018; Hetzner et al., 2011; Rausch et al., 2017; Seifried & Höpfer, 2013). Organizational researchers have provided evidence for fostering (Leicher & Mulder, 2016; Zhao, 2011) and inhibiting effects (Anselmann & Mulder, 2018; Hetzner et al., 2011; Rybowiak et al., 1999) of negative emotions on learning from errors. On the one hand, negative emotions may foster learning by highlighting the need for improving one's performance. On the other, they may inhibit learning by using up cognitive resources so that less attention can be devoted to learning (Kanfer & Ackerman, 1989; Keith & Frese, 2005; Rybowiak et al., 1999). Consistent with AET, the limited extant research provides initial evidence that emotions after errors serve as a mediator linking perceptions of the work context and engagement in learning from errors (Steuer et al., 2013; Tulis et al., 2018; Zhao, 2011; Zhao et al., 2019, 2018). While the majority of this work focused on the mediating role of positive affect, until now, only two studies investigated the mediating role of negative emotionality (Zhao, 2011; Zhao et al., 2019). Both Zhao (2011) and Zhao *et al.* (2019) found that error strain is an essential affective mechanism mediating the relationship between supervisors' (in)tolerance of errors and learning from errors. Building further on this limited work, we expect that the perception of a supportive learning from error climate reduces the level of error strain, which in turn motivates professionals to engage in social learning activities to learn from their error, leading to the following hypothesis:

H2a. Learning from error climate negatively relates to error strain, which in turn positively relates to engagement in learning activities.

The mediating role of cognitive error responses

Second, AET proposes that professionals react to making an error with cognitive processes such as reflecting, forming a judgment, or deciding on an action path (Weiss & Cropzano, 1996). A desirable cognitive response to committing an error is reflecting on it to understand its underlying causes (Rybowiak et al., 1999). Existing research has shown that a supportive learning (from error) climate fosters reflection on errors at the individual level (Baumgartner & Seifried, 2014; Gronewold & Donle, 2011; Hetzner et al., 2011). For example, in an audit context, Gronewold and Donle (2011) found that the perception of a supportive learning from error climate drives professionals' individual engagement in reflection on their errors. Furthermore, Zhao et al. (2019) show a positive association between reflecting on an error individually with learning activities performed in social interaction (e.g., sharing the error experience). Additionally, the study by Seifried and Höpfer (2013) provides evidence that a supportive learning (from error) climate promotes both engagement in individual learning activities (e.g., reflection on errors) and social learning activities after an error.

Having established that a supportive learning from error climate fosters professionals' cognitive reaction to reflect on an error, the link from individual reflection to social learning activities from the same error is not as straight-forward. Engagement in social learning activities after an error (e.g., jointly discussing and analyzing the error) involves making an error public (Edmondson, 1999). Admitting errors to others entails a certain degree of risk because it can create an evaluative or social threat for the individual (e.g., losing face and appearing incompetent) (Rodriguez & Griffin, 2009). Put differently, engagement in social learning activities requires professionals to overcome a threshold. Taking this into account, we suggest that engagement in learning activities performed individually and learning activities performed in social interaction do not co-occur but typically occur sequentially. It is expected that professionals in a supportive learning from error climate first want to analyze their errors on their own, before they take the step to approach others. We hypothesize the following:

H2b. Learning from error climate positively relates to reflecting on errors, which in turn positively relates to engagement in social learning activities.

Linking climate and behavior through affective and cognitive error responses

Finally, AET posits that affective and cognitive responses to events do not act independently from each other, but rather, that affective responses play into cognitive responses, with affective responses being considered to be more immediate and tacit, and cognitive responses to occur deliberately and with effort (Weiss & Cropzano, 1996). We, therefore, explore a double mediation where a supportive learning from error climate is linked to

engagement in social learning activities by sequentially affecting a professionals' affective error response, followed by the cognitive error response. Limited research showed that affective error responses are followed by cognitive error responses (Steuer et al., 2013; Tulis et al., 2018). For instance, Steuer *et al.* (2013) found that positive affect in the face of errors fostered students' engagement in cognitive activities to learn from the error. Building on the theoretical proposition of AET, as well as the limited empirical evidence to date, we formulate our final hypothesis:

H3. Error strain and reflecting on errors sequentially mediate the relationship between learning from errors climate and engagement in social learning activities.

3.3 Methods

Setting, sample, and procedure

This study was conducted in the field of auditing among young professionals who are in the first three years of their career[3]. Auditors assess organizations' financial statements and provide assurance that the financial statements are in accordance with laws and regulations. This makes the work context of auditors more standardized than that of many other professions, as both formal education and certification processes, as well as work procedures, rewards, and oversight mechanisms, are standardized at the national level. Auditors' daily work is performed in a hierarchical team setting, in which the work by lower-ranking professionals is reviewed by their direct supervisor, a setting in which many errors made by auditors are expected to be discovered (Dierynck et al., 2019; Jeppesen, 2007). This hierarchical review process was specifically designed to detect and correct errors made by auditors at lower ranks - the hierarchical audit process depends on the learning from errors made at all levels, especially at the lowest level, where procedures are performed that serve as the foundation of the audit opinion (Lambert & Agoglia, 2011). Errors made at the lowest level may escalate through the hierarchical levels, and if not corrected, potentially threaten audit quality, along with the reputation of the firm (Grohnert et al., 2019; Gronewold & Donle, 2011; Gronewold et al., 2013). The wider domain context and the organization of work makes auditing a suitable context for studying learning from errors individually (error strain and reflecting on errors) and in social interaction (engagement in social learning activities). Data for this study were collected during mandatory training sessions attended by Dutch beginning auditors as part of their audit certification trajectory. All participants filled in an online questionnaire in the presence of a researcher, making the response rate 100 percent. In total, 146

3 The aim of this research design was to explore the indirect relationships in this study with as little noise as possible. Hence, we have chosen to conduct our study in a single setting with participants who have comparable prior education and work experience, standardized responsibilities in their work, perform tasks of similar complexity, and who are enrolled in the same audit certification trajectory regulated at the national level.

participants completed the online questionnaire. Yet, we had missing data from seven participants, who were subsequently excluded from the analysis. The remaining sample of 139 participants included auditors with an average of 24.7 months of work experience, with 78% of participants working for one of the Big 4 firms, and 68% male participants. The approached sample appears to be representative of the population (e.g., the group of auditors who are in the first three years of their career). The distribution of males and females in the current sample is in line with the population. Moreover, the approached sample can be considered as a standardized group, since all participants entered in the audit certification trajectory at the same time, and attended the structured training as a mandatory part of the trajectory. As we included all attendants of the obligatory training session, participants could not self-select into participation. As such, sample bias could be limited.

Measures

Participants completed an online survey in which they were first asked to recall a specific error they had made themselves before responding to a set of previously validated scales measuring our variables of interest as well as our covariates. This design was chosen to foster ecological validity during recall, resulting in individual-level information on how perceptions of a learning from error climate translates into professionals' learning behavior. To measure our dependent variable, respondents' engagement in social learning activities, we used the *Engagement in Social Learning Activities* (ESLA) scale of Bauer and Mulder (2013). This scale consists of three subscales: (1) a general openness to discuss the error with others (general cause analysis, three items); (2) joint reflection on specific possible causes for the error (specific cause analysis, three items); and (3) discussing new ways of behavior or new guidelines to prevent similar errors (development of new strategies, six items). Sample items include: "Discuss with my colleagues why I made this error", "Discuss with colleagues whether there are gaps in my knowledge and skills," (specific cause analysis), and "Make agreements about new procedures and guidelines in a team meeting", (development of new strategies). Respondents rated all items on a five-point scale from 1 (strongly disagree) to 5 (strongly agree). The ESLA scale was found to be reliable with a high Cronbach alpha of 0.85.

We captured our independent variable, *learning from error climate,* using Putz et al.*'s (*2013) short version of their scale, consisting of 16 items that assess respondents' perception of the value their firms attached to learning from errors. Sample items included: "Employees can talk to our supervisor about things that went wrong frankly, without suspecting any negative consequences", and "when someone in our work group makes a mistake, other co-workers will help him/her to fix it". Respondents rated these items on a scale from 1(strongly disagree) to 5 (strongly agree). Again, we find a high level of reliability with a Cronbach alpha of 0.86.

We measured our two mediators, affective and cognitive error responses, through two previously validated survey scales. *Error strain* was assessed with the five-item subscale by Rybowiak et al. (1999). Sample items included: "I find it stressful when I err, and "I am often afraid of making mistakes". The reliability of the scale was satisfactory (a = 0.78). *Reflecting on errors* was measured using Rybowiak et al.'s (1999) five-item sub-scale of thinking about errors. Sample items included: "After making a mistake, I think about how it could happen" and "When something went wrong, I took the time to think it through". The reliability of the scale was satisfactory (α = 0.81).

Finally, we included a series of covariates to rule out alternative explanations for our findings. First, we controlled for respondents' gender because males and females have been found to differ in how they perceive the learning from error climate (Grohnert et al., 2017) and to differ in their experience and expression of emotions (Simon & Nath, 2004). Second, we controlled for respondents' work experience because prior research has demonstrated that work experience influences professionals' learning from errors (e.g., Carmeli & Gittell, 2009; Edmondson, 1999). Third, we controlled for company type (in auditing, four large firms dominate the market, known as the Big 4; these firms have more resources and offer more specialization than smaller firms), since Bishop (2017) observed that early-career auditors who work in a large firm received more opportunities for professional learning than auditors who work in smaller firms. Lastly, we controlled for participants' natural inclination to engage in self-reflection, as it is expected that individuals with higher levels of self-reflection are also more likely to reflect on errors and engage in social learning activities after committing an error. Self-refection was measured using Grant et al.'s (2002) scale. The reliability of the scale was acceptable (α = 0.75).

3.4 Results

Preliminary analyses

We conducted a confirmatory factor analysis (CFA) using SPSS AMOS 25, to assess the distinctiveness of the measures. The measurement model included four measures: learning from error climate, error strain, reflecting on errors, and engagement in social learning activities. The four-factor model demonstrated acceptable fit: comparative fit index (CFI)= 0.90; Tucker-Lewis index (TLI) = 0.86; standardized root mean square residual (SRMR)= 0.08; root mean square error of approximation (RMSEA) = 0.06. Furthermore, in line with Podsakoff et al.'s (2003) guidelines, we performed Harman's (1976) single factor test to test for common method bias. The results of this test revealed that no single factor accounted for the majority of the variance. The first factor only accounted for 20.75% of the variance. These results indicate that common method bias is not problematic in this study (Podsakoff et al., 2003).

Descriptives and correlations

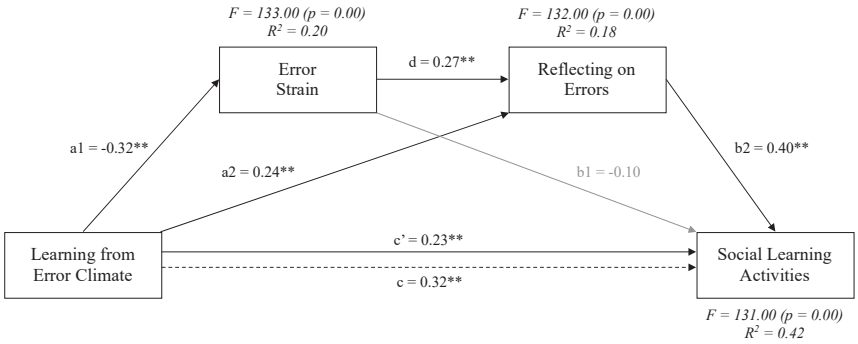
Table 3.1 reports the mean values, standard deviations, correlations, and reliability coefficients (where applicable) for all variables included in this study. Correlations ranged from -0.32 to 0.50, describing medium to large effects. In line with our hypotheses, learning from error climate correlates significantly, and in the expected direction, with engagement in social learning activities ($r = 0.40$, $p < 0.01$). Moreover, learning from error climate correlates significantly, and in the expected directions, with measures of error strain and reflecting on errors ($r = -0.32$, $p < 0.01$; $r = 0.40$, $p < 0.01$, respectively). Reflecting on errors correlates significantly and positively with engagement in social learning activities ($r = 0.50$, $p < 0.01$). In contrast to our hypotheses, however, error strain was not significantly related to engagement in social learning activities ($r = -0.10$, $p > 0.05$).

