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Psychology in management accounting and control research: an overview of the recent literature

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Abstract

For decades, management accounting and control (MAC) researchers have employed a diverse set of source disciplines to predict and examine behavior, and psychology is among the most frequently drawn upon. Although the literature confirms that psychological theories are highly relevant to MAC research, the existing knowledge on this field remains fragmented. Given this background, we examine recent MAC research through a systematic review of the different subfields of psychology to investigate the development of this stream of research. To do so, we collect 125 relevant articles from nine leading accounting journals between 2000 and 2019 and analyze their contents. On this basis, we provide a detailed overview of the use of psychological theories in recent literature and identify links between specific theories and MAC topics. We find that the quantity and proportion of psychology-based MAC research and the diversity of psychology subfields all increase during our investigation period, especially between 2015 and the first half of 2019. Overall, most studies address performance measurement and evaluation topics, and social psychology concepts are the most frequently applied. However, we find considerable differences in the application of psychological theories across different MAC topics. Our review provides insights into the content of this research stream and, thus, serves as a valuable source for researchers seeking an overview of previous investigations drawing on different subfields of psychology.

Keywords Management accounting · Management control · Psychology · Literature review

JEL Classification M41

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1 Introduction

For decades, management accounting and control (MAC) researchers have employed a diverse set of economic theories and sociological or organizational approaches to predict and examine behavior and decision-making (Hesford et al. 2007; Hopper and Bui 2016; Lachmann et al. 2017). Previous literature studies illuminate applications of specific subfields of psychology in MAC research. These studies identify cognitive, motivational, and social psychological theories frequently used in prior research (Birnberg et al. 2007) and examine research analyzing subjective decision-making in MAC contexts (Luft and Shields 2009). Further, a recent study by Kaplan et al. (2018b) discusses four social psychological theories that have been or could be applied to behavioral accounting. Taken together, these studies indicate that psychology is highly relevant to contemporary MAC research and spark further interest in its contents and characteristics. Although the aforementioned studies discuss psychological theories and, especially, the use of social psychology in MAC research, the literature lacks a recent comprehensive review of applications of theories and concepts beyond social psychology in MAC studies. The prior studies are limited to particular psychology subfields or were conducted several years ago, leaving more recently published research unanalyzed. Prior research, therefore, remains fragmented, impeding the aggregation of knowledge on how psychological theories may complement economic or organizational theories in MAC studies and a deeper understanding of how MAC practices influence behavior and decision-making. Recent trends in psychology-based MAC research, such as the application of personality psychology (Holderness et al. 2017; Nichol 2019), make a comprehensive review of this topic especially valuable.

Given this background, we investigate recent MAC research employing theories and concepts from the field of psychology through a systematic literature review. Our review aims to explore the main foci of the use of psychological theories in MAC research and intends to examine the links between psychological theories and certain MAC topics. Our review follows a multistep approach in which every step of the systematic literature review process is based on a synthesis of approved review methods (e.g., Cooper 1984, 1988; Grant and Booth 2009; Booth et al. 2012; Fink 2014; Mayring 2014). We identify the relevant research through a comprehensive, structured material collection process involving the development and establishment of several selection and inclusion criteria. This material collection process identifies 125 relevant articles out of a total of 5247 articles from nine leading accounting journals between 2000 and 2019. All of these articles are subject to in-depth content analysis that identifies the specific research topics, methods, and psychology subfields drawn upon and the psychological constructs and main findings of each relevant research study. Furthermore, we provide a comprehensive synthesis of the topics examined by the relevant studies and aim to present implications for future research.

Regarding recent developments, we confirm the trends indicated by prior studies (e.g., Hesford et al. 2007; Hopper and Bui 2016; Lachmann et al. 2017)

and find that the number and share of psychology-based MAC studies increased over the investigation period, especially between 2015 and the first half of 2019. Additionally, we find that the diversity in psychology subfields increases over the investigation period and that this diversity is especially high between 2015 and the first half of 2019. Both findings indicate a growing interest in employing psychological theories and concepts to foster a better understanding of the consequences and effects of MAC practices on behavior. Regarding MAC topics, most articles examine aspects of performance measurement and evaluation, followed by aspects of compensation, rewards, and incentives and aspects of budgeting. Specifically, subjective performance evaluations and subjective measures (e.g., Kunz 2015; Bol and Leiby 2018), incentive contract framing and compensation contract selection questions (e.g., Tafov 2013; Reichert and Woods 2017), and budgetary slack and honesty in budgeting (e.g., Brown et al. 2014; Blay et al. 2019) are very frequently investigated using psychology-based theoretical perspectives. Further, we find that social psychology is the predominant subfield of psychology applied to MAC research.

Our findings and syntheses contribute to the literature in several ways. We complement and extend existing discussions of psychology-based studies (e.g., Birnberg et al. 2007; Luft and Shields 2009; Kaplan et al. 2018b) by including articles that draw upon theories and concepts from four distinctive subfields of psychology. This includes articles employing theories or concepts from social psychology, cognitive psychology and motivation theory. Furthermore, we significantly extend the scope of prior studies by including articles that draw upon personality psychology, multiple subfields and several smaller subfields. Moreover, we provide a very detailed analysis of the use of psychological theories and concepts in a multitude of MAC subtopics, which allows us to evaluate the developments regarding specific subtopics and topics, as well as psychology-based MAC research as a whole. To our knowledge, this review is the first to systematically collect, analyze, and synthesize such a broad spectrum of psychology-based research from the selected journals to illuminate the characteristics and knowledge generation of this research stream during this time period. Further, our review draws a picture of an evolving research landscape and suggests several future research opportunities, as well as emerging new facets in psychology-based MAC research.

Moreover, our synthesis and contextualization show, there are specific domains, where reactions to implemented MAC practices are significantly affected by psychological aspects. Among others, reactions to, e.g., PME systems, compensation, rewards or incentives benefit from psychology-based explanations of behavioral patterns. For instance, designers of PME systems should be aware that personality traits like psychological entitlement can affect one's behavioral response to performance feedback (Holderness et al. 2017) or that compensation contract selection may be affected by one's need for achievement (Fehrenbacher et al. 2017). Thus, our review advocates the consideration of such aspects, and we provide relevant insights on these mechanisms for academics, practitioners, and designers of MAC practices and systems.

The remaining sections of this review are structured as follows. Section 2 provides a brief overview of predominant psychology subfields in and the history of

psychology-based MAC research, as well as previous studies regarding this research stream. Next, Sect. 3 describes our research methods and explains our systematic collection and review of the relevant research. The categorization process and the coding scheme developed for this purpose are also introduced in Sect. 3. Subsequently, our findings are presented in Sect. 4. In Sect. 5 our findings are synthesized and discussed regarding possible implications of the recent developments and future research avenues. We conclude by reflecting on the contributions and limitations of our systematic review.

2 Psychology in MAC research

2.1 Brief overview of predominant subfields

Owing to its role in facilitating and influencing decisions, MAC has a “behavioral function” (Caplan 1966, p. 496). It seems intuitive that some of the behavioral effects and impacts of MAC practices can only be predicted, examined, and eventually understood if researchers incorporate assumptions regarding the intrinsic processes and psychological aspects determining behavior into the research.¹ In the domain of psychology, the existence of individual differences in people’s personalities, intelligence levels, and cognitive functions, such as perception or memory, is believed to manifest in behavioral differences (e.g., Anastasi 1971; Boyle 2004; Chamorro-Premuzic and Furrhnam 2006; Roberson 2016). The field of psychology is therefore described as “the scientific investigation of mental processes (thinking, remembering, feeling, etc.) and behavior” (Westen 2002, p. 2). Thus, psychology focuses on subjective phenomena, such as emotional affective reactions, motivations, or mental representations of information (Birnberg et al. 2007; Luft and Shields 2009). This indicates a great number of possibly relevant subfields of psychology for researchers to draw upon. Prior research by Birnberg et al. (2007) finds that cognitive, motivational, and social psychological theories are frequently used. They conclude that MAC researchers employ a variety of different psychological theories from these subfields and that these theories are commonly applied to explain the motivational (e.g., effects on the willingness to exert effort) and informational effects (e.g., influences on judgments and decisions) of MAC practices (Birnberg et al. 2007). We describe these three subfields in the following paragraph.

Social psychology addresses the interactions of individual psychology with group phenomena by examining “the influence of real or imagined others on the way people behave.” (Westen 2002, p. 24). This subfield, therefore, aims to understand the

¹ A subdiscipline of MAC, referred to as behavioral management accounting, is substantially influenced by sociological perspectives and psychology (e.g., Hofstede and Kinard 1970; Dunk 2001; Birnberg 2011; Hopper and Bui 2016; Charifzadeh and Taschner 2017). It addresses such topics as the (unintended) effects of incentives, selected goals, and targets or appropriate design parameters of control systems in organizations (Charifzadeh and Taschner 2017). However, this review is not limited to research that refers to itself as behavioral management accounting but rather focuses on developing a holistic picture of any MAC research with a psychology background.

effects of social influences, such as attitudes, social interactions, and relationships, on individual behavior (Birnberg et al. 2007). *Cognitive psychology*, in contrast, attempts to understand human cognition by observing individual behavior when performing various cognitive tasks and processes, such as attention, judgments, decisions, or learning (Birnberg et al. 2007; Eysenck and Keane 2010). In *motivation psychology*, an individual's motivation may be described as a set of reasons, needs, and goals initiating and directing individual behavior (Maslow 1943; Deci and Ryan 1985). Motivation theories in psychology are therefore plentiful and range from drive theories, which argue that a number of physiological drives determine behavior, to theories of intrinsic motivation and self-determination, which focus more on psychologically-based motives (Deci and Ryan 1985). Birnberg et al. (2007) further describe motivation theory as the investigation of arousal, direction, intensity, and persistence of effort, four behaviors that influence psychological processes. In addition to these three subfields, our review identifies personality psychology as a subfield that has recently drawn more attention from MAC researchers. In contrast to the other subfields, *personality psychology* “examines people’s enduring ways of responding in different kinds of situations and the ways individuals differ in the ways they tend to think, feel and behave” (Westen 2002, p. 24). Personality psychology, therefore, studies human universals, individual differences, and individual uniqueness (Cervone and Pervin 2013). Table 1 provides a brief overview and lists a selection of the theories within these subfields.²

2.2 Origins and development

The employment of psychological theories is not new to MAC research; it may be traced back to the 1950s and the seminal work by Argyris (1952) (Birnberg et al. 2007; Hall 2016). In his study, Argyris (1952) employs concepts of human relations and group dynamics to examine the influence of budgets and the budgeting process on employee’s minds, behavior, motivations, and interpersonal relations in a social context.³ His findings come from interviews with operating and finance supervisors at four production plants, highlight the influence of budgets on employees’ motivations and social relations, and, thus, are the first to emphasize the importance of integrating psychological factors into MAC research. According to Birnberg et al. (2007), early research conducted after Argyris’s (1952) seminal work further strengthens the relevance of psychological explanations to understanding MAC practices’ effects on behavior and decision-making. Early studies (e.g., Steadry 1960; Barefield 1972; Hopwood 1972; Mock et al. 1972) focus on incorporating

² In some cases, our assignment of psychological theories to specific subfields may differ from prior studies (e.g., Birnberg et al. 2007). However, these assignments do not contradict the prior literature, as they are determined by consulting the psychology literature (e.g., Kanfer 1990; Westen 2002; Taylor et al. 2006; Eysenck and Keane 2010; Cervone and Pervin 2013) and represent another perspective on subfields that are not mutually exclusive.

³ In the 1920 s and early 1930 s, *human relations* was a research approach focusing on investigating morale, motivation, productivity, job satisfaction and group processes, and leadership or power in organizations (Birnberg et al. 2007).

Table 1 Overview of selected subfields of psychology

Subfield	Description
Social psychology	<p>Addresses the influence of individual or group phenomena on human behavior. Relies on such constructs as attribution, personal impressions, social interactions, and relationships (Taylor et al. 2006; Birnberg et al. 2007)</p> <p>Prior research identifies, for example, role theory, social comparison theory, social identity theory, and group identity theory as being frequently employed in MAC research (Birnberg et al. 2007)</p> <p>For an overview of social psychology, see, for example, Taylor et al. (2006)</p>
Cognitive psychology	<p>Observes the behavior of individuals performing various cognitive tasks to explore human cognition (Eysenck and Keane 2010). Several internal processes are involved in this behavior, including attention, perception, learning, memory, language, problem-solving, reasoning, and thinking (Eysenck and Keane 2010). This subfield focuses on how people perceive, process, and retrieve information and make decisions (Westen 2002)</p> <p>Prior research identifies heuristics and biases, prospect theory and framing, mental representations (or mental models), and outcome effects, for example, as being frequently employed in MAC research (Birnberg et al. 2007)</p> <p>For an overview of cognitive psychology, see, for example, Eysenck and Keane (2010)</p>
Motivation psychology	<p>Describes the many reasons, drives, needs, and goals that initiate and direct individual behavior (Maslow 1943; Deci and Ryan 1985)</p> <p>Prior research identifies, for example, level of aspiration theory, goal-setting theory, and person-environment-fit theory as theories frequently used in MAC research (Birnberg et al. 2007)</p> <p>For an overview of motivation theories, see, for example, Mitchell (1982), Deci and Ryan (1985), and Kanfer (1990)</p>
Personality psychology	<p>Often studies personality traits, which represent consistent elements of human behavior and manners (Cervone and Pervin 2013). We identify, for example, tolerance for ambiguity, psychological entitlement, and the Dark Triad of personality traits as being applied in recent MAC literature</p> <p>For an overview of personality psychology, see, for example, Westen (2002) and Cervone and Pervin (2013)</p>

concepts from motivational theory and social and cognitive psychology into the MAC research domain (Birnberg et al. 2007).

Several studies find that psychology is one of the most common source disciplines employed by researchers to describe the effects of MAC practices (Hesford et al. 2007; Hopper and Bui 2016; Lachmann et al. 2017). In 2007, Hesford et al. (2007) conducted a bibliographic study investigating expansions in terms of new research topics, methods, and theoretical perspectives in MAC research since the 1980s. They find that although more studies draw on economic or sociological perspectives, psychology is among the most frequently used source disciplines employed in MAC research studies between 1981 and 2000 (Hesford et al. 2007). More recent studies confirm this result for the period from 1980 to 2012; Lachmann et al. (2017) assess the development and state of positivist MAC research regarding diversity and validity and find that researchers between 1980 and 2012 most frequently relied on economic theories, psychological theories, and theories of organizational behavior. Furthermore, their findings provide evidence that the share and number of publications drawing on psychological theories

increased during the 2000s and 2010s. Examining contributions to the journal *Management Accounting Research* (MAR) over the last 25 years, Hopper and Bui (2016) also find an increase in the adoption of psychological theories in articles published in MAR between 2000 and 2014.

As noted in Sect. 2.1, there are prior review studies that provide an introduction to the psychological theories that have been frequently used in MAC research (e.g., Birnberg et al. 2007; Luft and Shields 2009). In comparison to the review by Birnberg et al. (2007) mentioned above, the review by Luft and Shields (2009) examines psychology-based research describing and analyzing subjective decision-making in MAC contexts. They find that studies published from the 1970s to the 2000s concentrate on the influence of subjective cognitive phenomena on the performance of subjective decisions. Newer studies incorporate more social concepts, such as preferences, individual valuations of (non-monetary) payoffs, and emotional reactions (Luft and Shields 2009). A similar recent study focuses on behavioral accounting. Kaplan et al. (2018b) discuss four social psychological theories that have been or could be applied to behavioral accounting. They provide an overview of the findings of selected behavioral accounting studies that encompass interpersonal affect, accountability, attribution, and social comparison, and they expect that social psychological theories, in particular, will continue to inspire behavioral accounting research.

Taken together, the findings of prior studies by Birnberg et al. (2007), Luft and Shields (2009), and Kaplan et al. (2018b) show a great diversity in the use of psychological theories and psychology subfields in behavioral accounting and, specifically, MAC research. They also provide evidence that psychology is employed in a variety of MAC contexts to foster a better understanding of the behavioral consequences of MAC practices. However, the aforementioned studies are either limited to a particular sub-field of psychology or were conducted several years ago. Thus, despite the seemingly increasing importance of behavioral aspects, the MAC literature lacks a systematic review of applications of psychological theories and concepts in recent MAC studies. Consequently, research results remain fragmented, impeding the aggregation of knowledge of psychology's ability to contribute to addressing recent challenges and emerging topics in MAC research.

Based on this reasoning, our study addresses the research questions of which psychological theories and concepts are most intensively applied in recent MAC research and which trends in the use of psychological theories and concepts are observable. Therefore, we conduct a systematic review following a multistep approach based on approved review methods (e.g., Cooper 1984, 1988; Grant and Booth 2009; Booth et al. 2012; Fink 2014; Mayring 2014). The following section explains our review scope, the structured material collection, and the descriptive and content analysis.

3 Methods

3.1 Review scope, material collection and article selection

We limit our review scope to psychology-based MAC research articles published between 2000 and the first half of 2019 by a selection of leading accounting journals.

First, we define psychology-based articles as articles that employ either psychological theories or theories that originate from psychology (e.g., *role theory in social psychology*) or that concentrate on single phenomena within psychological theories (e.g., *the phenomenon of role ambiguity within role theory*). We do so because MAC researchers may develop theoretical models by employing entire theories or a specific single phenomenon associated with a psychological theory.

Second, the period after 2000 is believed to be characterized by a broad spectrum of MAC research methods and theoretical perspectives, as well as an increase in publications drawing on psychology as a subdiscipline (Scapens 2006; Hopper and Bui 2016; Lachmann et al. 2017). As enumerated above, prior reviews examined selected articles, earlier years of this period, or are limited to a particular subfield of psychology (e.g., Birnberg et al. 2007; Luft and Shields 2009; Kaplan et al. 2018b). However, much of the knowledge generated by research studies published after Birnberg et al. (2007) or Luft and Shields (2009) has remained fragmented. Thus, to foster the aggregation of knowledge, we include articles published between 2000 and the first half of 2019. Further, we extend the scope of previous studies by analyzing articles that employ psychological theories and concepts from a multitude of subfields. We include research drawing upon social and cognitive psychology, motivation theory, personality psychology, multiple subfields, and several smaller subfields.

Third, we follow prior literature studies (e.g., Hesford et al. 2007; Lachmann et al. 2017) in selecting some of the most influential publication outlets. Thus, our journal selection reflects leading accounting journals according to accounting faculty surveys and journal rankings as well as diverse outlets in terms of origins, publishing authors, and topics.⁴ Our selection includes the following nine journals (in alphabetical order): *Accounting, Organizations and Society* (AOS), *Behavioral Research in Accounting* (BRIA), *Contemporary Accounting Research* (CAR), *European Accounting Review* (EAR), *Journal of Accounting and Economics* (JAE), *Journal of Accounting Research* (JAR), *Journal of Management Accounting Research* (JMAR), *Management Accounting Research* (MAR), and *The Accounting Review* (TAR).

Following the literature on efficient material collection (e.g., Fink 2014), we consecutively perform the initial and final inclusion steps. The initial inclusion step aims to identify potentially relevant articles by examining titles, keywords, and abstracts (Booth et al. 2012). The following criteria for relevant articles are established to operationalize the scope of our review:

⁴ All selected journals are ranked with a status ranging from A+ to B according to the VHB-JOURQUAL 3 of the German Academic Association for Business Research (Verband der Hochschullehrer für Betriebswirtschaft e.V. 2015) and have high impact factors according to several international journal rankings.

Table 2 Number of included and excluded articles per process step

Description	Number
Total articles screened in the selected journals during the investigation period	5247
Thereof...	
Excluded after initial inclusion check	5043
Articles deemed potentially relevant after initial inclusion check	204
Thereof...	
Excluded after final inclusion check	79
Articles included in the review after final inclusion check	125

1. Must cover MAC topics.
2. Must be an original research article.
3. Must employ an empirical research method.⁵
4. Must indicate the use of psychological theories or related constructs in the title, abstract, or keywords.

Consequently, we individually examine all the articles published in the nine selected journals during the investigation period by visiting the journals' or corresponding journal publishers' websites and browsing their article archives starting in 2000. Table 2 provides an overview of the number of articles retrieved after each material collection step.

First, we read and screened the titles, keywords, and abstracts of all 5247 articles for indications of nonoriginal research articles, research methods used, and references to MAC topics. Then, we screened the titles, keywords, and abstracts of all the identified *empirical original research articles addressing MAC topics* a second time to detect indications of the use of psychological theories or constructs. This second screening procedure aims to identify terminology associated with psychology in general, such as "cognitive," "attribution," or "motivation," and it deems articles that use this terminology as *potentially relevant*. The initial inclusion step identified 204 potentially relevant articles to be further examined in the final inclusion step. In the final inclusion step, we subjected the full texts of all 204 potentially relevant articles to an extended screening procedure that verified the employment of theories or concepts from psychology subfields. This final step, however, requires the authors of articles to explicitly refer to psychological theories or constructs in developing their studies' theoretical backgrounds or hypotheses.⁶ Owing to the diversity in research strategies and the different foci of the articles, references to psychology are not necessarily equally evident. For most articles, inclusion eligibility is rather clear owing

⁵ Empirical research methods are assumed to offer instruments of choice to acquire an in-depth understanding of decision-influencing and decision-facilitating effects on people (Sprinkle 2003), which, in turn, may be associated with the employment of concepts from subfields of psychology.

⁶ Simply stating that the research draws on psychology, without naming a specific theory or related construct, does not qualify an article for final inclusion.

to the wording and explicit mentioning of theories related to psychology subfields.⁷ The final inclusion check identifies 125 relevant articles to be analyzed in the following sections of this review.

3.2 Process and methods of analysis

All 125 included articles were subject to content analysis. According to Mayring (2014), content analysis is a mixed-methods approach that combines the *assignment of categories* to essential text points and the additional *quantitative analysis* of the frequency of those categories. Thus, following prior research (e.g., Shields 1997; Scandura and Williams 2000; Hesford et al. 2007; Lachmann et al. 2017), we perform descriptive analyses and examine the frequency of categories and subcategories in our data set to identify certain patterns in the article contents. Moreover, we apply linear time-based regressions (Scandura and Williams 2000) to identify trends in the use of the different psychology subfields in MAC research to complement our frequency analysis. Furthermore, to examine the diversity in the applied psychology subfields over time and in certain content areas, we calculate “heterogeneity indices” (Scandura and Williams 2000; Harrison and Klein 2007). These indices show that homogeneity is greater when, for instance, a large proportion of articles employ a particular psychology subfield as opposed to a more equal application of a variety of subfields (Scandura and Williams 2000).

In assigning the categories, we focus on determining MAC topics, psychology background, and research methods for each article. Thus, we (re)examine the titles, abstracts, keywords, and full texts. Most of the content analysis is conducted during the initial and final inclusion stages of the structured material collection. This approach allows us to efficiently collect all the relevant information but also minimize the number of individual (re)examinations of each article. Initially, we record the topics, psychological theories and concepts, and research methods of all 125 articles using each article’s terminology. In a second step, these records are harmonized (e.g., the terms *performance evaluation*, *performance assessment*, and *performance appraisal* are summarized by the term *performance evaluation*) to allow for precise and consistent categorization. To synthesize and contextualize the articles, we design a category scheme based on frameworks employed in prior literature reviews (e.g., Shields 1997; Scandura and Williams 2000; Hesford et al. 2007; Lachmann et al. 2017). However, these frameworks are extensively modified to reflect the contents of our included articles. The category scheme consists of the three coding dimensions (codes 1–3) outlined in Tables 3 and 4. Each coding dimension consists of several categories that may be further divided into the subcategories.

⁷ Four concepts that are recurrently used in the MAC literature are excluded from this review: trust, justice, honesty, and fairness. These specific concepts may be applied in several ways and with various underlying assumptions from a number of different theoretical perspectives. These concepts may be used within subfields of psychology, but they may also be employed for research that does not refer to itself as related to psychology. However, if these constructs are used along with or in addition to concepts from psychology subfields (e.g., as additional variables in an experimental setting) the article is eligible for final inclusion (e.g., Hartmann and Slapničar 2009; Brown et al. 2016).