Tests of hypotheses

To test our mediation hypotheses, the direct (Hypothesis 1) and indirect effects (Hypotheses 2 and 3) of learning from error climate on engagement in social learning activities were analyzed using model 6 in Hayes' (2013) PROCESS for SPSS macro. In line with (Hayes, 2013), a bias-corrected bootstrap confidence interval for the total, direct and indirect effects, based on 10,000 bootstrap samples, was calculated. We investigated indirect effects on the basis of 95% confidence intervals (CI); indirect effects were considered to be statistically significant when the CI did not include 0 (Hayes, 2013). Our results are illustrated in Figure 3.1.

In H1, we predicted that learning from error climate is positively related to engagement in social learning activities. Figure 3.1 shows that the total effect (c) of learning from error climate on engagement in social learning activities is positive and significant ($\beta = .32$, $p < 0.01$). Next, when controlling for both mediators (error strain and reflecting on errors), learning from error climate's direct effect (c') was reduced ($\beta = 0.23$, $p < 0.01$), but still significant, providing support for partial mediation in line with hypothesis 1.

H2a stated that the relationship between perceived learning from error climate and engagement in social learning activities is mediated by the affective error response of error strain. As Figure 3.1 reveals, we find a significant negative relationship between learning from error climate and error strain (a1) ($\beta = -0.32$, $p < 0.01$), and an insignificant relationship between error strain and engagement in social learning activities (b1). Overall, when error strain is the exclusive mediator between learning from error climate and engagement in social learning activities, the indirect effect (a1b1) was not significant. The standardized indirect effect was 0.03 and the CI included 0 [CI: –0.02; 0.09]. Therefore, hypothesis 2a is not supported. We find that our model explains 20% of the variance in error strain, a medium amount.



Total effect: 0.34 CI [0.18, 0.49];
Direct Effect c': 0.24 CI [0.09, 0.40]; Total indirect effect: 0.09 CI [.01, 0.19];
Specific indirect via error strain: 0.03 CI [-0.02, 0.09]; Specific indirect via reflecting on errors: 0.09 CI [0.01, 0.17]

Figure 3.1. Visual representation of the multiple mediation analyses on engagement in learning activities.

Note: All coefficients are standardized OLS coefficients. The dotted line (c) denotes the total effect. The solid line (c') denotes the direct effect. The model includes gender, work experience, company type, and self-reflection as covariates. Significance of coefficients is indicated as * p <0.05, ** p < 0.01.

Table 3.1. Descriptive statistics, correlations, and scale reliability

Variables	M	SD	1	2	3	4	5	6	7
1. Engagement in social learning activities	3.68	0.52	(0.85)						
2. Error strain	2.81	0.84	-0.10	(0.78)					
3. Reflecting on Errors	4.11	0.53	0.50**	0.19*	(0.81)				
4. Learning from errors climate	3.56	0.50	0.40**	-0.32**	0.14	(0.86)			
5. Self-reflection	3.32	0.52	0.36**	0.18*	0.32**	0.13	(0.75)		
6. Gender	0.31	0.46	-0.02	0.22**	-0.03	-0.15	0.08		
7. Company type	0.20	0.46	-0.16	-0.02	0.13	-0.05	-0.22**	-0.04	
8. Work experience	22.06	24.70	0.18*	-0.18*	0.02	0.03	-0.04	-0.03	0.27**

Notes: N = 139. Cronbach alphas are reported in parenthesis on the diagonal for relevant survey scales. Gender was coded as 0 = male and 1 = female; company type as 0 = employed at Big 4, 1 = employed at non-Big 4.

H2b predicted that the relationship between learning from error climate and engagement in social learning activities is mediated by professionals' cognitive error response of reflecting on errors. We find significant and positive relationships between learning from error climate and reflecting on errors (a2) (β = 0.24, p <0.01, see Figure 3.1), and between reflecting on errors and engagement in social learning activities (b2) (β = 0.40, p <0.01). Overall, the standardized indirect effect (a2b2) for this relationship of 0.09 is significant [CI: 0.01; 0.17]. These findings provide consistent support for hypothesis 2b. We can explain 18% of the variance in reflecting on errors, a medium amount.

H3 proposed that error strain and reflecting on errors sequentially mediate the relationship between learning from error climate and engagement in social learning activities. Learning from error climate negatively relates to error strain (a1, see above). Error strain in turn relates positively and significantly to reflecting on errors (d; $\beta = 0.16$, $p < 0.01$), which in turn relates positively to engagement in social learning activities (b2, see above). The overall indirect effect (a1db2) is significant at 0.09 [CI: 0.01; 0.019]. Together with the significant and positive direct effect (c') connecting learning from error climate and engagement in social learning activities, we find evidence for a partially mediated relationship, in line with both hypotheses 1 and 3. Notably, R^2 for engagement in social learning activities was large with 42% of the variance explained in the full mediation model.

3.5 Discussion

This study explored the link between learning from error climate and professionals' engagement in social learning activities through affective and cognitive error responses by individual professionals, resulting in two key findings. First, supporting prior research (Frese & Keith, 2015; Grohnert et al., 2019; van Dyck et al., 2005), this study reports a positive relationship between learning from error climate and engagement in social learning activities after making an error, further confirming that organizations have an active means of fostering learning from errors. Second, we could shed light on the mechanisms through which climate and behavior relate to each other. In line with affective event theory (AET, Weiss & Cropzano, 1996), we find support for a double mediation, in which a company's learning from error climate is negatively related to a professional's affective error response, lower error strain, which in turn was positively related to reflecting on errors, the cognitive error response, which in turn was positively linked to engagement in social learning activities. These findings align with earlier results showing that a supportive learning from error climate reduces error strain (Catino & Patriotta, 2013; Shepherd et al., 2011), as well as with evidence on the positive link between reflecting on errors and engagement in social learning activities (Zhao et al., 2019). However, we found mixed results for the link between error strain in relation to reflecting on errors and engaging in social learning activities. Error strain was positively related to individual reflecting on errors, lending support to the fostering hypothesis of negative emotions, consistent with prior limited work (e.g. Zhao, 2011; Zhao et al., 2019), suggesting that negative emotions elicited by errors serve as a warning signal and alert professionals to the need to learn and improve performance. At the same time, error strain was unrelated to engagement in social learning activities, an unexpected finding. Prior literature suggests that the direction of the relationship between negative emotions and learning from errors can vary, depending on whether the emotion was triggered by outside influences (such as an unsupportive learning from error climate), or whether they emerge from the person him-

or herself (Böhnke & Thiel, 2019; Seifried & Höpfer, 2013). It has been argued that negative emotions that emerge within the person such as anger at oneself, stimulate engagement in error-related learning activities. In contrast, negative emotions that are elicited by outward influences are speculated to impair learning from errors (Seifried & Höpfer, 2013). As this theory has not been empirically tested, it remains an important avenue for future research. Based on our findings, we conclude that the relationship between learning from error climate and engagement in social learning activities after committing an error is sequentially mediated by error strain (as an affective mechanism) and reflecting on errors (as a cognitive mechanism). This sequential mediating effect has not been observed before, and hence provides a novel perspective on the underlying mechanisms through which organizations can help professionals to learn from their errors.

Theoretical implications

The present study makes several contributions to research on learning (from errors) at work. In the past decades, a substantial body of research has demonstrated that professionals' learning from errors requires the perception of an error-tolerant climate (Frese & Keith, 2015; Putz et al., 2013). However, knowledge on the underlying mechanisms that explain the nature of this relationship is still limited. Our study builds on AET (Weiss & Cropzano, 1996) as well as on limited evidence on mediators of the climate-behavior relationship (Zhao, 2011; Zhao et al., 2019). We found that first affective and then cognitive error responses sequentially mediate this well-established relationship, laying the framework for future studies seeking to understand how learning from error climate influences engagement in social learning activities. Second, this study addresses calls for future research that investigate the role of emotions in learning (from errors) at work by highlighting the need to differentiate between individual and social learning activities in relation to error strain (Böhnke & Thiel, 2019; Hökkä et al., 2020). Finally, this study complements prior research (e.g. Anselmann & Mulder, 2018; Grohnert et al., 2019; Hetzner et al., 2011; Zhao, 2011) by directing attention to the sequential effects of engagement in error-related learning activities, first taking place individually (e.g., reflecting on errors) and subsequently in social exchange. Our results warrant future research to make a distinction between engagement in these two types of learning activities when investigating how organizations can enable professionals to most effectively learn from their errors.

Limitations and suggestions for future research

Our research entails several limitations that suggest directions for future research. First, we collected data among young professionals in a single setting, auditing. This does not allow us to explore whether the tested relationships also apply across hierarchy levels, nor to professional domains outside the audit context. Both are interesting issues for future research. Second, the cross-sectional design does not provide causal evidence for the investigated relationships, limiting our ability to quantify causal relationships

between variables. Having established the indirect relationships between learning from error climate and engagement in social learning activities cross-sectionally, our results provide support for designing a targeted longitudinal study or well-controlled field-based experiment, allowing for causal inferences. Third, our results are based on respondents' self-reported data, which may be subject to recall bias. Future studies could employ a diary method, where the delay between the event (e.g., the error) and the time it is documented can be minimized, and where possible, may collect physiological data during an error experience to triangulate data sources. Fourth, our study did not directly test alternative hypotheses for the underlying mechanisms (e.g., affective error responses, and cognitive error responses) in the relationship between learning from error climate and engagement in social learning activities. As a result, we cannot exclude the possibility that cognitive error responses precede affective error responses, or that both error responses occur simultaneously. Future research is recommended to test these alternative hypotheses. Fifth, our study did not comprehensively include personality factors (such as emotional stability) that may determine the degree of negative emotion that professionals experience after errors. Zhao (2011), for instance, examined the impact of emotional stability on the level of negative emotions and found that professionals with high levels of emotional stability were less susceptible to negative emotions and better able to manage negative emotions after errors. Therefore, future studies should include personality factors such as emotional stability in their research model, as they might provide us with richer explanations for the positive relationship between error strain and engagement in error-related learning activities.

Practical implications

By underlining and verifying the importance of a supportive learning from error climate in reducing error strain and promoting professionals' learning from errors individually and socially, this study has important implications for organizations. A supportive learning from error climate can be designed in several ways. First, organizations should clearly and consistently communicate that errors are expected to occur and engagement in error-related learning activities (such as addressing errors openly and jointly discussing errors) is expected, valued, and rewarded. Organizations can actively do this by introducing regular meetings in which professionals jointly analyze and reflect upon their errors (Grohnert et al., 2017; Zhao et al., 2018) and by providing time off for reflection (Rodriguez & Griffin, 2009). These opportunities need to be supplemented with attention to learning from errors in e.g., promotion criteria and coaching trajectories offered to (young) professionals. Second, extant literature emphasizes the crucial role of leadership behavior in shaping an organizations' learning from error climate (Edmondson, 2011; Edmondson & Lei, 2014). By framing errors as learning opportunities, admitting their own errors, and offering support for resolving and learning from errors, supervisors can role model learning from errors behavior and set the tone for a supportive learning from error climate (Grohnert et al.,

2019; Zhao et al., 2018). Evidence from Cha and Edmondson (2006) emphasize the need for these behaviors to be displayed consistently, both by supervisors themselves, as well as across supervisors and teams. If misalignment occurs between leaders' words and actions, professionals are likely to experience disenchantment, which relates to cynicism and withdrawal, instead of learning. Finally, we would like to highlight that the positive link between error strain and reflecting on errors should not be interpreted as a call for increasing negative emotions, e.g., through repercussions. Instead, we want to underline that organizations should emphasize professionals' responsibility for their own errors and their learning from them (Zhao et al., 2018). We suggest that organizations should strive to succeed in both — creating a supportive learning from error climate as well as holding professionals accountable for their errors — offering professionals a valuable way to use error strain as a motivational impulse to start learning activities after making errors. Thus, organizations need to find the right balance between accountability and creating a culture that avoids shame and blame. As it takes two to tango, it takes competent professionals in competent organizations to learn the most from errors.

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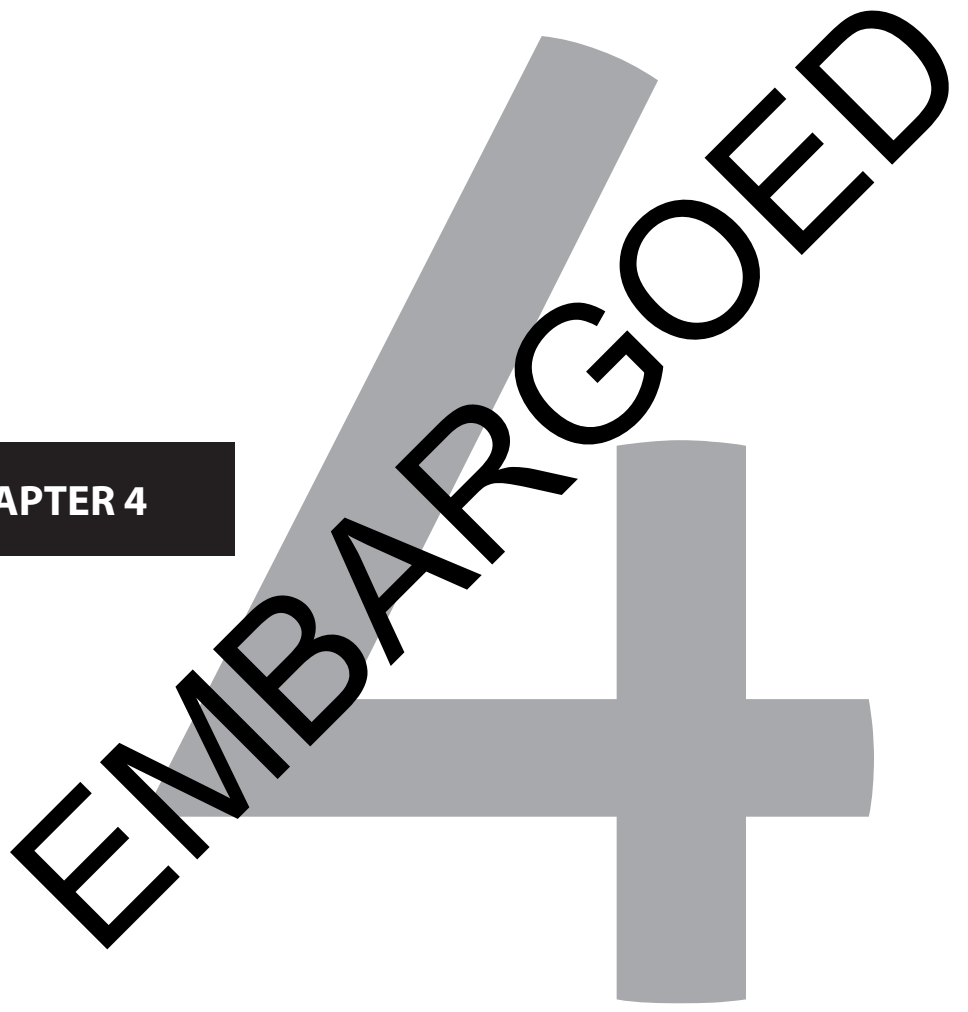
CHAPTER 4



When do Reviewers Invest in Coaching Preparers during the Audit Review Process?

This chapter is based on Smeets, L. H., Gijselaers, W. H., Grohnert, T., & Meuwissen, R. H. G. (under review). When do reviewers invest in coaching preparers during the audit review process? Auditing: A Journal of Practice & Theory.

CHAPTER 5

5

Professionally developing preparers: how are reviewers affected by the preparers' likelihood to recur and their performance reputation?

CHAPTER 6

6

General Discussion

6.1 Overview of findings

This dissertation started with the observation that enhancing auditors' professional development nowadays is a top priority within audit firms (De Vries & Herrijgers, 2018, 2020; NBA, 2014, 2019; Westermann et al., 2015). Enabling auditors to learn and improve their skills and knowledge continuously has been recognized by audit practice as an essential avenue towards sustainable improvement (IAASB, 2014; NBA, 2014, 2019; PCAOB, 2017). Nonetheless, auditors do not professionally develop overnight. In their pioneer work, Westermann et al. (2015) highlighted that "professional auditors are not born – rather they are developed through continuous and recursive professional work practices" (p. 867). Firms, and especially direct supervisors, e.g., reviewers, have been recognized to play a pivotal role in facilitating this continuous development of auditors (Andiola et al., 2019; Kornberger et al., 2011; Westermann et al., 2015). Despite this important role, insights into how to facilitate auditors' development and support effective coaching of less experienced auditors on audit engagements are still limited. Studying auditors' professional development is relatively novel in the audit literature and has not received much attention to date (Andiola et al., 2021; Dierynck et al., 2019; Westermann et al., 2015). This is especially the case for learning from errors (Grohnert et al., 2017). To address this void in audit research, this dissertation has particularly explored how professionals can be supported in their professional development through learning from their errors, and which factors drive supervisors to professionally develop their less experienced colleagues through coaching. Figure 6.1 depicts the baseline conceptual model studied in the four empirical chapters in this dissertation. The first two studies captured the perspective of subordinate auditors and investigated which direct supervisor behaviors (chapter 2), and how the perceived learning from error climate (chapter 3) can stimulate professionals' learning from errors. A second set of studies captured the perspective of supervising auditors (e.g., reviewers) and explored which factors drive reviewers to professionally develop their preparers through coaching (chapters 4 and 5).

An important contribution of the present dissertation is the use of both qualitative and quantitative methods to explore our research questions. This mixed approach allowed us, on the one hand, to gain a deep and contextualized understanding of how professionals can be enabled to further their professional development and when supervisors decide to focus on professionally developing their subordinates, and on the other hand, it allowed us to establish relationships through hypothesis testing. For both part 1 and part 2, this dissertation started with semi-structured interviews to gain detailed insights into subordinates' (chapter 2) and supervisors' (chapter 4) thoughts, needs, and complexities they encounter in daily practice (Miles & Huberman, 1994). Subsequently, it was followed up on the obtained insights of interview studies by quantitatively testing observed relationships, including the relationship between learning from errors climate

and professionals' engagement in learning from errors activities in chapter 3 and the link between preparer-specific factors including, preparers' performance reputation and the likelihood to recur, and reviewers' focus on professionally developing their preparers in chapter 5.

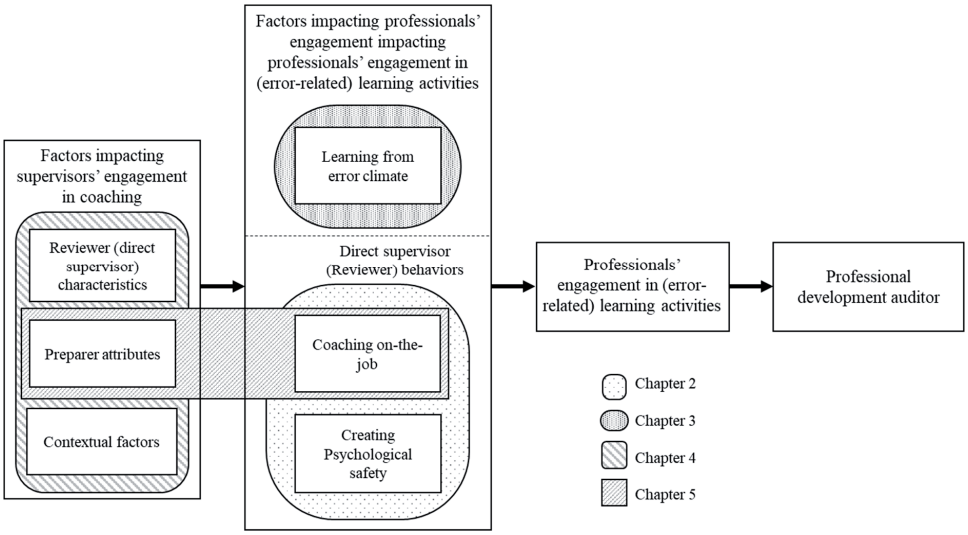


Figure 6.1. The overall model for this dissertation

In this concluding chapter, the main findings are integrated and discussed across three key topics: (I) how learning from error climate promotes engagement in social learning from errors activities, (II) how direct supervisors can enhance learning from errors beyond fostering psychological safety, and (III) when supervisors invest in coaching their subordinates. Furthermore, theoretical contributions are outlined along with an agenda for future research. In addition, practical implications derived from the results of this dissertation are presented. Finally, conclusions based on the main finding will be formulated.

6.2 Discussion of results

How can professionals be enabled to learn from their errors?

In chapter 2, semi-structured interviews were conducted among 23 audit professionals across all hierarchical ranks to explore how direct supervisors can enable professionals to learn from their errors. Echoing earlier studies (Nembhard & Edmondson, 2006; Ye et al., 2018; Zhao et al., 2019), it was found that supervisors play a pivotal role in enhancing professionals' learning from errors through creating a psychologically safe work

environment by tolerating errors, exhibiting openness, modelling fallibility and being physically present. Beyond creating a psychologically safe work environment, our results highlight that supervisors can foster learning from errors by providing timely and elaborate feedback, being accessible and involved, and organizing joint evaluations. These results align with Edmondson's (2019) theoretical assertion that psychological safety helps "to take off the brakes" that keep professionals from engaging in interpersonal risk behaviors such as seeking help from their supervisor, "but it is not the fuel that powers the car" (p. 21). This study contributes to existing knowledge on learning from errors (for an overview, see Edmondson & Lei, 2014), by shedding new light on other mechanisms through which supervisors can foster learning from errors besides creating psychological safety.

In chapter 3, a quantitative cross-sectional survey was conducted among 138 early-career auditors. Using serial mediation analysis, it was found that a supportive learning from error climate reduces error strain, which in turn facilitates individual reflection on errors, and subsequently leads to engagement in social learning from errors activities. Our results are consistent with the affective events theory (AET Weiss & Cropzano, 1996), positing that affective and cognitive (error) responses by individual professionals drive their behaviors more directly than the work context itself. Moreover, looking at the positive link between error strain and reflection on errors, our results reinforce the notion that negative emotions elicited by errors serve as a warning signal and, as such alert the need to learn (Zhao, 2011; Zhao et al., 2019). Although results revealed a positive relationship between error strain and individual reflection on errors, there was no significant relationship between error strain and engagement in social learning activities; an unexpected finding. Prior literature theorizes that the direction of the relationship between negative emotions and learning from errors can vary, depending on whether the emotion was triggered by outside influences (such as perceptions of an error intolerant climate) or whether it emerged from the person him or herself (Böhnke & Thiel, 2019; Seifried & Höpfer, 2013). It has been argued that negative emotions that emerged within the person, such as anger at oneself, stimulate engagement in error-related learning activities. In contrast, negative emotions that are elicited by outward influences are speculated to impair learning from errors (Seifried & Höpfer, 2013). So far, this theory has not been empirically tested, and hence remains an important question to be answered. Regarding the direct relationship, our findings are in line with earlier research finding a positive link between learning from error climate and engagement in error-related learning activities (Grohnert et al., 2019; Keith et al., 2020; Leicher et al., 2013; van Dyck et al., 2005). Concerning the indirect relationship, our study expands limited knowledge on the underlying mechanisms that explain the nature of the climate- behavior relationship. This is the first study that observes a double mediation by error strain (an affective mechanism) and reflecting on errors (a cognitive mechanism) on this relationship. Besides, results provide initial evidence that engagement in error-related learning activities occurs sequentially: it first takes place individually (e.g.,

reflection on errors) and subsequently in social exchange. Thus, this dissertation provides a unique perspective on the underlying mechanisms through which organizations can help professionals to learn from their errors.

To summarize, results from the first part (chapters 2 and 3) of this dissertation underline the vital role of support for learning from errors in the work environment and indicate a prominent role of direct supervisors. In both studies, auditors did not automatically learn from their errors; this process was fostered by the perception of a supportive learning from error climate (chapter 3) and psychological safety and learning opportunities afforded by the direct supervisor (chapter 2, in line with Grohnert et al., 2019; Leicher et al., 2013; Putz et al., 2013; Seifried & Höpfer, 2013). The empirical findings extend prior research on learning from errors by demonstrating that the mere existence of a psychologically safe work environment is not enough to initiate professionals' learning from errors; professionals need to receive learning opportunities –e.g., timely and elaborate feedback, to be able to engage in error-related learning activities.