Table 3 Overview of topic categories

Dimension	Description	Categories (in alphabetical order)
Topic (Code 1)	Refers to the MAC contents of an article	Budgeting Compensation, rewards, and incentives Costing systems Decision-making Organizational control Performance measurement and evaluation Roles in management control systems Strategic MAC

A detailed description of our coding scheme is provided in “Appendix 1”

Table 4 Overview of coding dimensions, categories, and subcategories

Dimension	Description	Categories (<i>subcategories in brackets</i>)
Subfield of psychology (Code 2)	Refers to the psychology subfield of an article	Social Cognitive Motivation Personality Multiple
Research method (Code 3)	Refers to the empirical research methods of an article	Survey Experiment (<i>laboratory experiment, field experiment</i>) Field study Archival study Case study Multiple

The categories represent the topics examined, the relevant psychology subfields, and the research methods employed.

The code 1 categories refer to the subfield of MAC that the primarily examined topics can be assigned to. The topic categories are developed based on the categories employed in prior studies (e.g., Shields 1997; Hesford et al. 2007; Lachmann et al. 2017) and the results of our content analysis. Table 3 depicts the nine categories of topics used in this review. To describe the subjects in greater detail, the topics of the included articles were recorded in detail during content analysis and harmonized afterward. Thereby, the identified topics have been summarized under several generic terms to further classify the articles into the respective categories.

The *budgeting* category comprises articles focusing on, for example, budgetary slack, participative budgeting, or budget reporting. Articles in the *compensation, rewards, and incentives* category concentrate on the design of compensation contracts or choices regarding reward types and incentives. The third category, *costing systems*, comprises articles on participation in costing system design or the effects of

costing systems. Articles covering factors that influence decision-making and decision quality are assigned to the *decision-making* category. Next, the *organizational control* category features articles that mainly deal with project controls, creativity controls, and other internal control systems not covered by the other categories of this review. The *performance measurement and evaluation* category comprises articles that focus on the evaluation process and its outcomes (e.g., the effects of subjectivity in weighting performance measures on employee performance) or on performance measurement system design (e.g., the choice of performance measures). Articles on perceptions of the role of management accountants are assigned to the *roles in management control systems* category. Lastly, the *strategic MAC* category includes articles focusing on strategic performance measurement systems. In order to contextualize the findings of our content analysis, the code 1-categories are further subdivided by subcategories that allow us to present frequently examined topics and applied psychological theories and concepts in Sect. 4.2.

The code 2 categories shown in Table 4 refer to the subfield of psychology that the employed psychological theories and concepts originated from. The concepts and theories were identified in the titles, keywords, abstract or full text of the respective article. The basic framework for code 2 relies on the often-researched psychological theories and constructs from Birnberg et al. (2007)'s comprehensive overview. As enumerated above, we added the *personality* category because we identify this subfield in several of the 125 included articles. Further, the *multiple* category is used for studies employing at least two theories or concepts from different subfields of psychology (e.g., a combination of social and cognitive concepts). Lastly, the code 3 categories are derived from the research method categorization scheme developed by Lachmann et al. (2017), who use a modified version of Hesford et al.'s (2007) categorization scheme. In line with this research, we distinguish between *surveys*, *experiments*, *archival studies*, *case studies*, and *field studies*. We also distinguish between laboratory and field experiments.⁸ This scheme is extended by the *multiple* category to allow for precise categorizations of articles employing more than one empirical research method.

To ensure as few deviations as possible in the coding of included articles, a sample of articles was precoded. Subsequently, the categories and corresponding definitions were further clarified and then reapplied to all included articles. The records of all 125 articles constitute the data set for our analyses.

⁸ Laboratory experiments are conducted under standardized conditions in a laboratory with a standard subject pool (i.e., students). Harrison and List (2004) identify six factors that can be used to distinguish between laboratory and field experiments: the subject pool, the information the subjects bring to the experimental task, the nature of the commodity, the nature of the experimental task, the nature of the stakes, and the nature of the experimental environment (Floyd and List 2016). We follow the classification scheme of Harrison and List (2004) and the remarks of Floyd and List (2016) and refer to experiments with, for example, managers in an organization as field experiments for this review. Online experiments with standard or not further classified subject pools are categorized as laboratory experiments. The term "field study" is not the same as field experiments. We use "field studies" to refer to investigations of more than one organization employing such techniques as interviews, observations, and internal documents (Birnberg and Shields 1990; Hesford et al. 2007; Lachmann et al. 2017).

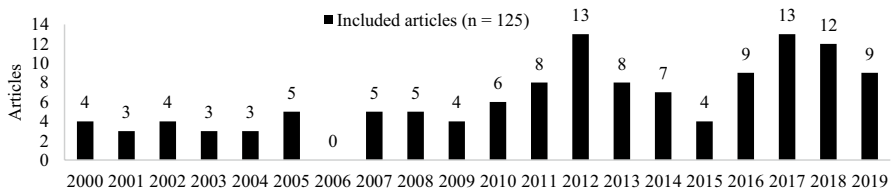


Fig. 1 Frequency of publication year

4 Findings

4.1 Descriptive analysis

We find that eight of the nine selected journals published articles employing psychological theories and concepts during our investigation period. AOS published the most articles fulfilling all the inclusion criteria (22), followed by TAR (21), MAR (17), CAR (16), JMAR (15), BRIA (15), EAR (10), and JAR (9). Figure 1 shows the distribution of articles over the investigation period. We identified between three to five articles in each year between 2000 and 2005, but we could not find any articles eligible for inclusion in 2006.

The number of included articles increased from zero to five in 2007 and eventually reached its first peak (13) in 2012. These thirteen articles account for 15.7% of all MAC-themed articles identified in 2012. The years 2013 through 2015 contain fewer included publications (eight, seven, and four articles, respectively), and the thirteen and twelve articles published in 2017 and 2018, respectively, comprise a second peak. These articles constitute 16.8% and 14.6%, respectively, of MAC-themed articles. Interestingly, we identify nine articles employing psychological theories and concepts in the first half of 2019, comprising 18% of all MAC-themed articles in this year. A time-based regression analysis reveals a significant increase in the number and share of psychology-based articles over time (both $p < 0.01$), indicating that psychological theories and concepts are more frequently applied in MAC studies in recent years.⁹

Psychology-based MAC articles may address several different topics. However, they most frequently examine performance measurement and evaluation (39), followed by aspects of compensation, rewards, and incentives (36); budgeting (17); and organizational control (12). Table 5 provides an overview of the frequencies of all topic categories. Most of the studies conduct experiments (83), especially laboratory experiments (76).¹⁰

Table 6 presents the frequencies of psychology subfields across the topic categories. Most articles rely on concepts from a single subfield (94) (i.e., the social,

⁹ The time-based regression analysis uses the year as the independent variable and the number of identified articles in a year as the dependent variable (Scandura and Williams 2000).

¹⁰ These results are not tabulated. This and the following untabulated results are available from the corresponding author on reasonable request.

Table 5 Frequency of MAC topic categories

Code 1 category	Frequency
Performance measurement and evaluation	39
Compensation, rewards, and incentives	36
Budgeting	17
Organizational control	12
Decision-making	7
Strategic MAC	6
Costing systems	4
Roles in management control systems	4
Total	125

Table 6 Frequency of psychology subfield by MAC topic

	Social	Cognitive	Motivation	Personality	Multiple	Total
Performance measurement and evaluation	8	14	4	3	10	39
Compensation, rewards, and incentives	14	5	3	3	11	36
Budgeting	9	–	2	1	5	17
Organizational control	5	2	4	1	–	12
Decision-making	2	3	–	–	2	7
Strategic MAC	2	2	1	–	1	6
Costing systems	1	1	1	–	1	4
Roles in management control systems	3	–	–	–	1	4
Total	44	27	15	8	31	125

cognitive, motivation, or personality categories) rather than employing concepts from multiple subfields simultaneously (31). Social psychology (44) is the most utilized subfield, followed by cognitive psychology (27). Most of the articles drawing on social psychology build their theoretical foundations using social comparison theory (e.g., Hannan et al. 2013; Tafkov 2013; Knauer et al. 2017), social norms (e.g., Fisher et al. 2000; Maas and van Rinsum 2013; Blay et al. 2019), attribution theory (e.g., Coletti et al. 2005; Hartmann and Slapničar 2009), or social identity theory (e.g., Towry 2003; Hiller et al. 2014; Tian et al. 2016).

Prospect theory (e.g., Church et al. 2008; Oblak et al. 2018), mental models (e.g., Kadous and Sedor 2003; Hall 2011), and cognitive biases (e.g., Libby et al. 2004; Fehrenbacher et al. 2018) are concepts from cognitive psychology that are frequently employed.¹¹ Fewer studies are built on motivation concepts (15) and personality psychology (8) alone. When examining motivational issues, studies are often built on self-determination theory (e.g., Kunz and Linder 2012; Groen et al. 2017),

¹¹ These results are not tabulated.

followed by concepts of intrinsic motivation (e.g., Wong-On-Wing et al. 2010; Christ et al. 2012). We identify a rather diverse set of concepts from personality psychology in the included articles, but the concepts of tolerance for ambiguity (e.g., Hartmann and Slapničar 2012) and psychological entitlement (e.g., Nichol 2019) are both employed by several studies.

The 31 articles employing concepts from multiple subfields simultaneously mostly rely on a combination of motivation and social psychology concepts (8), followed by a combination of cognitive and social psychology concepts (5).¹² Thus, social psychology is also the prevalent theoretical foundation when multiple subfields are applied simultaneously. Interestingly, personality psychology is used more often in combination (10) with the other psychology subfields (i.e., the social, cognitive, or motivation subfields), than as a single subfield (8).¹³ The remaining studies that draw upon multiple subfields also incorporate concepts from industrial and organizational psychology (e.g., Maas and Matějka 2009), neuropsychology (e.g., Farrell et al. 2014), or positive psychology (e.g., Burney and Widener 2013).

To foster our understanding, we calculate heterogeneity indices to measure the diversity of applications of psychology subfields within our topic categories. We find that the diversity of psychology subfields is relatively high for most topic categories. The heterogeneity index is especially high within the costing systems ($h=0.750$) and performance measurement and evaluation categories ($h=0.747$) and is rather low in the roles in management control systems category ($h=0.375$).¹⁴ Nevertheless, the specific psychology subfields and the extent to which they are employed both differ across topic categories and subtopics. For example, on the one hand, studies that examine aspects of performance measurement and evaluation predominantly employ cognitive concepts (14), followed by concepts from multiple subfields (10) and social (8), motivation (4), and personality (3) concepts. On the other hand, studies of issues regarding compensation, rewards, and incentives mostly rely on social psychology (14), followed by concepts from multiple subfields (11) and cognitive (5), motivation (3), and personality (3) concepts. According to our analysis, the use of personality psychology, even in combination with other subfields, is restricted to certain MAC topics and subtopics. We do not identify articles employing personality concepts to examine strategic MAC aspects, costing systems, or roles in management control systems.

The temporal distribution depicted in Fig. 2 illustrates that the range of subfields used in MAC research has increased over the years.

Whereas studies drew upon four subfields in 2000, they drew on only one to three subfields in the years between 2001 and 2005. We find that the use of psychological theories and concepts was more diverse between 2015 and 2019. From 2015 to the

¹² These results are not tabulated.

¹³ These results are not tabulated.

¹⁴ The maximum value of the heterogeneity index in this case is 0.8 ($h_{max}=1-1/n$). The heterogeneity indices regarding the application of psychology subfields for the remaining categories are calculated as follows: strategic MAC ($h=0.722$); compensation, rewards, and incentives ($h=0.722$); organizational control ($h=0.681$); decision-making ($h=0.653$); and budgeting ($h=0.616$).

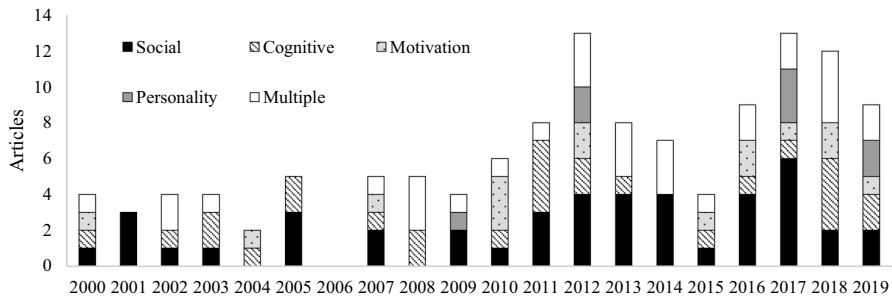


Fig. 2 Frequency of psychology subfields by year

first half of 2019, we identify articles employing concepts from social, cognitive, and motivation psychology and multiple subfields simultaneously. Furthermore, five out of the seven articles employing personality psychology were published in 2017 and 2019 (Fehrenbacher et al. 2017; Holderness et al. 2017; Wang 2017; Davidson 2019; Nichol 2019). Moreover, three articles that rely on a combination of personality psychology and other subfields were published in 2017, 2018, and 2019 (Reichert and Woods 2017; Kaplan et al. 2018a; Chong and Wang 2019). The heterogeneity index for psychology subfields is very high at the end of the examined time span, indicating that researchers have tended to apply a greater diversity of subfields in more recent years ($h_{2015-2019} \geq 0.722$).¹⁵ The time-based regression analyses provide further evidence that social ($p=0.013$), motivational ($p=0.076$), and personality concepts ($p=0.039$) increase in importance over time, whereas the use of cognitive concepts remains relatively stable over the examined time span ($p=0.209$). The number of articles that apply more than one psychological theory or concept also significantly increases between 2000 and 2019 ($p=0.014$).

To further illuminate these developments, we contextualize selected articles that allow us to present frequently examined topics and applied psychological theories and concepts in the following section.

4.2 Content analysis

4.2.1 Performance measurement and evaluation

Subjective performance evaluation and subjective measures The research stream shown in Table 7 addresses subjective elements in performance evaluations. We find that cognitive psychology, particularly the effects of heuristics (e.g., Bailey et al. 2011; Dai et al. 2018) and biases (e.g., Bol and Smith 2011; Fehrenbacher et al. 2018), is a focal point of this research.

Although heuristic reasoning may simplify complex cognitive judgment tasks, it is associated with systematic judgment errors referred to as biases (Kahneman

¹⁵ The maximum value of the heterogeneity index in this case is 0.8. .

Table 7 Articles on subjective performance evaluation and subjective measures

Article	Research method	Psychology subfield	Psychological theories or concepts
Ghosh and Lusch (2000)	Field study	Cognitive	Outcome effect
Ittner et al. (2003)	Case study	Cognitive	Outcome effect
Krishnan et al. (2005)	Laboratory experiment	Cognitive	Mental models
Bailey et al. (2011)	Laboratory experiment	Cognitive	Anchoring heuristic
Bol and Smith (2011)	Laboratory experiment	Cognitive	Spillover effect
Kunz (2015)	Laboratory experiment	Motivation	Self-determination theory
Luft et al. (2016)	Laboratory experiment	Personnel psychology; Industrial and organizational psychology	Multiple biases
Bol and Leiby (2018)	Multiple	Cognitive	Cognitive schema
Dai et al. (2018)	Laboratory experiment	Cognitive	Heuristics
Fehrenbacher et al. (2018)	Laboratory experiment	Cognitive	Spillover effect

and Tversky 1982). Subjective performance evaluations are often based on a starting point, such as a specific performance measure or information in a report. Different starting points may result in different outcomes, and the cognitive *anchoring* heuristic describes a decision being biased towards this starting point (Kahneman and Tversky 1982). Bailey et al. (2011) investigate this phenomenon and find evidence for anchoring in the presence of contractible and non-contractible information. Their results suggest that anchoring eventually leads to less incorporation of non-contractible information in supervisors' bonus pool allocation decisions, and, thus, such allocations may be biased (Bailey et al. 2011). Newer research examines heuristic reasoning in performance measure weighting and finds measures that are perceived as more scientific influence evaluation decisions more strongly (Dai et al. 2018).

Additionally, cognitive psychology is used to illuminate the tendency to overweight the implications of specific performance measures in performance evaluations, a bias referred to as the *outcome effect* (Ghosh and Lusch 2000; Ittner et al. 2003). Under the outcome effect, evaluators tend to evaluate positive outcomes positively and negative outcomes negatively, ignoring whether the actions that led to the outcomes were appropriate (Mitchell and Kalb 1981; Ghosh and Lusch 2000; Ittner et al. 2003). Ghosh and Lusch's (2000) field study provides evidence for the outcome effect in subjective performance evaluations of retail store managers. They find that these evaluations are impacted by the outcome effect, as failing to meet a store's target leads to a less positive evaluation of a manager. A similar study provides evidence that the subjective weighting of performance measures allows supervisors to ignore many of them and overweight financial outcome measures (Ittner et al. 2003). Furthermore, researchers address *spillover effects*, a bias that potentially arises through knowledge about (prior) evaluation outcomes or ambiguous performance information (Murphy et al. 1985; Huber et al. 1987; Bol and Smith 2011).

Bol and Smith (2011) use this term to describe knowledge about performance on one task influencing a supervisor's subjective evaluations of an employee's performance on a separate task. They show that subjective evaluations are directionally influenced, indicating spillover effects between performance on different tasks (Bol and Smith 2011). A similar laboratory experiment finds that spillovers between subjective and objective measures also exist by showing that subjective performance evaluations are directionally biased towards the valence of objective performance measures (Fehrenbacher et al. 2018).

Provision of relative performance information and relative performance evaluation Another stream of research considers the provision of relative performance information (RPI) and relative performance evaluation (RPE). An overview of this research is provided in Table 8. Our analysis shows that some the psychology-based research on RPI and RPE draws upon social comparison theory (e.g., Hannan et al. 2013; Eyring and Narayanan 2018; Hartmann and Schreck 2018). Social comparison theory is based on the assumption that individuals evaluate their abilities by comparing themselves to others, a process that eventually influences their self-image and behavior (Festinger 1954; Hannan et al. 2013). The studies that we examine provide evidence that RPI induces comparison processes and, thus, has both effort motivation and effort distortion effects and may trigger positive or negative affective reactions (Hannan et al. 2013; Mahlendorf et al. 2014; Eyring and Narayanan 2018; Hartmann and Schreck 2018).

When not drawing upon social comparison theory, researchers incorporate aspects of personality into their research, such as the three personality traits of Machiavellianism, narcissism, and psychopathy, which are also referred to as the Dark Triad of personality traits (Paulhus and Williams 2002; Wang 2017). All three are rather negative character traits that are associated with strategic manipulation, a sense of superiority, high impulsiveness, or low empathy (Wang 2017). In the context of recognition programs, Wang's (2017) laboratory experiment examines the Dark Triad of personality traits and suggests that the provision of RPI can have

Table 8 Articles on the provision of RPI and RPE

Article	Research method	Psychology subfield	Psychological theories or concepts
Kaplan et al. (2012)	Laboratory experiment	Social/personality	Negativity bias
Hannan et al. (2013)	Laboratory experiment	Social	Social comparison theory
Mahlendorf et al. (2014)	Survey	Social	Social identity theory; self-evaluation maintenance model
Wang (2017)	Laboratory experiment	Personality	Dark triad
Eyring and Narayanan (2018)	Field experiment	Social/motivation	Social comparison theory; expectancy theory; goal theory
Hartmann and Schreck (2018)	Laboratory experiment	Social	Social comparison theory
Kaplan et al. (2018a)	Laboratory experiment	Social/personality	Negativity bias

productive or counterproductive effects depending on an individual's score on those traits. A second social and personality construct examined in this research is negativity bias. Negativity bias refers to an individual's tendency to place more weight on negative information than on neutral or positive information (Baumeister et al. 2001; Kaplan et al. 2012). Two studies in our sample investigate this bias. First, Kaplan et al. (2012) conduct two laboratory experiments on RPE. They find that evaluators exhibit negativity bias and, thus, tend to weight measures with negative performance differences more than those with positive performance differences (Kaplan et al. 2012). Kaplan et al. (2018a) not only replicate these findings in another laboratory experiment but also find that the negativity bias is enhanced when negative performance differences exist for strategically linked measures. Furthermore, they find that relative self-assessments are also prone to negativity bias.

Other influences on performance evaluations and evaluation outcomes We identify nine articles investigating influences on performance evaluations not addressed by the preceding subtopics. Table 9 provides an overview of these articles.

We find that personality characteristics and social phenomena seem to be especially relevant for these topics. For example, Liedtka et al. (2008) and Ding and Beaulieu (2011) both identify the effects of balanced scorecard (BSC) design on performance evaluation using social concepts and a combination of personality and cognitive concepts. Incorporating prospect theory, Liedtka et al. (2008) examine how an evaluator's tolerance for ambiguity influences evaluation outcomes. According to prospect theory, individuals exhibit different risk behaviors when facing gain and loss situations (Tversky and Kahneman 1979; Liedtka et al. 2008). The personality trait of tolerance for ambiguity refers to individuals' tolerances for different levels of ambiguity in the information they receive, and individuals make judgments according to those tolerances (Budner 1962; Liedtka et al. 2008). They find that this trait applies to evaluations based on BSCs and that variation between measures within BSC categories can affect the evaluation outcomes of ambiguity-intolerant

Table 9 Articles on other influences on performance evaluations

Article	Research method	Psychology subfield	Psychological theories or concepts
Libby et al. (2004)	Laboratory experiment	Cognitive	Cognitive biases
Farrell et al. (2007)	Laboratory experiment	Cognitive	Mental representations
Liedtka et al. (2008)	Laboratory experiment	Cognitive/Personality	Prospect theory; tolerance for ambiguity
Hartmann and Slapničar (2009)	Survey	Social	Attribution theory
Hartmann et al. (2010)	Survey	Motivation	Goal theory
Burkert et al. (2011)	Survey	Social	Role theory
Ding and Beaulieu (2011)	Laboratory experiment	Social	Mood; affective reactions
Hartmann and Slapničar (2012)	Survey	Personality	Tolerance for ambiguity
Thornock (2016)	Laboratory experiment	Social	Cognitive dissonance
Holderness et al. (2017)	Laboratory experiment	Personality	Psychological entitlement

individuals. Furthermore, Ding and Beaulieu's (2011) laboratory experiment results suggest that the occurrence of affective reactions and mood congruency biases are associated with BSC complexity. When such biases occur, judgments and decisions relate to the evaluator's mood and may not be hindered even by the implementation of incentives to avoid such behavior (Ding and Beaulieu 2011). Moreover, personality traits, such as tolerance for ambiguity (Hartmann and Slapničar 2012), and social concepts, such as leadership style (Hartmann and Maas 2010), are found to be associated with an individual's perceived fairness of evaluations. Interestingly, reactions to performance feedback are also affected by personality characteristics. For example, the effect of feedback on individual performance depends on the degree of the recipient's personality trait of psychological entitlement, which is a sense of deserving more than others (Campbell et al. 2004; Holderness et al. 2017).

Performance measurement system design Choices regarding performance measurement system (PMS) design are addressed by seven articles, as shown in Table 10. Our analysis indicates that psychology-based research on PMS design is primarily influenced by cognitive psychology.

For instance, mental models are employed in the investigations of performance measure diversity by Hall (2008, 2011). Mental models are subjective, cognitive representations of concepts or relations that can be drawn upon to make judgments and decisions (Markman 1999; Birnberg et al. 2007; Hall 2008, 2011). Hall (2008) provides evidence that comprehensive PMSs influence social-psychological aspects, cognition, and motivation, which, in turn, are linked to managerial performance. Furthermore, comprehensive PMSs support the cognitive processes of forming new mental models and confirming existing mental models, which both positively affect performance (Hall 2011). Furthermore, decision-makers' behavioral heuristics or cognitive biases are affected by PMS design. For example, as the findings of a field study suggest, the incorporation of behavioral nudges into performance measurement models can serve to exploit or mitigate managers' heuristics or cognitive biases (Malina and Selto 2015). Recent research employs cognitive psychology

Table 10 Articles on PMS design

Article	Research method	Psychology subfield	Psychological theories or concepts
Kominis and Emmanuel (2007)	Survey	Motivation	Expectancy-valence theory
Hall (2008)	Survey	Social/cognitive	Role clarity; psychological empowerment; Mental models
Hall (2011)	Survey	Cognitive	Mental models
Farrell et al. (2012)	Laboratory experiment	Cognitive	Melioration theory
Marginson et al. (2014)	Case study	Social/motivation	Goal theory; role ambiguity; psychological empowerment
Malina and Selto (2015)	Field study	Cognitive	Nudges; anchoring heuristic; framing
Bedford et al. (2019)	Survey	Cognitive	Cognitive conflict

to investigate the decision-facilitating role of PMSs using the concept of cognitive conflict (Bedford et al. 2019). Bedford et al. (2019) explain that cognitive conflict is triggered by the perception of differences in opinions or judgments of appropriate actions or procedures to achieve an objective. They find that firms choose performance measures that induce cognitive conflict, allowing them to translate ambidextrous strategies into innovation.