When do supervisors invest in coaching their subordinates?

Based on the key finding in part 1 that direct supervisors play a pivotal role in actively creating learning and development opportunities for their supervisees, a second set of studies (chapters 4 and 5) was conducted to explore when supervisors decide to invest in coaching their subordinates and to create an opportunity for learning and professional development.

In chapter 4, semi-structured interviews were conducted among 15 reviewing auditors with 1-5 years of experience coaching preparers. Findings revealed two new insights: reviewers need to foster preparers' self-insights through asking questions, and they need to provide preparers with clear performance expectations to stimulate preparers' professional development. Moreover, this study was designed to explore a multitude of factors that affect reviewers' engagement in coaching, relating to three broad categories: (1) reviewer characteristics, (2) preparer attributes, and (3) contextual factors. Concerning the first category, reviewers' characteristics, findings revealed that having a positive attitude towards professionally developing preparers is essential, but it does not automatically translate into actual coaching behavior, again highlighting the role of the work environment (Andiola et al., 2021). Accordingly, it is concluded that this first category is insufficient to understand determinants of effective coaching. Concerning the second category, preparer attributes, findings demonstrate that reviewers are more willing to coach preparers who are open to coaching and proactively ask for it, regardless of what expectations reviewers have of their preparers' quality of work. To the best of our knowledge, this is the first study showing this link. Regarding the third category, contextual factors, our findings substantiate earlier work by Westermann et al. (2015) and

Ater et al. (2019), showing that high time/work demands play an eminent role in decreasing reviewers' coaching efforts. This study adds several new insights to extant literature. First, reviewers tend to reduce their coaching efforts when preparers are dealing with a high workload, and physical proximity and team staffing levels impact reviewers' decisions to coach their subordinates. Second, supervisors' enactment of coaching is driven by factors related to the reviewer, the preparer, and the context (in line with Hagen, 2012; Turner & Mccarthy, 2015). Third, firms could promote the provision of effective coaching through four mechanisms, including: the provision of formal trainings on coaching, the provision of on-the-job coaching for reviewers, assigning sufficient time for review and coaching, and designing a supportive firm culture for coaching. Taken together, this study enriches audit and coaching literature by introducing a multidimensional perspective of facilitating and inhibiting factors related to effective coaching.

In chapter 5, a quantitative experiment was conducted with 220 audit seniors and managers of a Big 4 firm. The purpose was to investigate how two preparer-specific factors affect reviewers' developmental approach in the review process. All participants reviewed the same workpaper, completed by preparers who are (un)likely to recur on the engagement with a (low) high-performance reputation, comparing professional development efforts across reviewers. First, it was found that reviewers are more (less) focused on professionally developing preparers who are likely (unlikely) to recur on the engagement. This finding is in line with the conservation of resources theory (COR, Hobfoll, 1989), which states that individuals take inventory of costs and personal benefits when expending resources, such that it results in future gains, avoiding future losses. Consequently, reviewers might see a long-term benefit to coaching returning preparers (e.g., benefits such as spending less time on making review notes, improving audit quality). Second, results revealed that preparers' likelihood to recur and performance reputation interacted in the following ways: (1) reviewers focus least on professionally developing preparers who have a low-performance reputation and who are unlikely to recur on the engagement, (2) reviewers focus most on professionally developing preparers who have a low-performance reputation and who are likely to recur on the engagement, and (3) there are no differences for preparers who have a high-performance reputation, regardless of the preparers' likelihood to recur on the engagement. Mirroring prior audit research (Gimbar et al., 2018; Sweeney et al., 2017; Tan & Jamal, 2001), it is perceived performance, not the actual performance that drives reviewers' judgements and behaviors. Our findings suggest a conditional Matthew effect for preparers: preparers with a low-performance reputation receive few opportunities for learning and development than preparers with a high-performance reputation, unless preparers with a low-performance reputation are likely to recur on the audit engagement (Merton, 1968). This makes low performers more vulnerable to switching engagement teams frequently and, thus potentially miss on coaching opportunities to develop their full potential on the engagement. To the best of

our knowledge, these interactive effects have not been observed before, enriching both audit and supervisory coaching literature.

To summarize, the results of studies 3 and 4 in part 2 of this dissertation provide clear evidence that reviewers do not consistently engage in effective coaching. Instead, reviewers' decisions to invest effort in coaching their preparers depends on their own characteristics, perceptions of preparer' attributes, and contextual factors. These results provide audit firms with a deeper understanding of how effective coaching during audit engagement can be promoted.

6.3 Theoretical contributions

First, the empirical investigation of how audit firms and particularly direct supervisors can foster auditors' professional development adds to the scarce research of workplace learning in auditing. Until now, only a few studies exist within auditing that explicitly focused on auditors' learning on-the-job and professional development (Andiola et al., 2021; Grohnert et al., 2017, 2019; Hicks et al., 2007; Westermann et al., 2015). While existing work that studied auditors' professional development mainly focused on subordinate perspectives, this dissertation considers the perspective of supervisors and as such contributes to the scant audit literature on professional development. The studies presented in the first part of this dissertation contribute to our understanding of the relationship between learning from error climate and learning from errors, and how direct supervisors can help individuals to learn from their errors.

Second, this dissertation introduces a multidimensional perspective of antecedent factors that facilitate or inhibit coaching behaviors in reviewers. Whereas audit research provided important insights into the determinants of the error detection function of the review process, very little attention has been paid to the determinants of the professional development function of the review process. Prior studies on professional development in the review process mostly focused on particular subordinate outcomes, including preparer retention, performance improvement, and organizational commitment (Andiola & Bedard, 2018; Andiola et al., 2021; Dalton et al., 2015; Vera-Muñoz et al., 2006), yet knowledge about which factors drive or impair reviewers' coaching efforts is still lacking. The results in this dissertation take a first step in closing this gap. Chapter 4 provides a broad picture of factors facilitating and inhibiting reviewers to coach preparers, including: reviewers' characteristics, preparers' attributes, and contextual factors. To the best of our knowledge, this is the first study exploring determinants of effective coaching, considering the perspective of the reviewer. In chapter 5, we are the first to provide evidence for the joint effects of preparers' likelihood to recur and the preparers' performance reputation

during audit review. In sum, the findings presented in this dissertation extend the limited audit research stream on professional development by uncovering a range of antecedent factors that drive reviewers to professionally develop preparers through coaching.

Third, this study advances understanding of how audit supervisors (e.g. seniors, managers, and partners) can help less experienced auditors to learn from their errors. This dissertation provides initial evidence for the notion that creating a psychologically safe work environment is a necessary yet insufficient condition to initiate professionals' engagement in learning activities (Baumgartner & Seifried, 2014; Edmondson, 2019; Edmondson & Lei, 2014; Ye et al., 2018). Research in this dissertation develops new insights into which behaviors of direct supervisors effectively facilitate professionals' learning from errors in concert with psychological safety. The theoretical contribution lies in the value of identifying critical supervisor behaviors that participants viewed as facilitating learning from errors next to fostering a psychologically safe work environment.

6.4 Agenda for future research

The research presented in this dissertation explored how professionals can be enabled to learn from their errors and when direct supervisors decide to provide their subordinates with opportunities for learning and development, resulting in five avenues for future research that are discussed below.

Measuring learning from errors and using alternative methods

First, it is suggested that future research should optimize the measurement of learning from errors. In line with prior research on learning from errors (Anselmann & Mulder, 2018; Bauer & Mulder, 2007; Leicher & Mulder, 2016), this dissertation operationalized professionals' learning from errors as engagement in learning activities. The strength of this approach is that it focuses on concrete and measurable behavior in everyday work (Simons & Ruijters, 2004). A drawback is that it does not provide information on realized learning outcomes. Although this dissertation assumes that engagement in learning from error activities leads to desired learning outcomes (e.g., new knowledge and skills), this relationship was not empirically tested. Therefore, future research is warranted to investigate whether and how professionals' engagement in learning from errors activities translates into learning outcomes, for example by employing alternative designs such as well-controlled experiments and longitudinal studies.

Another avenue for future research is derived from the self-reported nature of the data gathered in this dissertation. In chapters 2 and 3 (Part I of this dissertation), self-reported statements and measures were used to explore professionals' engagement in learning

activities after making an error. A question that remains in light of the self-reported statements is whether the participants were able to assess themselves accurately, and whether there is a causal relationship between the described error experience, the impact of work context factors, and subsequent engagement in learning activities. Instead of relying on self-reported data -where participants might be subject to biases and inaccuracies – future research could employ alternative methods such as well-controlled experiments or longitudinal studies. Experiments offer rich ground for unraveling professionals' learning and allow the generation of ex-ante evidence regarding the impact of work context factors on professionals' engagement in learning activities. Longitudinal studies provide the advantage of studying how the learning from errors process unfolds over time. Besides, using a longitudinal design makes it possible to provide information on causality and to investigate the long-term effects of learning from errors on performance.

Along with employing alternative designs, future research is encouraged to explore learning from errors on other levels. Since the present dissertation focused on the individual level, a relevant next step would entail to investigate learning from errors on the team more systematically. In the present dissertation, data could not be collected from the same audit teams. This prevented us from aggregating individual-level data to calculate a team-level measure. Since most of the audit work is conducted in hierarchical audit teams, it is crucial to extend the research findings of this dissertation to the level of audit teams, and their learning behavior. Future research on the team-level could for instance explore how individuals' learning from errors impacts a teams' shared knowledge. This could be done by examining how knowledge about errors is transmitted in audit teams, and how it changes team mental models (Bauer, 2008; van den Bossche et al., 2011). Exploring learning from errors on the team-level will refine the understanding of the phenomena examined in this dissertation, and provide firms with rich insights into how auditors' professional development on multiple levels can be promoted.

Examining different mechanisms and interactions on professionals' learning from errors

Future research is recommended to devote more attention to the underlying mechanisms, as well as to investigate the boundary conditions in the specific link between learning from error climate and professionals' engagement in error-related learning activities. While the present dissertation adds knowledge regarding two mediating variables (e.g., error strain and reflection on errors) in this specific relationship, it is recognized that obtaining knowledge on both mediators and moderators remains essential. Gaining richer insights into the underlying mechanisms and factors that impact the strength of the error climate – learning behavior link, is particularly relevant for organizations that have a vested interest in fostering professionals' learning and development. An advanced understanding of the mediating and moderating variables will enable firms to design

effective work environments and practices that help individual professionals to learn from their errors.

With regard to mediators, it is suggested that future research could explore the mediating effects of other individual characteristics such as error-related self-efficacy. Zhao et al. (2019) showed for instance that supervisors' modelling fallibility positively affected subordinates' learning from errors through enhancing their error-related self-efficacy (e.g., subordinates' belief in their ability to cope with errors). In addition, research could study the potential mediating effect of individuals' error orientation, e.g., individuals' attitudes towards errors. In this dissertation, only the mediating role of error strain, a facet of error orientation, was investigated (Rybowiak et al., 1999). Including other facets of error orientation such as relevance to learning (e.g., the estimation of an error as being relevant to learning) in the research model could provide further evidence and understanding for the influence of learning from error climate on engagement in learning from errors activities. Taken together, future studies should pay attention to other underlying mechanisms such that our understanding of how perceptions of learning from errors climate translate into professionals' learning from errors can be refined.

Regarding moderators, future research is encouraged to explore contingency factors that might alter the strength of the error climate – behavior link. A limited stream of research shows that work context factors such as a psychologically safe climate interact with other variables to predict learning (Edmondson & Lei, 2014). A particular example is found in Sanner and Bunderson's (2015) meta-analysis study showing that the relationship between psychological safety and learning was stronger when high creativity requirements and complexity characterized the task environment. Furthermore, in the information technology and pharmaceutical sector, Kostopoulos and Bozionelos (2011) showed that task conflict strengthened the positive link between psychological safety and team learning. Another interesting finding relates to the study of Zhao et al. (2018), who provided initial evidence for an interaction between work context factors (e.g., direct supervisor attitudes towards errors and error climate on professionals' engagement in learning activities). It was found that learning from errors is impaired when supervisors respond to subordinate errors in ways that are incompatible with the perceived norms and practices supporting learning from errors within the broader organization. Furthermore, recent research has suggested that error characteristics, such as error severity, potentially impact the strength of the relationship between learning from error climate and professionals' learning from errors (Keith et al., 2020). In light of these findings, future research is suggested to consider the above discussed factors when examining the error climate- behavior link.