Participation in PMS design Five articles on participation in PMS design are depicted in Table 11. We find that researchers highlight the motivational effects of this participation.

One theory used in this regard is self-determination theory (e.g., Groen et al. 2017; Groen 2018). This theory distinguishes between autonomous and controlled motivation (Ryan and Deci 2000; Gagné and Deci 2005; Groen et al. 2017). Autonomously motivated individuals feel that they may choose to act and behave to satisfy their personal needs, whereas, under controlled motivation, individuals feel rather pressured to take actions that satisfy external demands (Gagné and Deci 2005; Groen et al. 2017). Groen et al. (2017) employ the self-determination theory to investigate the effects of employee participation in developing performance measures. Although they do not directly measure motivation, they find an indirect effect of this participation on employee performance when managers use the co-developed performance measures for subsequent evaluations (Groen et al. 2017). Groen's (2018) survey extends this knowledge on the effects of participation. She complements the self-determination theory with the social exchange and goal-setting theory. Social exchange theory focuses on the social phenomenon of offering some benefit for reciprocation (Blau 1964; Groen 2018). Conversely, goal-setting theory relates to defining effective goals in work settings and posits that goals affect motivation and performance (Locke and Latham 2002). Groen (2018) finds a relation between participation and goal coherence and provides evidence that perceptions of fairness mediate the relation between participation and goal commitment. The relation between participation and goal coherence is further confirmed by combining goal-setting theory and mental models theory (de Haas and Algera 2002).

Table 11 Articles on participation in PMS design

Article	Research method	Psychology subfield	Psychological theories or concepts
Shields et al. (2000)	Case study	Social/industrial and organizational	Task-demands-performance capability model
de Haas and Algera (2002)	Case study	Cognitive/motivation	Mental models; goal coherence and goal congruence
Groen et al. (2012)	Field study	Social	Theory of planned behavior
Groen et al. (2017)	Survey	Motivation	Self-determination theory
Groen (2018)	Survey	Social/motivation	Social exchange theory; goal-setting; self-determination theory

4.2.2 Compensation, rewards, and incentives

Incentive contract framing and compensation contract selection Table 12 provides information about the articles that address contract framing and contract selection topics. Our analysis reveals a focus on cognitive psychological theories, especially prospect theory and related concepts (e.g., Church et al. 2008; Hales and Williamson 2010; Hirsch et al. 2017; Oblak et al. 2018). As previously explained, prospect theory deals with decision-making under risk (Tversky and Kahneman 1979). We find that researchers employ prospect theory to, for example, investigate the effects of implicit employment contracts on firm productivity (Hales and Williamson 2010) or to examine the effects of clawback provisions on information processing and investment behavior (Hirsch et al. 2017).

Moreover, two studies also use prospect theory to examine the influence of contract framing on work effort (Church et al. 2008; Oblak et al. 2018). Church et al. (2008) compare the effects of budget-based incentive contracts framed in terms of bonuses and penalties. Consistent with prospect theory, they find that individuals exert more effort to avoid penalties than to receive bonus payments. Furthermore, prospect theory is applied to compare the effects of fair and unfair outcome distributions in differently framed contracts. Oblak et al. (2018) extend Church et al.'s (2008) findings by showing that when the distribution is unfair, risk-taking behavior and effort are the same for bonus and penalty contracts. When payment is fair, however, penalty contracts have strong positive effects on individual risk-taking and effort (Oblak et al. 2018).

Table 12 Overview of articles on incentive contract framing and compensation contract selection

Article	Research method	Psychology subfield	Psychological theories or concepts
Sprinkle (2000)	Laboratory experiment	Motivation	Intrinsic motivation
Church et al. (2008)	Laboratory experiment	Cognitive	Prospect theory
Sprinkle et al. (2008)	Laboratory experiment	Cognitive	Security-potential/aspiration theory
Hales and Williamson (2010)	Laboratory experiment	Cognitive	Prospect theory; certainty effect
Tafkov (2013)	Laboratory experiment	Social	Social comparison theory
Farrell et al. (2014)	Laboratory experiment; functional magnetic resonance imaging	Social/cognitive/neuropsychology	Dual process theory; affect
Fehrenbacher et al. (2017)	Laboratory experiment	Personality	Need for achievement; locus of control
Hirsch et al. (2017)	Laboratory experiment	Social/cognitive	Motivated reasoning; prospect theory
Reichert and Woods (2017)	Survey	Personality/neuropsychology/motivation	Biopsychological theory of personality
Christ and Vance (2018)	Laboratory experiment	Social/industrial and organizational	Leader-member-exchange theory
Oblak et al. (2018)	Laboratory experiment	Cognitive	Prospect theory; framing

There are interactions between personality factors and incentive contract design choices (e.g., Fehrenbacher et al. 2017; Reichert and Woods 2017). Fehrenbacher et al. (2017) investigate the effects of task-related skills, risk preferences, and personality traits on employees' compensation contract selections. Specifically, they examine the personality traits of need for achievement and locus of control. The personality trait of need for achievement can be subsumed within an urge to continually improve, whereas locus of control refers to whether individuals believe that they can control events (Rotter 1966; Fehrenbacher et al. 2017). Fehrenbacher et al.'s (2017) findings indicate that choosing a performance-based contract is not only associated with an individual's skill level and risk preferences but also with that individual's need for achievement and locus of control.

Provision of feedback and reward types As shown in Table 13, the motivational aspects of the provision of feedback and rewards are strongly emphasized. Research on these topics mostly employs self-determination theory (e.g., Drake et al. 2007; Stone et al. 2010; Kunz and Linder 2012). These studies extend the use of self-determination theory to, for example, examine the reliability of financial incentives (Stone et al. 2010) or illuminate the effects of non-monetary rewards relative to those of financial rewards (Kunz and Linder 2012). Drake et al. (2007) combine aspects of self-determination theory with the social concept of psychological empowerment.

Drake et al. (2007) examine the impacts of performance-based reward types and types of performance feedback on psychological empowerment, a multidimensional concept that can be split into the dimensions of perceived impact and competence and self-determination (Drake et al. 2007; Spreitzer 1995). They provide evidence that the types of feedback and rewards affect different dimensions of the empowerment construct. Furthermore, financial feedback is positively associated with perceived impact, whereas performance-based rewards negatively impact self-determination and perceived competence (Drake et al. 2007). Other researchers use goal-setting and goal conflict theory to study the effects of reward types. For instance, Presslee et al. (2013) find differences in goal setting, goal commitment, and performance across tangible and cash rewards. Receiving tangible rewards is associated with the selection of less challenging goals and more commitment to

Table 13 Overview of articles on the provision of feedback and reward types

Article	Research method	Psychology subfield	Psychological theories or concepts
Drake et al. (2007)	Laboratory experiment	Social/motivation	Psychological empowerment; self-determination theory
Stone et al. (2010)	Survey	Motivation	Self-determination theory
Kunz and Linder (2012)	Laboratory experiment	Motivation	Self-determination theory
Presslee et al. (2013)	Field experiment	Cognitive/motivation	Mental accounting theory; goal-setting theory
Brown et al. (2016)	Laboratory experiment	Social	Attribution theory
Christ et al. (2016)	Laboratory experiment	Cognitive/motivation	Goal conflict theory

achieving self-selected goals. However, average performance is better when receiving cash rewards owing to the selection of more challenging goals (Presslee et al. 2013). Christ et al. (2016), in contrast, draw upon goal conflict theory in the context of multidimensional tasks. Goal conflict theory suggests that individuals have difficulty responding to multiple and conflicting goals at the same time (Kehr 2003; Christ et al. 2016). Christ et al. (2016) incorporate this theory and find that compensation on multiple task dimensions decreases overall performance, as employees commit to multiple goals and divide their attention between these goals. The conflict can be reduced through a combination of compensation and (non-monetary) feedback on different task dimensions.

Tournament incentive schemes The seven articles depicted in Table 14 address tournament incentive schemes. We find that this research is predominantly based on social comparison theory (e.g., Hannan et al. 2008; Knauer et al. 2017; Berger et al. 2018).

For instance, social comparison theory is employed to explore whether and how the proportion of tournament winners and tournament horizons influence employee effort (Knauer et al. 2017; Berger et al. 2018). Knauer et al. (2017) find positive effects of higher proportions of tournament winners on effort and suggest that psychological aspects have a decisive impact, as participants exert more effort not only to earn money but also to preserve a positive self-image. Berger et al. (2018) find that higher proportions of winners are more effective at sustaining effort in repeated tournaments and that longer tournament horizons result in better performance owing to more engagement in social comparison processes. The effect of the proportion of winners on tournament performance is also examined based on the theories of group identity and psychological costs (Kelly and Presslee 2017). Other researchers investigate the effects of reward types in tournaments based on mental accounting theory (Kelly et al. 2017). Two studies integrate social comparison theory and goal-setting theory (Hannan et al. 2008; Newman and Tafkov 2014). Hannan et al. (2008) research the combination of tournament incentive schemes and RPI provision. Their

Table 14 Overview of articles on tournament incentive schemes

Article	Research method	Psychology subfield	Psychological theories or concepts
Hannan et al. (2008)	Laboratory experiment	Social/motivation	Social comparison theory; goal-setting theory
Chen et al. (2012)	Laboratory experiment	Social	Group cohesion
Newman and Tafkov (2014)	Laboratory experiment	Social/motivation	Social comparison theory; goal-setting theory
Kelly et al. (2017)	Field experiment	Cognitive	Mental accounting
Kelly and Presslee (2017)	Laboratory experiment	Social	Group identity; psychological costs
Knauer et al. (2017)	Laboratory experiment	Social	Social comparison theory
Berger et al. (2018)	Laboratory experiment	Social	Social comparison theory

laboratory experiment is designed to examine the effects of the presence and content of RPI and compensation based on a tournament or individual incentive scheme on individual performance. They find that RPI provision has opposite effects under the two incentive schemes. RPI provision increases performance under an individual incentive scheme but decreases performance under a tournament incentive scheme (Hannan et al. 2008). Newman and Tafov (2014) extend Hannan et al.'s (2008) findings by examining whether the tournament's prize structure has an influence on the identified performance effect. The provision of RPI has a detrimental effect on performance in reward tournaments, but it has a positive effect on performance when the tournament's prize structure is based on rewards and punishments (Newman and Tafov 2014).

Incentive system design choices in teams We identify six studies on the effects of incentive system design choices on behavior in teams. Table 15 presents an overview. Our analysis reveals that this subtopic is predominantly investigated using social psychology.

We find that social identity theory is employed particularly frequently (e.g., Towry 2003; Sedatole et al. 2016; Tian et al. 2016). Social identity theory considers the psychological processes behind an individual's identification with a team, inter-group relations, and team identity (Tajfel and Turner 1986; Towry 2003). Towry (2003) examines the differences between mutual monitoring in vertical and horizontal incentive systems and their influence on effort. She finds that the effectiveness of such systems depends on team identity. Her findings indicate that a strong team identity is associated with greater coordination among members. A horizontal incentive scheme, in which members directly control each other's actions, is more effective for effort in this context (Towry 2003).