Measuring supervisors' focus on professionally developing subordinates

Another avenue for future research relates to employing alternative methods for measuring the extent to which supervisors professionally develop their subordinates. In this dissertation self-report instruments, e.g., the critical incidents technique (chapter 4) and five self-report items based on Zhou's (2003) and Heslin et al.'s (2006) employee coaching scale (chapter 5), have been used to study reviewers' perceptions of professionally developing one's preparer. Given that we used a self-report instrument, it might be that participants' responses on the five self-report items are impacted by their inability to accurately self-assess the extent to which their review comments professionally develop preparers. As a result, we cannot be sure that the pattern that was found in our results will also be reflected in actual coaching behavior. As a remedy to this potential drawback, automatic text analysis (e.g., LIWC) was used as a more objective measure to assess the extent to which review comments professionally develop preparers. LIWC is an automated text analysis program that measures word usage patterns (Tausczik & Pennebaker, 2010) derived from word frequencies in pre-defined dictionary categories (Pennebaker, Mehl, & Niederhoffer 2003). The strength of using LIWC is that it has been recognized as a psychometrically valid method of analyzing text communications (Tausczik & Pennebaker 2010; Pennebaker & King 1999). Despite this strength, it needs to be noticed that in chapter 5 participants provided only a limited number of words in their reviewer comments, leading us to apply caution in interpreting our findings.

In consideration of this, future research is suggested to also consider other possibilities to capture reviewers' focus on professional development during the review process. One alternative would be to use independent raters with public accounting experience to evaluate the written review comments by participants and assess the extent to which reviewers focus on professionally developing the preparer (Andiola et al., 2020). Another alternative that can be considered by future research is including both the perspectives of reviewers and preparers when assessing the extent to which review comments facilitate preparers' professional development. Since the data in studies 3 and 4 only represent the reviewer perspective, it was not possible to explore the alignment between reviewers' perceptions and preparers' perceptions regarding the developmental value of written review comments. Capturing both perspectives of subordinates and supervisors on the extent to which reviewers' comments are learning-oriented might provide a complete picture of how and when reviewers invest in their preparers' professional development. Taking even a step further, future research may employ a longitudinal design with matched pairs of subordinates and supervisors (e.g., existing reviewer- preparer pairs who work together on audit engagements) to further understand when supervisors invest in coaching their subordinates and the intricacies of the interactions between supervisors and subordinates over time.

Investigating antecedent factors of coaching and interactions

More research is needed on the factors that drive supervisors to professionally develop their subordinates. Chapter 4 uncovered a multitude of antecedent factors (e.g., reviewers' characteristics, preparer attributes, and contextual factors). Given that these findings are qualitative, future research is warranted to test the effects of reviewer and preparer characteristics, and contextual factors in well-controlled experiments. A quantitative approach allows to gauge the relative impact of these three factors and to obtain deeper insights into relevant levers of effective coaching. Besides investigating the relative impact of determinants, well-controlled experiments allow to explore interactions between these three categories of factors. Especially research that investigates how the identified supervisors' characteristics, subordinates' attributes, and contextual factors interact would be invaluable to audit literature as well as to psychology and managerial literature, given that the available evidence on what drives supervisors to coach their subordinates is still in its infancy.

Building on our findings in chapter 4, chapter 5 experimentally tested how two preparer-specific factors, preparers' performance reputation and preparers' likelihood to recur, impact reviewers' focus on professionally developing their preparers in the workpaper review process. One of the main findings was that reviewers provide fewer developmental opportunities to preparers who are unlikely to recur. This effect was found to be strengthened when the preparer has a low-performance reputation. This finding implies a risk-based short-term focus on audit quality over investing in long-term professional development that might also benefit other engagements. Given that professional development is considered a critical element contributing to audit quality, our study raises the question of how this risk-based short-term focus of reviewers can be attenuated. In other words, which factors could potentially mitigate reviewers' susceptibility to preparer-specific factors, when coaching preparers in the review process? Prior managerial and educational research suggests that a supervisors' mindset (e.g., growth versus fixed mindset) plays a vital role in determining how susceptible supervisors are to subordinates' performance reputations (Heslin et al., 2006; Kouzes & Posner, 2019; Rattan et al., 2012). In their pioneer study, using managers enrolled in MBA programs, (Heslin et al., 2006) found that managers differ in their inclination to coach their subordinates based on their mindset. Heslin et al. (2006) showed that managers holding a growth mindset (e.g., the belief that human attributes are innate and unalterable) are disinclined to help poor-performing subordinates enhance their professional development, comparably to managers who hold a growth mindset (e.g., the belief that personal attributes can be developed). Based on these findings, future research is recommended to investigate the potential diminishing effect of reviewers' characteristics, such as holding a growth mindset.

Along with investigating a supervisors' mindset, future research should explore how the organizational context might strengthen or weaken the evidenced relationship between preparers' characteristics and reviewers' focus on professionally developing their preparers. Prior organizational behavior research (see for an overview Hagen, 2012) and limited audit work (Westermann et al., 2015) provided initial evidence that organizations can encourage supervisors to invest time in coaching through creating a supportive culture for coaching. Westermann et al. (2015) for instance reported partners' views emphasizing that coaching is often not prioritized over other competing demands on a supervisors' time. The authors highlighted that firms could encourage reviewers to recognize the long-term value of effective coaching through formally rewarding effective coaching (Westermann et al., 2015). Hence, further studies which take the organizational context into account will need to be undertaken. Furthermore, future research needs to explore both the determinants of coaching and their impact on desired subordinate outcomes (such as learning and performance improvement) in the same research model. Until now, existing studies on supervisory coaching examined either the determinants of effective coaching or its outcomes. Regarding the effect of coaching on subordinates' outcomes, Andiola et al.'s (2014) review study for instance provides strong evidence that when supervisors' feedback is considered valid and useful, subordinates have greater intentions to use the feedback for subsequent performance improvements. Taking this finding into account, it is suggested that exploring the missing link between determinants of coaching, supervisors' coaching behaviors, and outcomes of coaching is essential to gain a deeper understanding on how effective coaching can be enhanced during audit engagements.

Exploring how supervisors' attitudes towards coaching and subsequent behaviors are shaped

Future research is recommended to explore how supervisors' attitudes towards coaching and subsequent behaviors are shaped. The results of the present dissertation suggest that audit firms play a dominant role in creating skilled audit supervisors who are capable of providing effective coaching that enhances subordinates' learning and development. A relevant next step would be to explore how supervisors' coaching behaviors are shaped by their own coaching experiences as subordinate auditors.

Initial audit research and managerial research found evidence that supervisors' attitudes towards coaching and subsequent behaviors are appropriately shaped by their own coaching experiences as subordinate auditors (Andiola et al., 2019; Steelman & Wolfeld, 2018). Steelman and Wolfeld (2018) for instance, showed a direct positive association between a managers' feedback orientation and a subordinate's feedback orientation. It is argued that over time subordinates might come to mirror the characteristics of their supervisor (Steelman & Wolfeld, 2018). In a similar vein, Andiola et al. (2019) assumed

that positive coaching experiences might encourage a "do onto others what was done onto me" mentality causing a positive socialization of subordinates as they move up in the hierarchy. By contrast, negative coaching experiences might encourage subordinates to mirror the ineffective coaching behaviors of their supervisor (Andiola et al., 2019). This assumption elicits the question of whether and how subordinates over time might come to mirror (in) effective behaviors of their supervisors. Until now, there is limited empirical evidence available of whether (in)effective coaching behaviors by supervisors lead to the socialization of subordinates and thus is an important area for future research to consider. Researchers are encouraged to conduct longitudinal studies to develop a full picture of how this process might unfold over time. Exploring how supervisors' attitudes towards coaching and subsequent behaviors are shaped will provide audit firms with essential information on how to facilitate effective coaching during audit engagements.

6.5 Implications for practice outline

The research in this dissertation was conducted within and in close collaboration with the audit profession; consequently, implications for practice are formulated with this specific context in mind. Based on the obtained results throughout this dissertation, implications have been formulated for individuals (e.g., preparers), supervisors (e.g., reviewers), and audit firms. It needs to be noticed that these three levels are nested in each other. Accordingly, fostering auditors' professional development is dependent on conditions created at higher levels.

Individual-level implications

In the present dissertation, engagement in learning from error activities has been studied at the individual level. An important observation in this dissertation is that professionals' engagement in learning activities does not automatically follow from erring: two important conditions must be met. First, individuals benefit from a work environment where errors are viewed as likely to occur and where learning from errors is expected, valued, and rewarded. Subordinate individuals have limited influence on the learning climate (Putz et al., 2013). As a result, learning from errors is nested in the broader learning environment of the firm. Second, auditors need sufficient opportunities for learning and development, such as timely feedback that sheds light on what needs to be improved, as well as explanatory feedback that provides them with specific information on how and why the current task performance deviates from desired goals and/ or standards (Govaerts et al., 2013; Mulder, 2013). In addition, auditors – especially in their early career years - require supervisors who make the effort to be physically present at the client location, regularly for effective and timely face-to-face coaching. Our findings suggest that subordinate auditors can influence the opportunities they receive for learning and

professional development to a certain extent (1) by actively asking for coaching and guidance, and (2) by initiating a discussion early on in the engagement to express their wish to recur in the next years' engagement.

Supervisor-level implications

In this dissertation, the role of direct supervisors in enhancing auditors' learning and professional development has been underlined. In light of this vital role, several practical implications have been formulated for direct supervisors who want to foster professionals' learning (from errors) and further their professional development. One of our main findings is that supervisors can directly impact how safe their subordinates feel to engage in learning activities, such as seeking help from their supervisor. To create a psychologically safe work environment, supervisors need to role model certain behaviors, such as showing fallibility and framing errors as learning opportunities. Supervisors need to make sure that they enact these behaviors consistently, otherwise, subordinates are less likely to believe that their errors are worthy of reflective thinking and analysis (Cha & Edmondson, 2006; Tucker & Edmondson, 2003). Besides creating psychological safety, our findings emphasized that supervisors need to actively create opportunities for learning through providing timely and explanatory feedback. This requires that supervisors develop knowledge and competences on how to provide effective feedback. In addition, supervisors need to evaluate the quality of their feedback to verify whether their feedback can actually contribute to learning and development. Supervisors can do this by requesting feedback from their subordinates on their supervision and coaching, and evaluating how their current organization supports them in providing sufficient opportunities for learning and development. This is important because supervisors' developmental opportunities appear to depend on how much supervisors believe their firm values learning on-the-job, including a reflection on the organizations' overall learning goals and the professionals' learning needs (Nägele & Stalder, 2019). More practical implications for supervisors can be derived from findings in our second part of this dissertation, where it was found that supervisors tailor their coaching to perceptions of their preparer involving preparers' competence and openness to coaching and guidance. Based on this observation, it is suggested that supervising auditors need to reflect on their implicitly held beliefs regarding preparers' attributes since these perceptions might not be accurate. Moreover, supervisors need to encourage their preparers to proactively ask for coaching when needed and to develop an openness to feedback.