Sedatole et al.'s (2016) study considers a similar setting and provides additional information on horizontal monitoring. Their findings suggest that horizontal monitoring and team member dependence provide strong enough implicit incentives to motivate individual performance to reduce free-riding without the implementation

Table 15 Overview of articles on incentive system design choices in teams

Article	Research method	Psychology subfield	Psychological theories or concepts
Towry (2003)	Laboratory experiment	Social	Social identity theory
Upton (2009)	Laboratory experiment	Personality	Social value orientation
Naranjo-Gil et al. (2012)	Laboratory experiment	Social/cognitive	Individualism-collectivism theory; cognitive orientation
Sedatole et al. (2016)	Case study	Social	Social identity theory
Tian et al. (2016)	Laboratory experiment	Social	Self-categorization theory; social identity theory; similarity attraction theory
Berger et al. (2019)	Laboratory experiment	Social	Social comparison theory; group identity

of team rewards (Sedatole et al. 2016). Similar studies based on social identity theory suggest that team incentives have a greater positive effect on effort than individual incentives have when the potential conflict level in a group is high (Tian et al. 2016). Other studies indicate that personality and cognitive aspects should not be neglected. Upton (2009) draws upon the personality concept of social value orientation, that is, the extent to which an individual is concerned about how his or her actions influence the outcomes of independent others. According to these findings, an individual's social value orientation affects group performance.

Additionally, group performance is affected by a team's predominant cognitive orientation (Naranjo-Gil et al. 2012).

Effects of incentive system design choices on misreporting, honesty, and whistleblowing Studies also consider the psychological aspects of honesty, misreporting, and whistleblowing in incentive system design. As our analysis reveals, this subtopic is primarily based on the concept of social norms (e.g., Chen and Sandino 2012; Maas and van Rinsum 2013; Cardinaels and Yin 2015; Chen et al. 2017). Table 16 provides information on the articles about this subtopic.

Social norms represent behavioral regularities that are based on shared beliefs regarding appropriate behavior. The violation of such social norms can lead to social sanctions or psychological discomfort (Fehr and Gächter 2000; Chen and Sandino 2012). Social norms are used to investigate the effects of compensation levels on employee theft (Chen and Sandino 2012) or the design of incentive systems to encourage internal whistleblowing (Chen et al. 2017), among other topics. Maas and van Rinsum (2013) set up a laboratory experiment in a setting in which managers receive monetary benefits from overstating their performance. They provide evidence that managers experience disutility if their misreporting violates social norms or results in unfair outcomes for their peers. Furthermore, managers' misreporting is influenced by whether it decreases or increases their peers' gains and whether their performance reports are made public (Maas and van Rinsum 2013). Further research indicates that misreporting increases when the choices of compensation contracts suggest that behaving dishonestly is a social norm (Cardinaels and Yin 2015). Other studies suggest that personality

Table 16 Overview of articles on the effects of incentive system design choices on misreporting, honesty, and whistleblowing

Article	Research method	Psychology subfield	Psychological theories or concepts
Chen and Sandino (2012)	Archival	Social	Social norms
Maas and van Rinsum (2013)	Laboratory experiment	Social	Social norms
Cardinaels and Yin (2015)	Laboratory experiment	Social	Social norms
Chen et al. (2017)	Laboratory experiment	Social	Social norms
Chong and Wang (2019)	Survey	Social/personality	Moral disengagement; responsibility rationalization
Nichol (2019)	Laboratory experiment	Personality	Psychological entitlement

Table 17 Overview of articles on budgeting and the use of budgets

Article	Research method	Psychology subfield	Psychological theories or concepts
Poon et al. (2001)	Case study	Social	Goal interdependence theory
Marginson and Ogden (2005)	Case study	Social	Empowerment; role ambiguity
Wong-On-Wing et al. (2010)	Case study	Motivation	Self-determination theory
Venkatesh and Blaskovich (2012)	Survey	Positive psychology	Psychological capital
Chong and Mahama 2014	Survey	Social	Team effectiveness; social facilitation

aspects also affect misreporting (e.g., Chong and Wang 2019; Nichol 2019). Nichol (2019) investigates the effects of incentive contract framing on misreporting and the personality trait of psychological entitlement. Psychological entitlement can be seen as believing that one has a right to receive something (Major 1995; Nichol 2019). Nichol's (2019) results suggest that misreporting is higher under a penalty contract and occurs owing to a feeling of entitlement to monetary payoffs.

4.2.3 Budgeting

Budgeting and the use of budgets Five articles in our dataset consider budgeting and the use of budgets, and three of them address the effects of participation in the budgeting process. All five articles are presented in Table 17. Social psychology is the predominant subfield, but no one theory or concept predominates. Studies of the benefits of participating in the budgeting process (e.g., Wong-On-Wing et al. 2010; Venkatesh and Blaskovich 2012) also rely on motivation and positive psychology.¹⁶

Wong-On-Wing et al.'s (2010) study employs self-determination theory in a participative budgeting setting. Their findings are similar to those of studies of participation in PMS design (e.g., Groen et al. 2017). Wong-On-Wing et al. (2010) provide evidence that intrinsic and autonomous extrinsic motivations for participative budgeting positively influence individual performance. They also suggest that controlled extrinsic motivation is negatively associated with individual performance.

Venkatesh and Blaskovich (2012) study participation in the budgeting process from a different perspective. Their survey focuses on the relation between participation, psychological capital, and individual performance. Psychological capital thereby represents a positive stage of psychological development that can be characterized by an individual's levels of hope, efficacy, optimism, and resiliency. They

¹⁶ Essentially, positive psychology focuses on subjective experiences, such as well-being or hope; positive individual traits, such as courage or forgiveness; and moving individuals towards better citizenship (Seligman and Csikszentmihalyi 2000).

provide evidence that participation positively affects psychological capital, which, in turn, positively affects individual performance (Venkatesh and Blaskovich 2012). Other psychology-based studies suggest that budgets have positive effects on job experience (Marginson and Ogden 2005) or team effectiveness (Chong and Mahama 2014).

Budgetary slack and honesty The twelve articles presented in Table 18 address the phenomena of budgetary slack or honesty. Most articles on these subtopics investigate participative budgeting settings and were published after 2010; three were published as recently as the first half of 2019. We find a strong focus on social psychology and the concept of social norms therein (e.g., Fisher et al. 2000; Stevens 2002; Brown et al. 2017; Blay et al. 2019).

Social norms are used to provide evidence that the aspects of the participative budgeting process (Fisher et al. 2000), reputation and feelings of ethical responsibility (Stevens 2002), preferences for honesty (Blay et al. 2019) and the choice of who sets the budget (Brown et al. 2017) reduce slack or positively influence performance.

Additionally, honesty is examined based on a variety of theories and concepts (e.g., Church et al. 2012; Brown et al. 2014; Church et al. 2019). These findings suggest that factors such as managers' profits from dishonesty (Church et al. 2019) and the provision of rankings (Brown et al. 2014) affect the creation of slack.

Interestingly, personality aspects are addressed rather frequently in these studies (e.g., Hartmann and Maas 2010; Hobson et al. 2011; Davidson 2019). Hartmann

Table 18 Overview of articles on budgetary slack

Article	Research method	Psychology subfield	Psychological theories or concepts
Fisher et al. (2000)	Laboratory experiment	Social	Social norms
Stevens (2002)	Laboratory experiment	Social	Social norms
Hartmann and Maas (2010)	Laboratory experiment	Social/personality	Social pressure; Machiavellianism
Hobson et al. (2011)	Laboratory experiment	Social/personality/ cognitive	Moral judgment; empathy; moral decision-making theory
Church et al. (2012)	Laboratory experiment	Social	Moral disengagement theory
Brown et al. (2014)	Laboratory experiment	Social	Social comparison theory
De Baerdemaeker and Bruggeman (2015)	Survey	Motivation/industrial and organizational psychology	Self-determination theory; organizational commitment
Brown et al. (2017)	Laboratory experiment	Social	Social norms
Boster et al. (2018)	Laboratory experiment	Motivation	Crowding theory
Blay et al. (2019)	Laboratory experiment	Social	Social norms; affect
Church et al. (2019)	Laboratory experiment	Social/cognitive	Self-interest; psychological conflict
Davidson (2019)	Laboratory experiment	Personality	Social value orientation

and Maas (2010) also consider social pressure and Machiavellianism in the examination of slack. Machiavellianism refers to an individual's tendency to act based on self-profit and refrain from ethical considerations (Schepers 2003; Hartmann and Maas 2010). Hartmann and Mass (2010) suggest that high levels of Machiavellianism may lead to a higher likelihood of giving into management pressure to create slack. Hobson et al. (2011) also investigate ethical considerations regarding slack in participative budgeting. Their findings indicate that personalities reflecting high levels of traditional values and empathy are more likely to consider slack unethical. However, although they find that participants judge slack to be unethical on average, they show that participants still create slack under a slack-inducing pay scheme, although they do not do so under a truth-inducing pay scheme (Hobson et al. 2011). Furthermore, evidence suggests that social-value orientation affects honesty. Davidson (2019) examines the influence of personality on managerial reporting behavior in the context of hiring choices and budget signing requirements. He distinguishes between two types of social value orientation and shows that these types also exhibit differences in honesty.

4.2.4 Organizational control

Use of formal and informal controls in organizational control systems The eight articles shown in Table 19 focus on the use of formal and informal controls in organizational control systems. Our analysis shows that social psychological theories and concepts (e.g., Coletti et al. 2005; Anderson et al. 2017) are predominantly employed by these studies.

Additionally, formal and informal controls are studied in terms of their potential effects on motivation and creativity (Christ et al. 2012; Grabner and Speckbacher 2016; Pfister and Lukka 2019). Regarding the use of social psychology, some

Table 19 Overview of articles on the use of formal and informal controls in organizational control systems

Article	Research method	Psychology subfield	Psychological theories or concepts
Coletti et al. (2005)	Laboratory experiment	Social	Attribution theory
Taylor and Bloomfield (2011)	Laboratory experiment	Social	Social norms
Christ et al. (2012)	Laboratory experiment	Motivation	Motivational framing
Christ (2013)	Laboratory experiment	Social	Social norms
Grabner and Speckbacher (2016)	Survey	Motivation	Intrinsic motivation; cognitive evaluation theory
Anderson et al. (2017)	Laboratory experiment	Social	Cognitive dissonance theory; attribution theory
Bhattacharjee and Moreno (2017)	Laboratory experiment	Social	Emotions
Pfister and Lukka (2019)	Field study	Motivation	Self-determination theory

researchers rely on social norms to provide evidence that formal controls influence people's perceptions of appropriate behavior (Tayler and Bloomfield 2011). Other researchers show that the way that formal controls are imposed determines their effects on employee effort (Christ 2013). Moreover, research based on social psychology suggests that emotional signals, such as anger or satisfaction, affect accounting-based transfer pricing decisions (Bhattacharjee and Moreno 2017). Attribution theory is also used in the context of formal controls (e.g., Coletti et al. 2005; Anderson et al. 2017). According to attribution theory, individuals try to make causal attributions about other individuals' behavior to eventually understand their motivations (Coletti et al. 2005; Anderson et al. 2017). Coletti et al. (2005) employ this theory in a setting with collaboration between divisions. They find that strong initially present formal control systems induce cooperation between divisions, thereby improve trust between collaborators. Interestingly, Anderson et al. (2017) provide evidence that initial trust decreases expenditures on formal controls and simultaneously increases investment in the cooperation in new interfirm relationships. Trust seems to help with causal attributions about behavior and, thus, helps to intensify cooperation.

Project controls, internal control systems, interfirm transactions, and revisions

Table 20 provides information on articles that address organizational controls in terms of project controls, internal control systems, interfirm transactions, and system revisions. These subtopics are examined using cognitive and personality psychology and motivation theory. For instance, psychology-based research uses the cognitive concept of mental representation in a study of recommendations to continue a project (e.g., Kadous and Sedor 2003).

Birnberg and Zhang (2011) focus on the effects of economic conditions and psychological factors on a principal's internal control system choices. They investigate the impact of betrayal aversion, a tendency to experience disutility from potentially being exploited by others, and the concept of loss aversion, taken from prospect theory. Their findings indicate that both factors influence decisions (Birnberg and Zhang 2011). Ylinen and Gullkvist (2012) adapt the personality concept of tolerance for ambiguity to examine the use of project controls. Their findings suggest that tolerance for ambiguity is an important factor in the use of project controls, as managers choose project controls based on their tolerance for ambiguity.

Table 20 Overview of articles on project controls, internal control systems, interfirm transactions, and revisions

Article	Research method	Psychology subfield	Psychological theories or concepts
Kadous and Sedor (2003)	Laboratory experiment	Cognitive	Mental representations
Birnberg and Zhang (2011)	Laboratory experiment	Cognitive	Prospect theory; betrayal aversion; loss aversion
Ylinen and Gullkvist (2012)	Survey	Personality	Tolerance for ambiguity
Thomas (2016)	Laboratory experiment	Motivation	Goal priming theory

Additionally, the motivational goal priming theory is used to examine ways to motivate individual effort in management accounting system revisions (Thomas 2016).

4.2.5 Decision-making

Capital investment decisions The articles shown in Table 21 address capital investment decisions. All three experimental studies incorporate a form of affect, a concept derived from social psychology.

Kida et al. (2001) show that affective reactions (i.e., emotional reactions, such as anger) influence capital investment decisions. Furthermore, their findings indicate that managers tend to reject alternatives that elicit negative emotional reactions even if they have higher expected financial utility (Kida et al. 2001). Moreno et al. (2002) demonstrate similar behavioral responses in a subsequent field experiment. Building on prospect theory, they find that negative and positive affective reactions change risk-taking behavior. This behavior is expressed by managers' tendency to choose decisions that elicit positive affect and, thus, exhibit greater risk-taking behavior. (Moreno et al. 2002). Additionally, negative affect should be considered in the context of difficult decisions, as it is associated with the tendency to avoid choices (Sawers 2005).

Decision-making quality Table 22 provides an overview of articles on decision-making quality and the use of psychological theories in studies of decision-making. Our analysis reveals a focus on cognitive psychology.

Chang et al. (2002) show that cognitive theories, such as prospect theory, fuzzy-trace theory, and probabilistic mental models, can be used to explain framing effects in a decision-making context. Although they posit that the fuzzy-trace theory best depicts the effects of framing on behavior in an accounting context (Chang et al. 2002), we do not identify other articles building on this theory. Recent articles build on mental models to find that causal linkages and time delay information in strategy maps affect decision-making quality and, thus, long-term profit performance (Humphreys et al. 2016). A similar study examines the effects of different forms of accountability and causal chain framing on information search processes and decision-making quality. Dalla Via et al.'s (2019) eye-tracking laboratory experiment reveals that, on the one hand, the provision of a causal chain is paramount to achieve high decision quality under outcome accountability. On the other hand, providing such a causal chain reduces information search effort and does not improve decision-making quality under process accountability (Dalla Via et al. 2019). Furthermore, studies examine the effects of personality traits on decision quality. Specifically, the

Table 21 Overview of articles on capital investment decisions

Article	Research method	Psychology subfield	Psychological theories or concepts
Kida et al. (2001)	Field experiment	Social	Emotional affective reactions
Moreno et al. (2002)	Field experiment	Social/cognitive	Prospect theory; affective reactions
Sawers (2005)	Laboratory experiment	Social	Negative affect

Table 22 Overview of articles on decision-making quality

Article	Research method	Psychology subfield	Psychological theories or concepts
Chang et al. (2002)	Laboratory experiment	Cognitive	Prospect theory, fuzzy-trace theory; probabilistic mental models
Cheng et al. (2003)	Laboratory experiment	Cognitive/personality	Cognitive style; Myers-Briggs type
Humphreys et al. (2016)	Laboratory experiment	Cognitive	Mental models
Dalla Via et al. (2019)	Laboratory experiment	Cognitive	Causal reasoning theory

Table 23 Overview of strategic MAC articles

Article	Research method	Psychology subfield	Psychological theories or concepts
Webb (2004)	Field experiment	Motivation	Goal commitment; Self efficacy
Burney and Widener (2007)	Survey	Social	Role ambiguity
Taylor (2010)	Laboratory experiment	Social	Motivated reasoning
Choi et al. (2012)	Laboratory experiment	Cognitive	Attribute substitution theory
Burney and Widener (2013)	Field study	Social/motivation/positive psychology	Exchange theory; intrinsic motivation; goal setting theory
Choi et al. (2013)	Laboratory experiment	Cognitive	Attribute substitution theory

Myers-Briggs type indicator is used to classify subjects according to their preferred cognitive styles (Cheng et al. 2003).

4.2.6 Strategic MAC

In total, we analyze six articles on strategic MAC. Three of them illuminate the relations between strategic performance measurement systems (SPMSs) and behavioral responses (i.e., commitment to goals, individual performance, or psychological factors, such as role stress). The other three investigate the evaluation of strategies using SPMS and managers' use of strategic performance measures and their characteristics. Although SPMS seem to affect motivational factors, such as goal commitment (e.g., Webb 2004), we find a pronounced use of social and cognitive theories. Table 23 provides an overview of these articles.

The social concepts and theories used by these studies range from role theory (Burney and Widener 2007) to exchange theory (Burney and Widener 2013) and motivated reasoning (Taylor 2010). Taylor (2010) examines ways to mitigate motivated reasoning, that is, a manager's preference for arriving at a certain conclusion. He finds that a combination of involving managers in the selection of BSC measures

Table 24 Overview of articles on costing systems

Article	Research method	Psychology subfield	Psychological theories or concepts
Jermias (2001)	Laboratory experiment	Social	Cognitive dissonance theory
Dearman and Shields (2005)	Laboratory experiment	Cognitive	Cognitive adaption
Mahama and Cheng (2013)	Survey	Social/motivation	Psychological empowerment; self-determination theory
Hoozée and Ngo (2018)	Survey	Motivation	Self-determination theory

and simultaneously framing them as a causal chain can reduce motivated reasoning in strategy assessments (Tayler 2010). Two studies investigate the consequences of strategies that have been translated into performance measures. When managers are not fully aware that such measures only represent strategic constructs, they may treat representative measures as constructs of interest, a phenomenon explained by attribute substitution theory (Kahneman and Frederick 2008; Choi et al. 2012). Choi et al. (2012, 2013) refer to this phenomenon as strategy surrogation. These studies show that compensating managers based on a single measure of a strategic construct increases the propensity to use that specific measure as a surrogate for the strategic construct and, thus, incur potential costs (Choi et al. 2012). However, involvement in strategy selection mitigates this strategy surrogation effect (Choi et al. 2013).

4.2.7 Costing systems

We identify four articles on costing system subtopics. These articles employ concepts from social, cognitive, and motivation psychology to examine either the use and usefulness of costing systems or the effects of participating in costing system design. Table 24 provides an overview.

For instance, cognitive psychology-based research provides evidence that cognitive adaptations to changes in costing methods are rather unusual for most individuals (Dearman and Shields 2005). Additionally, this research employs cognitive dissonance theory, which posits that individuals aim to ensure that their behavior is consistent with their attitudes towards certain events and therefore appears reasonable to themselves and others (Festinger 1957; Jermias 2001). Jermias (2001) provides evidence that commitment to a costing system influences the perceived usefulness of this system. Mahama and Cheng (2013) provide similar implications based on psychological empowerment and self-determination theory. They find that when managers perceive a costing system as more enabling, they use it more intensely. Complementing other research on participation (e.g., Wong-On-Wing et al. 2010; Groen et al. 2017), Hoozée and Ngo (2018) build on self-determination theory in the context of costing systems. Their findings indicate similar positive effects on autonomous motivation as well as effects on the perceived usefulness of cost information and the perceived contributions to process improvements.

Table 25 Overview of articles on roles in management control systems

Article	Research method	Psychology subfield	Psychological theories or concepts
Byrne and Pierce (2007)	Field study	Social	Role theory
Maas and Matějka (2009)	Survey	Social/industrial and organizational psychology	Role theory; role stress; role conflict
Marginson and Bui (2009)	Case study	Social	Role theory
Hiller et al. (2014)	Survey	Social	Social identity theory

4.2.8 Roles in management control systems

Four studies describe the consequences of role expectations within management control systems and, thus, predominantly rely on role theory. Table 25 provides additional information.

Role theory considers role expectations in organizations. It posits that central organizational roles are determined by the expectations of other members of the organization (Kahn et al. 1964; Byrne and Pierce 2007). These expectations can cause role ambiguity, role conflict, and role stress, which eventually affect performance negatively (Kahn et al. 1964; Marginson and Bui 2009).

Byrne and Pierce (2007) build on role theory and find that interactions between management accountants and operating managers may be subject to contingencies and conflicts. Furthermore, adopting a “business partner” role seems conditional and uncertain. Research based on this theory further suggests that the need to fulfill expectations for multiple roles may lead to higher levels of role conflict and role ambiguity for management accountants and other organizational members (Maas and Matějka 2009; Marginson and Bui 2009).

In addition to diverse role expectations, a management accountant’s occupational prestige may also determine specific conflicts between organizational and professional demands. Beyond role theory, Hiller et al. (2014) provide evidence that aspects of social identity may decrease conflict and turnover intentions.

5 Discussion and avenues for future research

Our findings indicate a great diversity regarding topics, psychological theories, and concepts employed. In the following, we discuss implications and avenues for future research. From the eight broader topics presented in this review, aspects of performance measurement and evaluation are examined most frequently. We find evidence that the use of psychological theories differs across performance measurement and evaluation subtopics. For instance, both subtopics subjectivity in performance evaluations and PMS design are strongly influenced by cognitive theories (e.g., Dai et al. 2018; Fehrenbacher et al. 2018; Bedford et al. 2019). Psychology-based research on the provision of RPI instead illuminates social aspects using social comparison

theory (e.g., Hartmann and Schreck 2018) or incorporates negative personality aspects, such as the Dark Triad or negativity bias (e.g., Wang 2017; Kaplan et al. 2018a). Other effects of evaluation processes and outcomes are addressed by considering personality traits, such as tolerance for ambiguity or psychological entitlement (e.g., Holderness et al. 2017), and social phenomena, such as affective reactions (e.g., Ding and Beaulieu 2011). Conversely, motivational aspects, specifically self-determination theory, are relevant when investigating the effects of participation in PMS design. Our findings indicate that more recent research may particularly shift its focus to cognitive and personality theories to illuminate phenomena that are not yet understood. Prior research has discovered many cognitive heuristics and biases, and their negative consequences. Future research could, therefore, address ways to mitigate the negative consequences of the design of PMS or evaluation processes, for example, to support the present heuristic reasoning in a positive way. Furthermore, researchers could incorporate positive psychological traits, such as empathy or humility, to illuminate their influences on evaluation decisions and outcomes.

Aspects of compensation, rewards, and incentives are second-most often examined. Overall, our analysis reveals a stronger emphasis on social aspects in this research stream, than, for example, in the performance measurement and evaluation stream. Specifically, social comparison theory (e.g., Hannan et al. 2008; Knauer et al. 2017), social norms (e.g., Maas and van Rinsum 2013; Chen et al. 2017) and social identity theory (e.g., Sedatole et al. 2016; Tian et al. 2016) are frequently drawn upon. However, researchers also selectively focus on cognitive theories, especially prospect theory and related concepts (e.g., Hirsch et al. 2017; Oblak et al. 2018), to investigate incentive contract design effects. In contrast, earlier research on the provision of feedback and rewards is described based on the motivational theory of self-determination (e.g., Drake et al. 2007; Stone et al. 2010; Kunz and Linder 2012). Although personality aspects were less frequently incorporated in this research in the past, they have been more frequently examined in recent years. Personality traits, such as the need for achievement or psychological entitlement (e.g., Fehrenbacher et al. 2017; Nichol 2019), may offer opportunities to explain behavioral patterns regarding compensation, rewards or incentives that are not yet understood, especially in contexts prone to misreporting and honesty issues. Further research may also benefit from incorporating personality aspects, e.g., psychological entitlement, in areas based mainly on social concepts, such as the effects of tournament incentive schemes. The reactions to tournaments and thereby induced pressure are likely to be contingent on an individual's personality traits and coping mechanisms and, thus, are worth looking into.