Firm-level implications

Firms possess a number of tools that can support supervising auditors in their coaching role, and facilitate subordinate auditors' learning and professional development. First, firms can actively shape a supportive learning from error climate through introducing regular meetings in which professionals share errors and jointly analyze and reflect

upon errors (Grohnert et al., 2017; Zhao et al., 2018), and by providing time for (guided) reflection (Rodriguez & Griffin, 2009). Second, firms can create conditions that enable supervising auditors to provide their subordinates with adequate opportunities for learning and development on-the-job by equipping auditors in a supervisory function with all the required competences necessary to provide effective coaching during the audit engagement (Hagen, 2012). Firms can achieve this goal through organizing formal coaching training where supervisors learn about effective coaching practices tailored to the context of audit reviews, and focusing on providing timely and explanatory feedback, the significance of serving as a positive role model for effective coaching, and the implications of tailoring their coaching efforts to preparers' attributes (e.g., perceptions of quality of work and preparers' likelihood to recur) (Milner et al., 2018). In addition, firms also need to design continuous feedback systems for supervisors such that their coaching skills and knowledge can be fostered on-the-job, e.g., through mentor systems where skilled supervisors help less experienced supervisors in developing their coaching and feedback skills, setting learning goals, and tracking progress (Milner, 2020; Steelman & Wolfeld, 2018). This formal support is best nested in a supportive culture for learning so that supervisors are motivated to consistently engage in coaching (Hagen, 2012; Turner & Mccarthy, 2015). As suggested by Westermann et al. (2015), this requires firms to formally reward effective coaching and communicate clear expectations, such that auditors perceive it as "the norm" to schedule time for coaching to enhance subordinates' professional development. Moreover, firms could express their priority for exerting effort on coaching subordinates by allocating adequate learning resources (e.g., space and time). One last remark that needs to be made relates to Westermann et al.'s (2015) suggestion that enhancing the professional development of auditors requires a commitment of the preparer, personal commitment of the supervisors, and the commitment of the firm to provide a context in which the process of coaching can function effectively. The results of this dissertation support this notion for shared responsibility across these three levels for enhancing professionals' learning and development during audit engagements.

6.6 Conclusion

How can professionals be enabled to learn and further their professional development continuously, and when do supervisors invest in professionally developing their less experienced colleagues through coaching? This dissertation took an interdisciplinary and multi-method approach to address this research question and studied both the perspective of subordinates and supervisors. Four studies provide evidence for the vital role that direct supervisors play in enhancing auditors' learning (from error) and professional development by fostering a supportive and psychologically safe work environment, where errors are viewed as likely to occur and learning from errors is

expected, valued, and rewarded. The findings show that reviewers do not consistently provide their preparers with opportunities for learning and professional development on audit engagements: reviewers' characteristics such as feedback orientation, contextual factors, and reviewers' expectations about the preparer influenced preparers' chances of receiving opportunities for coaching. Firms play an essential role in facilitating effective coaching on audit engagements where preparers receive equal opportunities for learning and development: they can create the optimal conditions for promoting individual professionals' learning (from errors) by supporting both subordinates and supervisors. In conclusion, enhancing auditors' professional development can be considered a shared responsibility of subordinates, supervisors, and the firm alike; it requires commitment from all three levels.

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CHAPTER 7

Valorization Addendum

7.1 Social relevance

In the past decade, the professional development of auditors became an increasingly important topic on the strategic agenda of the audit sector. The audit profession recognized that to attain a sustainable improvement in audit performance and to continuously meet society's expectations, investments in continuous learning and development activities for audit professionals must be made. Even though professional development is an increasingly important topic on the strategic agenda of audit practice, this particular topic has received limited attention in research.

Accordingly, the research presented in this dissertation was designed with the explicit purpose of providing audit firms with a deeper understanding of how to foster auditors' professional development and how to promote effective coaching of less experienced auditors during audit engagements. Throughout this dissertation, professional development has been described as the acquisition of new knowledge and skills obtained through day-to-day experiences at work (Wallin et al., 2020). Enabling audit professionals to continuously learn (from errors) and further their professional development allows them to keep up with the increasing speed of changes within the audit context that are driven by a growing complexity of processes and systems, and continuous regulatory and technological changes (Andiola et al., 2021; Westermann et al., 2015). The results of the presented studies in this dissertation can aid audit firms in providing meaningful support to less experienced auditors, as well as to supervising auditors such that they can consistently engage in effective coaching during the audit review process. Subsequently, the empirical findings presented in this dissertation are not only academically valuable, they are also meaningful for the audit profession and society alike. This valorization addendum elaborates on how the obtained findings can be used by audit firms that are interested in promoting their employees' professional development. Moreover, it discusses the valorization activities undertaken as part of this PhD project.

7.2 Translating empirical findings of this dissertation to the audit profession

The present research identifies drivers of auditors' professional development at three different levels: the audit firm level, the direct supervisor level (e.g., reviewers), and the individual level (e.g., preparers). Regarding the *firm level*, chapter 3 demonstrated that firms play an essential role in designing a supportive learning (from error) climate, where errors are viewed as likely to occur, and learning from errors is expected, valued, and rewarded. Firms can actively create such a work environment by rewarding the reporting of an error, by role modelling successful learning from errors, and by organizing regular meetings

for all members where error knowledge is shared (Grohnert et al., 2019; Putz et al., 2013). Besides creating a supportive learning (from error) climate, chapters 2, 4, and 5 highlight that firms also need to create conditions that enable supervising auditors to effectively coach their subordinates on audit engagements. This includes the allocation of sufficient time for review and coaching, the creation of a formal reward system for coaching during the audit review, and the design of continuous feedback systems for supervisors, such that their coaching skills can be developed on-the-job. More specifically, our experimental findings in chapter 5 suggest that preparers who are unlikely to recur on the engagement, particularly those with a low-performance reputation, potentially miss opportunities for future professional development during the audit review process. Since these factors are not under the direct control of the preparer, conditions for receiving effective coaching have to be created by firms through the way in which engagement teams are composed. In this composition process, practical concerns have to be balanced with opportunities for learning and performance through keeping team members together versus varying team membership. In the healthcare setting, Valentine and Edmondson (2015) found that grouping healthcare workers into larger pods from which temporary teams are formed improved team performance due to increased familiarity with team members over time, combined with a range of different experiences by pod members. A similar approach might be beneficial for audit offices as well.

At the *direct supervisor level*, chapters 2, 4, and 5 showed that professionals' learning and development can be fostered through creating a psychologically safe work environment, along with the provision of timely and explanatory feedback. Supervisors can create a psychologically safe climate through demonstrating fallibility, by framing errors as valuable learning opportunities, exhibiting openness, and by physical presence. Moreover, chapters 4 and 5 revealed that subordinates' attributes are central to supervisors' intention to provide effective coaching. These perceived attributes may not be accurate (i.e., expected versus actual quality of work), or may not be under the preparer's control (i.e., recurrence and workload), so that some preparers seem to be unfairly disadvantaged in their professional learning and development. To avoid the tendency of tailoring coaching efforts to perceptions of subordinates' attributes, supervisors are encouraged to reflect on their implicitly held beliefs regarding subordinates' attributes, as these perceptions might not be accurate. In addition, supervisors should explicitly encourage their preparers to proactively seek feedback and guidance, ask for coaching when needed, and develop an openness to feedback.

At the individual level, chapters 4 and 5 imply that professionals who aspire to learn and develop on audit engagements can actively influence the extent to which they receive coaching opportunities by proactively asking for coaching and guidance and by initiating

a discussion early on in the engagement to express their wish to recur in the next year's engagement.

Finally, based on the empirical findings obtained throughout this dissertation, it is emphasized that all three levels need to become aware that enhancing auditors' professional development as an avenue towards sustainable performance improvement is a shared responsibility: it requires commitment from subordinates, supervisors, and the firm alike.

7.3 Current valorization activities in auditing

The research presented in this dissertation was conducted in the audit context. Measurement instruments (e.g., for chapter 5) were developed in close collaboration with one Big 4 firm to assure the validity and significance of the results for practice. Throughout this PhD trajectory, results have been shared with the participating firm and with audit professionals working at a variety of firms (particularly those in the first three years of their career). Regarding chapter 2, a tailored workshop was designed for audit staff based on the main findings obtained in interviews. The participants attended this workshop as part of their audit certification programme at the VU Amsterdam and the University of Amsterdam. This workshop focused on how audit professionals can be enabled to learn from their errors and facilitated an active discussion among audit staff on how they believe that their organizations and direct supervisors can foster or hinder their learning (from errors) and professional development.

Furthermore, chapters 2 and 4 can be considered as valorization activities at an individual level. In chapter 2, interviews were conducted with 23 audit professionals across all ranks from different audit firms. At the end of each interview, the participants often reflected on the main insights they gained themselves during the interview. Participants frequently mentioned that the interview made them more aware of what they need from their organization and direct supervisors to learn and develop their knowledge and skills continuously. In chapter 4, interviews were conducted with 15 auditors in a supervising role. After the interview, many participants indicated that describing recent examples of effective and ineffective coaching on-the-job made them more aware of what they consider as effective coaching in the review process, and what factors foster or inhibit them from engaging in effective coaching. Moreover, participants mentioned that reflecting on their way of supervision and coaching in the review process made them more aware of their firm's role in creating the right conditions for effective coaching.

With regard to chapter 5, the experimental design and associated measures were developed in collaboration with the participating Big 4 firm. One of the main purposes of the participating firm is to become a purpose-led and values-driven organization while improving audit quality. The firm considers professional development as one of the key levers for audit quality. Accordingly, the firm's motivation to collaborate and participate in our experimental study was driven by a need to gain insights into how to optimize the use of the review process as a key tool for professional development. Particularly, the firm aimed at advancing their understanding of when supervising auditors invest in professionally developing their subordinates, and on how to foster the provision of effective coaching and feedback in the audit review process. Our experimental study was part of the firms' annual training program in the summer of 2020. It was agreed with the collaborating firm that in exchange for participating in our study, individual participants (e.g., reviewers) would be provided with real-time feedback regarding their feedback orientation, learning mindset, and how they provided feedback to the preparer. Participants were encouraged to download their personal scores and associated feedback as a PDF file and to use this as an input for reflection during a workshop in the annual training program. Moreover, as agreed with the firm, a video was recorded in which we shared and elaborated on our empirical findings regarding the determinants that drive reviewers to professionally develop their preparers. All participants in the training program gained access to this video. The video served as an input for a constructive conversation on how effective coaching during audit engagements can be fostered. Furthermore, we provided the firm with a detailed report including our main empirical findings and recommendations of how the firm can continue its existing efforts in fostering a learning culture where supervising auditors are supported in providing effective developmental opportunities and subordinates receive opportunities to reach their full learning potential. Based on this report, the firm has already organized several intervision sessions to raise awareness of how preparer characteristics and reviewers' characteristics affect the extent to which reviewers focus on professional development in their review comments, along with the potential risks for audit quality in the long-term.

Finally, the results of chapters 4 and 5 serve as a starting point for future research and valorization activities. The firms' next aim is to share and translate our empirical results acquired on a national level to an international level. The purpose is to globally raise awareness on how audit firms can create the optimal conditions for effective coaching during audit engagements, such that audit professionals can achieve their full learning potential, and audit quality can be improved.

7.4 Conclusion

In conclusion, the research presented in this dissertation has been designed with the specific purpose of informing practice and has been carried out in close collaboration with the audit profession. Focusing on identifying enablers for professionals' learning and development on audit engagements has resulted in new insights into how audit firms can actively enable both less experienced auditors and supervising auditors to facilitate employees' professional development. From developing workshops to sharing and discussing findings through a business report and videos, the research presented in this dissertation has been valorized for audit practice.

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Appendices

Appendices

Research instruments
About the author
List of publications and valorization activities

Appendix I
Semi-structured interview script used in chapter 2

Introduction

My goal in this interview study is to better understand auditors' professionalism and which factors contribute to how they manage errors at work. This interview will last approximately one hour. Do you agree to me recording this interview in order to transcribe and analyze the data later on? All information you provide will be handled anonymously, please do not mention names of colleagues, clients, and/ or your firm during the interview. Do you have any questions before we start with the interview?

Part 1: Describing a recent error experience

Opening question: First, I would like to ask you what makes your daily job challenging? *(Since our interviews involve a sensitive topic, we decided to open the interview with a general question to build rapport first.)*

Due to the increasing pressure from regulators, and legislation, situations may arise in which you realize afterwards that something has not gone quite right. I would like to ask you to think back to a specific situation (that occurred in the past three months) during the audit process, in which something went wrong during the execution of your work for which you were responsible yourself. Consider a situation in which the audit procedures were carried out properly, but were found to be insufficient to rely on. Please describe a situation in which you were convinced that you were doing the right thing. However, during the review process, your direct supervisor provided you with negative feedback (e.g., an unintended deviation between the current state and the goal) and that you have not been able to achieve the desired result. How would you describe this experience?

- *Detection of error:* How did you discover that something went wrong during the audit process (detected by direct supervisor, yourself, the system)
- *Causes of the error:* What were the causes of this error? Why do you think that this happened?
- *Consequences of errors:* What were the consequences of the error that you just described?
- *Other information?*

Part 2: Dealing with the error experience and engagement in learning activities

- *Emotions*: Can you describe how you reacted after discovery of your error? What thoughts did you have?

- *Engagement in learning activities:* What have you done to prevent the same error from occurring?

Part 3: The role of the supervisor in the error-related learning process

- *Perception of psychological safety*: How did your supervisor react to your error? How does this affect you? How safe do you feel to talk openly with your supervisor about your error experience?
- *Creating psychological safety*: In your supervisor position, how do you ensure that supervisees feel safe to approach you for feedback, help and support after they made an error?
- *Role supervisor in professionals' engagement in learning activities*: What was the role of your supervisor in preventing the same error from occurring?
- *Supervisor role in inhibiting professionals' learning from errors and professional development*: How would you have been helped better to prevent the same error from occurring again? What advice would you like to give to your direct supervisor?
- *Supervisor role in facilitating professionals' learning from errors and professional development:* What would you need from your supervisor to further improve the quality of your work and to prevent the same error from occurring? In your supervisor position, what have you done to ensure that professionals do not make the same error again?
- *Other behaviors or processes?*

Appendix II
Questionnaire used in chapter 3

Instructions for participants

Dear participant,

To advance our understanding on how professionals deal with their own errors, we would like to ask you to recall situations in your day-to-day work when errors are likely to occur. When we use the term error or mistake, we refer to any action that deviates from your intended goal. Actions can fail to achieve their goal when they go as planned, but the plan itself is poor. Think of a surgeon who plans to operate the left knee and the operation went well, except for the fact that it was the wrong knee.

Please describe a situation in which you made an error during your own audit work, within the last three months.

You might, for example, consider a situation in which you thought you performed a certain audit procedure adequately (according to the standards), but during the review process your immediate supervisor pointed you to a certain error you have made during your work.

You could think of the following categories of errors typically made:

- Not employing the appropriate audit procedure
- Gathering insufficient audit evidence
- Relying on inappropriate audit evidence
- Unjustified reliance on checks or internal controls of the client
- Inaccurate assessment of the scope of the audit
- Incomplete documentation of audit work

When describing this error experience please provide details on when the error was noticed (e.g., immediately, one week later, one month later), by who it was noticed and what the consequences were of this error situation.

Make sure that you do not mention the name of the client, people with who you work together or the name of the firm you work for.

Questionnaire scales & Items

Engagement in Social Learning Activities (ESLA scale, Bauer & Mulder, 2013)

Thinking back about the error experience that you described before, the following questions explore what you and your colleagues do to prevent this error from occurring again.

Each question describes a strategy, and we ask you to evaluate how likely it is that you would apply each strategy. Please respond as if you had just experienced the error you described earlier. Remember: indicate how likely you are to use each strategy; not how desirable others may consider this strategy.

- Discuss with colleagues why I made this error.
- Discuss with colleagues whether there are gaps in my competence.
- Discuss the error with colleagues, so the error will not happen again.
- Discuss with colleagues what my part was in this error.
- Discuss with colleagues whether something in our cooperation contributed to letting the error happen.
- Discuss with colleagues what led to this error.
- Discuss with colleagues whether something was wrong with the communication of the client.
- Make agreements about new standards and guidelines in a team meeting
- Ask experienced team members what they would have done in my place.
- Initiating a discussion in a team meeting, how we could prevent similar errors in the future.
- Ask my colleagues what I can do differently, next time.
- Discuss new guidelines with my supervisor.

Organizational Learning from error climate (Putz et al., 2013)

Supervisor Behavior

- Our supervisor informs his/her team about consequences that may result from errors in subsequent work processes.
- Employees can talk to our supervisor about things that went wrong frankly, without suspecting any negative consequences.
- Our supervisor praises his/her employees when they share their experiences in dealing with errors.
- When someone in our team has made a mistake, our supervisor helps him/her to correct it.

Colleague Behavior

- In our team, employees call each other's attention to consequences errors can have on their work and the work results of co-workers.
- When someone in our group makes a mistake, other co-workers will help him/her to fix it.
- In our team, co-workers readily accept hints about how to avoid or correct errors.

Procedures and Tasks

- In our team, there are regular meetings during which employees can also share their experiences in handling mistakes.
- Employees in our team are in a position to realize for themselves when they have done something wrong.
- In our team, employees are trained about how to deal with stress and fear arising from errors at work.
- Employees in our team know how to get the information they need to correct errors.

Principles and Values

- People in our organization value open discussions about things that have gone wrong in day-to-day work.
- People in our organization believe that errors at work can be a helpful part of the learning process.
- When something goes wrong in our organization, emphasis is put on determining the cause.
- Everybody in our organization is expected to consider what and how other co-workers can also learn from his/her mistakes.

Error Orientation Questionnaire (Rybowiak et al., 1999)

Error strain

- I find it stressful when I err.
- I am often afraid of making mistakes.
- I feel embarrassed when I make an error.
- If I make a mistake at work, I `lose my cool' and become angry.
- While working I am concerned that I could do something wrong.

Reflecting on errors

- After I have made a mistake, I think about how it came about
- I often think: `How could I have prevented this?
- If something goes wrong at work, I think it over carefully
- After a mistake has happened, I think long and hard about how to correct it
- When a mistake occurs, I analyze it thoroughly

Control variables

Self-reflection **(**Grant et al. (2002) scale)

- I don't often think about my thoughts.
- I am really interested in analyzing my behavior.
- I rarely spend time in self-reflection.
- It is important for me to evaluate the things that I do.
- I frequently examine my feelings.
- I am very interested in examining what I think about.
- I don't really think about why I behave in the way that I do.
- It is important to me to try to understand what my feelings mean.
- I frequently take time to reflect on my thoughts.
- I have a definite need to understand the way my mind works.
- I often think about the way I feel about things.
- It is important to me to be able to understand how my thoughts arise.

Demographics

- Please indicate your gender (male/female)
- How many months have you been performing audit tasks?
- Are you employed at a Big4 firm? (yes/no)

Appendix III
Semi-structured interview script used in chapter 4

Introduction

Our goal in this interview study is to gain insights into what reviewers consider to be effective coaching in the audit review process and when they decide to invest time on coaching preparers. This interview will last approximately one hour. Do you agree to me recording this interview in order to transcribe and analyze the data later on? All information you provide will be handled anonymously, please do not mention names of colleagues, clients, and/ or your firm during the interview. Do you have any questions before we start with the interview?

Part 1: Describing recent review experiences

Opening question: First, I would like to ask you to think back to a recent coaching experience as part of the review process, that you consider as an effective example. Choose an example where you were satisfied with the coaching you provided and where you believed that it contributed to a preparers' professional development.

- *Context audit review*: Can you describe the context of the review? How many review layers were involved in this example?
- *Quality of review*: Why did you choose this example? What made your coaching (in)effective in the audit review process? What makes you think that your coaching contributed to the preparer's professional development? What characterizes (in) effective coaching in the audit review process? How do you ensure that you effectively contribute to the professional development of preparers?

After describing an effective example of coaching, I would like to ask you to think back to a recent coaching experience that you consider as an ineffective example. How would you describe this example?

Part 2: factors that drive or impair reviewers to engage in effective coaching

Which factors played a role in the effective/ineffective examples of coaching you described? What factors enabled you (in the case of the described effective coaching example) to effectively coach the preparer? What factors impaired you (in the case of the described ineffective coaching example) to effectively coach the preparer?

- *Reviewer characteristics:* How would you describe your general supervision style when coaching preparers? How important is it for you to effectively coach preparers in the audit review process? What motivates you to spend time on coaching preparers?
- *Preparer attributes:* What is your general impression of the preparer in the described

- example? How did this impression affect your engagement in coaching the preparer?
- *Contextual factors:* What role did workload and time available play in the examples that you described? What was the role of the priority given to coaching in your firm? What other factors affected your decision to invest in coaching the preparer?

Part 3: Firm level support for effective coaching

What would you need, in your reviewer role, from your firm to effectively contribute to the professional development of preparers?

Appendix VI
Variable definitions chapter 5

Variable Name	Variable definition
REV_EXP	Participants' general experience with reviewing workpapers measured in years
PREP_EXP	Measuring whether participants have experience in performing inventory counts as a preparer (PREP_EXP, coded as 1= yes and no= 0).
SPEC_EXP	Measuring whether participants have specific experience reviewing papers concerning inventory counts (SPEC_ EXP, coded as 1= yea and no= 0).
RECUR	Manipulated by noting that the preparer was either likely or unlikely to stay on the engagement next year.
REPUT	Manipulated as high-performance reputation (the preparer was meeting the performance expectations for their function level and would be promoted to senior soon) or low-performance reputation (the preparer was not yet ready to be promoted and needed to work on meeting the performance expectations for the next function level).
FB_ORIENT	We measured reviewers' feedback orientation through Linderbaum and Levy's (2010) 20-item validated scale.
FAM_INV	Participants' self-rated familiarity with audit standards on inventory counts. Responses were given on a scale ranging from 0 (not familiar at all) to 10 (perfectly familiar).
PERCEIVED_PROFDEV	We measured perceptions of professionally developing one's preparer through participants' responses on a composite scale consisting of six questions based on Zhou's (2003) developmental feedback scale and Heslin et al.'s (2006) employee coaching scale.
OBSERVED_PROFDEV	We measured observed focus on professionally developing preparers as the sum of causation words, insight words, future-oriented words, and question marks in reviewers' feedback comments, all in percent.

Appendix V
Case used to measure reviewers' focus on professionally developing preparers in chapter 5

Zapatos BV

Zapatos BV is a Dutch web shop for shoes and accessories. The company is based in Amsterdam and sells directly to consumers in The Netherlands. The company was founded in 2008, has a turnover of approximately € 59 million - representing an average of more than 3000 pairs of shoes a day - and employs a total of 90 people.

In the past years, your firm PwC has performed the statutory audit of Zapatos. This year, PwC has been hired again. Your firm has a good and professional relationship with Zapatos. From prior year statutory audits, you have no indication of an aggressive reputation with respect to profit management. The prior audits also indicated that the internal controls of Zapatos are of a high maturity level.

The Warehousing Process at Zapatos

Zapatos has one warehouse in Rotterdam where all inventory is stored. This warehouse can be described as well-organized. The goods have a fixed place on racks and shelves. The goods that are sold more often are in the most accessible place and goods that are used less frequently are placed further away. The warehouse is set up in such a way that an outsider can effortlessly find all goods. The warehouse also looks neat and clean.

Once a year, Zapatos performs a year-end inventory count, which usually takes place on December 31st. Zapatos has a strict procedure for this year-end inventory count. It is a structured step-by-step plan, in which, for example, counters receive detailed written instructions aimed at counting each item specifically instead of making an estimation. Zapatos' management provides these detailed written instructions to counters and reviews the instructions together with all counters prior to the year-end inventory count.

Zapatos 2019 Audit

In the morning of December 31st, 2019, Zapatos performed their year-end comprehensive inventory count. Your engagement team members were present and observed this count. In the afternoon of the same day, your team members performed a year-end inventory count at Zapatos themselves (e.g., sheet to floor and floor to sheet). Please note that the inventory count instructions have been reviewed by the engagement team, not matters were noted.

Today is February 18th, 2020, and the auditor's report is due to be issued on February 28th. Some review work is still pending.

Instructions to reviewers

Your current task is to review the work of Associate Dominique and to provide review comments.

Dominique is a new team member on this audit engagement. Dominique has been working at the firm for almost two years, and this is the first time you work with Dominique.

Please take a look at the following workpaper in order to review Dominique's work with respect to the audit of Zapatos' inventory. For your convenience, we only provide those parts of the workpaper that are relevant for this task. Please perform the review as you would in your current role at your firm.

For completing your review, please take the following points into account:

- The work paper is divided into several parts;
- For each part of the work paper, you can indicate issues (e.g., places you would like to comment on) by clicking on that part of the documentation. A red dot will appear (to remove a dot, click on it again);
- If you would like to adjust the documentation or share your review comments, please do so in the text box provided below each part. If you do not have comments, leave this box empty;
- After reviewing the work paper, you can provide Dominique with overall feedback.

Appendix VI
Questionnaire used in chapter 5

Questionnaire scales & Items

Reviewers' perceptions of professionally developing one's preparer in review comments

(composite scale based on Zhou's (2003) developmental feedback scale and Heslin et al.'s (2006) employee coaching scale)

Based on the feedback comments you provided for Dominique, to what extent do you agree with the following statements?

- I provided feedback that focused on helping the preparer to learn and improve.
- I provided guidance to the preparer regarding performance expectations.
- I helped the preparer to analyze task performance.
- I provided useful information to the preparer on how to improve job performance.
- I provided constructive feedback to the preparer regarding areas for improvement.
- I offered useful suggestions to the preparer on how to improve performance.

Reviewers' feedback orientation

To what extent do the following statements apply to yourself during your daily work?

- Feedback contributes to my success at work.
- To develop my skills at work I rely on feedback.
- Feedback is critical for improving performance
- Feedback from supervisors can help me advance in a company
- I find that feedback is critical for reaching my goals
- It is my responsibility to apply feedback to improve my performance.
- I hold myself accountable to respond to feedback appropriately.
- I don't a sense of closure until I respond to feedback.
- If my supervisor gives me feedback, it is my responsibility to respond to it.
- I feel obligated to make changes based on feedback.
- I try to be aware of what other people think of me.
- Using feedback, I am more aware of what people think of me.
- Feedback helps me manage the impression I make on others
- Feedback lets me know how I am perceived by others
- I rely on feedback to help me make a good impression
- I feel self-assured when dealing with feedback.
- Compared to others, I am more competent at handling feedback

- I believe that I have the ability to deal with feedback effectively
- I feel confident when responding to both positive and negative feedback.
- I know that I can handle the feedback that I receive.

Demographics & Amount of Experience

- Please indicate your gender (male/female)
- How many years have you been performing audit tasks?
- How many years have you been performing work paper reviews?
- How familiar are you with audit standards on inventory counts?
- Have you performed a work paper review with respect to an inventory count at some point during your career? (No/ Yes)
- Have you performed an inventory count yourself at some point during your career? (No/ yes)

Manipulation checks

- As far as you know, how well did Dominique perform on prior audit tasks, in percent?
- How well did Dominique perform on this specific audit task, in percent?
- How would you rate Dominique's quality of work compared to others of similar experience in your daily practice, in percent?
- How likely do you believe it is that you would work again with Dominique in the future, in percent?

Appendix VII
About the author

In 2013, Laura Smeets graduated with a BSc. Psychology and Neuroscience from the Faculty of Psychology and Neuroscience at Maastricht University. Subsequently, Laura obtained her Master's degree in Work and Organizational Psychology from the Faculty of Psychology and Neuroscience at Maastricht University in 2015.

After graduation, Laura gained work experience as a recruiter at a temporary employment agency, and as a career counsellor at an insurance company. In December 2016, Laura started her PhD trajectory on workplace learning and professional development at the school of Business and Economics, Maastricht University. In 2019, Laura had the opportunity to spend three months with prof. Ganesh Krishnamoorthy at Northeastern University in Boston.

Next to pursuing her research, Laura has served in several teaching roles: course coordinator and tutor in the course Cognition, Learning & Human Performance, reviewer of writing assignments in the course Theories and Models of Learning, coach in the Study Coach Trajectory of the Master Learning and Development in Organizations, and thesis supervisor in the Master Learning and Development in Organizations. Besides, she has served the role of competence coach in the Premium Honours Program offered at Maastricht University.

Starting in September 2020, Laura works as a student counsellor at University College Maastricht, being a contact person for students in case of study-related problems and personal issues.

Appendix VIII
List of publications and valorization activities

Peer-reviewed journal articles

Smeets, L. H., Gijselaers, W. H., Meuwissen, R. H. G., & Grohnert, T. (2021). Beyond psychological safety – the role of direct supervisor behavior in fostering learning from errors at the workplace. *Vocations and Learning14(3*), 533-558. https://doi.org/10.1007/s12186-021-09272-6

In progress

Smeets, L. H., Gijselaers, W. H., Meuwissen, R. H. G., & Grohnert, T. (under review). Exploring the link between learning from error climate and professionals' engagement in social learning activities after errors. *Baltic Journal of Management*.

Smeets, L. H., Gijselaers, W. H., Grohnert, T., & Meuwissen, R. H. G. (under review). When do reviewers invest in coaching preparers during the audit review process? *Auditing: A Journal of Practice & Theory*

Peer-reviewed conference presentations

Smeets, L. H., Gijselaers, W. H., Meuwissen, R. H. G., & Grohnert, T. (2019*). Pain in present gain in future: How professionals learn from self-made errors*. Paper presented at the EARLI SIG 14 Conference, August 12-16, Aachen, Germany.

Smeets, L. H., Gijselaers, W. H., Meuwissen, R. H. G., & Grohnert, T. (2020). *Beyond a positive error climate- the role of supervisor behavior in the wider organizational context*. Paper was accepted for the Annual Meeting of the American Educational Research Association, April 17-21, San Francisco, USA.

Smeets, L. H., Gijselaers, W. H., Meuwissen, R. H. G., & Grohnert, T. (2020). *Good thing, bad thing: how do negative emotions encourage young professionals' learning from errors?* Paper was accepted for the Annual Meeting of the American Educational Research Association, April 17-21, San Francisco, USA.

Valorization activities related to this dissertation

Smeets, L.H. (2021). *The power of failure. How to get up and keep going?* Workshop for students at Maastricht University (EDLAB), 09-11-2021.

Smeets, L. H., Grohnert, T., Gijselaers, W. H., & Meuwissen, R. H. G. (2021). *When do reviewers professionally develop their coachees?* Report for auditors of a Big 4 firm, Amsterdam, The Netherlands, 20-03-2021.

Smeets, L. H., & Grohnert, T. (2020). *The review process in audit quality: When do reviewers invest in professional development?* Video presentation for auditors of a Big 4 firm, Amsterdam, The Netherlands, 26-06-2020.

Smeets, L.H. (2019). *When do errors become your best friends?* Faculty Science Slam at Maastricht University, 14-06-2019, Second place.

Smeets, L.H. (2018). *Pain in present gain in future: How professionals learn from self-made errors*. Colloquium for the Graduate School of Business and Economics, Maastricht University, 28-11-2018.

Smeets, L.H. (2018). *Critical incidents at work*. Workshop for staff auditors at the Vrije Universiteit (VU), Amsterdam, 16-11-2018.

Smeets, L.H. (2018). *Critical incidents at work*. Workshop for staff auditors at the University of Amsterdam (UvA), Amsterdam, 07-12-2018.

Appendix IX
ICO Dissertation series

In the ICO Dissertation Series dissertations are published of graduate students from faculties and institutes on educational research within the ICO Partner Universities: Eindhoven University of Technology, Leiden University, Maastricht University, Open University of the Netherlands, Radboud University Nijmegen, University of Amsterdam, University of Antwerp, University of Ghent, University of Groningen, University of Twente, Utrecht University, Vrije Universiteit Amsterdam, and Wageningen University, and formerly Tilburg University (until 2002). The University of Groningen, and the Erasmus University Rotterdam have been 'ICO 'Network partner' in 2010 and 2011. From 2012 onwards, these ICO Network partners are full ICO partners, and from that period their dissertations will be added to this dissertation series.

398. De Vetten, A.J. (21-11-2018) *From sample to population*. Amsterdam: Vrije Universiteit Amsterdam.
399. Nederhand M.L. (22-11-2018) *Improving Calibration Accuracy Through Performance Feedback*. Rotterdam: Erasmus University Rotterdam.
400. Kippers, W.B. (28-11-2018) *Formative data use in schools. Unraveling the process*. Enschede: University of Twente.
401. Fix, G.M. (20-12-2018) *The football stadium as classroom. Exploring a program for at-risk students in secondary vocational education.* Enschede: University of Twente.
402. Gast, I. (13-12-2018) *Team-Based Professional Development – Possibilities and challenges of collaborative curriculum design in higher education*. Enschede: University of Twente.
403. Wijnen, M. (01-02-2019*) Introduction of problem-based learning at the Erasmus School of Law: Influences on study processes and outcomes*. Rotterdam: Erasmus University Rotterdam
404. Dobbelaer, M.J. (22-02-2019) *The quality and qualities of classroom observation systems*. Enschede: University of Twente
405. Van der Meulen, A.N. (28-02-2019) *Social cognition of children and young adults in context*. Amsterdam: Vrije Universiteit Amsterdam
406. Schep, M. (06-03-2019) *Guidance for guiding. Professionalization of guides in museums of art and history*. Amsterdam: University of Amsterdam
407. Jonker, H.M. (09-04-2019) *Teachers' perceptions of the collaborative design and implementation of flexibility in a blended curriculum*. Amsterdam: University of Amsterdam
408. Wanders, F. H. K. (03-05-2019). *The contribution of schools to societal participation of young adults: The role of teachers, parents, and friends in stimulating societal interest and societal involvement during adolescence*. Amsterdam: University of Amsterdam
409. Schrijvers, M.S.T. (03-05-2019) *The story, the self, the other. Developing insight into human nature in the literature classroom*. Amsterdam: University of Amsterdam

410. Degrande, T. (08-05-2019) *To add or to multiply? An investigation of children's preference for additive or multiplicative relations*. Leuven: KU Leuven.
411. Filius, R.M. (23-05-2019) *Peer feedback to promote deep learning in online education. Unravelling the process.* Utrecht: Utrecht University
412. Woldman, N. (24-05-2019) *Competence development of temporary agency workers*. Wageningen: Wageningen University
413. Donszelman, S. (06-06-2019) *Doeltaal-leertaal didactiek, professionalisering en leereffecten*. Amsterdam: Vrije Universiteit Amsterdam
414. Van Oeveren, C.D.P. (12-06-2019) *ITHAKA gaf je de reis*. Amsterdam: Vrije Universiteit Amsterdam
415. Agricola, B.T. (21-06-2019) *Who's in control? Finding balance in student-teacher interactions*. Utrecht: Utrecht University
416. Cuyvers, K. (28-08-2019), *Unravelling medical specialists self -regulated learning in the clinical environment*. Antwerp: University of Antwerp
417. Vossen, T.E. (04-09-2019*) Research and design in STEM education.* Leiden: Leiden University
418. Van Kampen, E. (05-09-2019) *What's CLIL about bilingual education*? Leiden: Leiden University
419. Henderikx, M.A. (06-09-2019) *Mind the Gap: Unravelling learner success and behaviour in Massive Open Online Courses*. Heerlen: Open University of the Netherlands
420. Liu, M. (13-09-2019) *Exploring culture-related values in Chinese student teachers' professional self-understanding and teaching experiences*. Utrecht: Utrecht University
421. Sun, X. (13-09-2019) *Teacher-student interpersonal relationships in Chinese secondary education classrooms*. Utrecht: Utrecht University
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431. Li, N (08-01-2020) *Analyzing online in-service teacher training courses in China.* Eindhoven: Eindhoven University of Technology
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435. Nugteren, M.L. (12-06-2020) *What do I know and where do I go? The effects of guidance on task selection*. Utrecht: Utrecht University
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438. Dijkema, S. (25-08-2020) R*eady for takeoff? The relation between the type of teacher training program and daily teaching practices of Dutch beginning primary school teachers*. Groningen: University of Groningen
439. Slot, E.M. (11-09-2020) *Characterizing adolescents' interest: understanding multiplicity and dynamics in persons, objects and contexts.* Utrecht: Utrecht University
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441. Van Rijswijk, M.M. (16-10-2020) *Experiences of continuity and discontinuity in student teachers' development.* Utrecht: Utrecht University
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443. Langeloo, A. (17-09-2020) *Multilingual and monolingual children in kindergarten classrooms: Exploring teacher-child interactions and engagement as learning opportunities*. Groningen: University of Groningen
444. Sekeris, E. (06-10-2020) *Unravelling computational estimation development in 5- to 7-year-olds* Leuven: KU Leuven
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455. Boonk, L.M. (04-12-20202) *Exploring, measuring, and evaluating parental involvement in vocational education and training* Heerlen: Open University of the Netherlands
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