Psychological theories are also employed in research concentrating on budgeting, organizational control matters, and decision-making processes. Many psychology-based budgeting studies were published very recently, indicating a recent interest in the psychological aspects of budgeting. Notably, participation is a particularly common research topic in this context. Prior research provides evidence that the psychological reactions induced by participation influence performance and reporting behavior (e.g., Brown et al. 2017; Blay et al. 2019) and should, therefore, be further investigated by future research. However, most research in this field deals with budgetary slack and honesty, two concepts that seem deeply interwoven with

psychology. We find a strong focus on social psychology, and the concept of social norms therein, in both older and more recent budgeting research (e.g., Fisher et al. 2000; Stevens 2002; Brown et al. 2017; Blay et al. 2019). Interestingly, personality aspects are addressed rather often with regard to slack creation and honesty issues (e.g., Hartmann and Maas 2010; Hobson et al. 2011; Davidson 2019). An essential difference from the performance measurement and evaluation literature, which also shows tendencies towards personality psychology, is the consideration of more positive character traits. Interestingly, very few studies in this area draw upon cognitive or motivation psychology. However, we assume that future budgeting research could benefit from the stronger incorporation of theories of heuristics, framing, or motivation, as they may also prove to be relevant for explaining negative behavior (e.g., slack creation or misreporting) and its potential mitigation.

Further, our analysis indicates that although social psychological theories and concepts have a stronger influence on organizational control research, this area also incorporates several motivation theories. This research stream most frequently employs the social concepts of social norms and attribution theory, motivational aspects used include intrinsic motivation and self-determination constructs. Cognitive psychology is only drawn on in organizational control studies published before 2012, and tolerance for ambiguity is the only personality trait incorporated in research on this topic. These findings suggest avenues for future research. Although there is a strong focus on social psychology, some areas may additionally benefit from the incorporation of social aspects. Particularly in the context of project controls and interfirm transactions, individuals' social and personal behavior significantly influences their judgments and, thus, their outcomes. Nevertheless, we did not identify any research that addresses social aspects in this field. Thus, researchers could draw on concepts from, e.g., social identity theory or even role theory, to examine potential dysfunctional behaviors or coordination difficulties between project or transaction parties. Interestingly, research on formal and informal organizational controls does not incorporate cognitive psychology. However, cognitive theories and concepts, such as prospect theory, may provide additional explanations for individual behavior when formal or informal controls are present. Organizational control research also may benefit from determining the influences of a more diverse set of personality traits on behavior. For example, researchers could investigate how a set of traits like, e.g., honesty, agreeableness and conscientiousness, affect transactions or the use of and reaction to informal and formal controls.

Regarding decision-making research, our findings indicate a focus on cognitive psychology and affective reactions. Similar to other subtopics (e.g., performance measurement and evaluation), researchers examine rather negative implications of affect. Future research could, therefore, examine the effects of positive affective reactions in this context and ways to elicit and use them for the benefit of organizations. More recent research incorporates new experimental methods, such as eye-tracking, to examine decision quality. Future research in this field could also combine cognitive and social or personality psychology to identify the effects of character traits (e.g., social value orientation) or existing social norms on decision quality.

Our analysis also reveals implications for psychology-based strategic MAC and costing system research. For instance, we did not identify psychology-based strategic MAC articles published after 2013. Although researchers have shown that psychological aspects are in fact influential, this outcome may suggest that interest in psychological explanations has decreased in this field. We find that psychology-based SPMS research relies mainly on social concepts, followed by cognitive and motivation theories. Interestingly, we do not identify studies that incorporate personality aspects into their examinations of the effects of SPMS even though these aspects have been proven to impact behavior in the context of other MAC subtopics. Thus, future research regarding strategic MAC could investigate how, for example, the commitment to strategic goals or the effectiveness of the translation of strategy into performance measures is contingent on personality traits like, e.g., the dark triad or one's social value orientation.

The small number of analyzed costing system articles provide evidence that social, cognitive, and motivational factors influence perceptions of usefulness and the use of cost information. Further, studies that show the effects of participation in the design process seem to be affected by motivational aspects. However, based on other articles in this review, participation elicits social phenomena as well. Thus, future costing system research may benefit from considering the effects of, e.g., existing social norms. Additionally, researchers could examine potential effects of phenomena like cognitive dissonance, which may be evoked by contradictory beliefs or ideas and actual presented costing information and costing system design. Further, future research could examine whether and how the perceived usefulness and the use of cost information may also be affected by personal characteristics, e.g., one's tolerance for ambiguity.

Besides the aforementioned, researchers use psychology to shed light on the roles of actors in management control systems. We find that psychology-based investigations of role expectations seemingly prompt the use of role theory. However, individuals' methods of coping with expectations and their behavior under stress and ambiguous expectations may also be determined by other factors. We, therefore, believe that the role perceptions of individuals in control systems may relate to positive and negative personality traits, e.g., the dark triad or social value orientation. Furthermore, an individual's cognitive orientation or perceptions of accountability may impact the fulfillment of these roles.

Overall, our results confirm the developments indicated by previous studies (e.g., Hesford et al. 2007; Hopper and Bui 2016; Lachmann et al. 2017): The quantity and proportion of psychology-based MAC research both increased over the investigation period, especially between 2015 and the first half of 2019. Further, we find that the variety of psychology subfields used by MAC studies increases over the investigation period and that this diversity is especially high between 2015 and the first half of 2019. Both findings indicate a growing interest in employing psychological theories and concepts to foster a better understanding of the consequences and effects of MAC practices on behavior. We show that social psychology is the most frequently utilized subfield. We believe this is the case because the research that we examined in this review investigates contexts in which social interactions between individuals are mandatory (e.g., performance evaluations or participative

budgeting). Thus, focusing on and observing social psychological phenomena, such as affective reactions or social comparison processes, offers additional valuable explanations for behavior that may contradict the predictions of traditional economic theory in some cases. Interestingly, many studies rely on more than one psychology subfield to derive theoretical foundations. One possible explanation for this finding may be that psychological processes are so complex that multiple psychological theories are necessary to capture, predict, and examine the effects of specific behavioral phenomena and their facets.

Some psychological theories and concepts within the respective subfields have been employed by researchers more frequently than others have. For example, articles drawing on social psychology build theoretical foundations on social comparison theory (e.g., Hannan et al. 2013; Tafkov 2013; Knauer et al. 2017) or social norms (e.g., Fisher et al. 2000; Maas and van Rinsum 2013; Blay et al. 2019). Prospect theory (e.g., Church et al. 2008; Oblak et al. 2018) and mental models (e.g., Kadous and Sedor 2003; Hall 2011) are among the most frequently employed concepts from cognitive psychology. When examining motivational issues, articles most often build on self-determination theory (e.g., Kunz and Linder 2012; Groen et al. 2017), followed by concepts of intrinsic motivation (e.g., Wong-On-Wing et al. 2010; Christ et al. 2012). We find that personality psychology seems to be of growing interest to researchers. Interestingly, personality psychology is not addressed by previous literature studies (e.g., Birnberg et al. 2007). We identified a rather diverse set of concepts from personality psychology. The concepts of tolerance for ambiguity (e.g., Hartmann and Slapničar 2012) and psychological entitlement (e.g., Nichol 2019) are both employed by several studies. However, according to our analysis, the use of personality psychology, even in combination with other subfields, is restricted to certain MAC topics and subtopics. For example, we do not identify articles employing personality concepts to examine strategic MAC aspects, costing systems, or roles in management control systems.

Regarding research methods, many studies use laboratory experiments. The external validity of such experiments is often questioned owing to concerns regarding the representativeness and generalizability of their results (Sprinkle 2003). Interestingly, we identified very few field experiments, which offer higher generalizability and, thus, higher external validity (Harrison and List 2004). Psychology-based MAC research can, therefore, benefit from researchers venturing into the field. Field experiments can provide additional knowledge and verify existing knowledge under more natural conditions but offer the additional benefits of experimental manipulations (2004; Floyd and List 2016).

Within the MAC topics discussed above, we identified several subtopics that are of greater interest based on the number of articles addressing them. Specifically, subjective performance evaluations and subjective measures (e.g., Kunz 2015; Bol and Leiby 2018), incentive contract framing and compensation contract selection (e.g., Tafkov 2013; Reichert and Woods 2017), and budgetary slack and honesty in budgeting (e.g., Brown et al. 2014; Blay et al. 2019) are very frequently investigated using psychology-based theories. The outcomes and consequences of these studies are deeply influenced by individual judgments and behaviors and, thus,

benefit from the incorporation of theories that offer additional explanations beyond pure economic reasoning. Beyond that, our analysis shows an increase in publications in specific topic categories in recent years. This may be explained by the general increase in the number and share of psychology-based MAC research articles; however, it may also indicate a growing interest in some specific subtopics. The increase is especially pronounced for research on budgetary slack and honesty. Six of the twelve articles on these subtopics were published in or after 2015, and three were even published in the first half of 2019. Further, more than half of all articles included in our review with a background of personality psychology were published between 2016 and 2019. We first identified personality concepts in articles published in 2003 (Cheng et al. 2003). The newer articles focus on a variety of personality aspects, such as psychological entitlement (Holderness et al. 2017; Nichol 2019), social value orientation (Davidson 2019), and responsibility rationalization (Chong and Wang 2019). Although personality traits and their effects on actions do not play a significant role in the economic theory underlying MAC, considering these factors offer an opportunity to provide further insight into the potential effects and influences of MAC practices. The insights of this review into recent MAC research imply that researchers have only begun to incorporate personality aspects, and this incorporation may be accelerating. Conversely, some subtopics have not received much attention in recent years. For instance, the most recent article in the strategic MAC category was published in 2013. Researchers can, therefore, address these thematic fields using new technologies, tested theories, and more recent knowledge to answer unanswered research questions.

Interestingly, there is an overarching theme that evoked psychology-based research across multiple categories. Specifically, we found seventeen articles on participation in different contexts. For instance, we identified articles on participation in PMS design, budget setting, costing system design, and strategic MAC. Interestingly, the concept of participation is already examined by the seminal work of Argyris (1952). Articles on participation incorporate social psychological and motivation theories with almost equal frequency. This offers the opportunity to benefit from already existing psychology-based knowledge. For example, future research on the effects of participation in MAC contexts may use already tested theories and recent knowledge from one setting to find explanations for research questions in other participation-based research settings. Specifically, researchers could, e.g., benefit from the knowledge that participation affects factors like goal commitment and individual performance, and derive research questions regarding the effects of participation in costing system design and use. Further, even though we did not find any personality psychology-based participation research, we believe that such research in PMS design, or costing system design could lead to a better understanding of why such systems may or may not work in practice.

In summary, psychology-based MAC research is diverse regarding its topics, and psychological theories and concepts employed. Based on our review, there are several potentially fruitful avenues for future research in the eight topic categories discussed. Particularly, personality characteristics are likely to influence many MAC-related aspects, but their effects are yet to be examined. Beyond personality characteristics, there are many more already tested psychological theories

and concepts from related fields, that could prove relevant to MAC research. For instance, the concept of accountability, which is examined in, e.g., auditing research or organizational sciences, could also be applied in MAC research. Despite the known influences of accountability in these fields, little MAC research (e.g., Fehrenbacher et al. 2020) has asked and answered accountability related questions. Nevertheless, although there is a seemingly endless variety in promising psychological theories or concepts to draw from, MAC researchers should exercise caution in picking theories and concepts that are reasonably applicable in the MAC context. Therefore, we believe psychology-based MAC research would especially benefit from interdisciplinary exchange, interdisciplinary research teams, and potentially even interdisciplinary education in university courses, in order to continue to deepen our understanding of the effects of MAC practices on behavior.

6 Conclusion

We conclude by reflecting on the contributions and limitations of our systematic literature review. Our work investigates the main foci of and developments in recent psychology-based MAC research. We shed light on which MAC topics are investigated, which research methods are applied in these investigations, and which theories and concepts are used to generate knowledge on the effects of MAC practices from a psychological perspective. We achieved this through a structured material collection and a subsequent in-depth content analysis of relevant articles published between 2000 and 2019. We thereby identified 125 relevant articles out of a total of 5247 articles from nine leading accounting journals. In our subsequent content analysis, we focused on determining the theoretical perspectives, research methods, and main findings of each included article. Additionally, all 125 articles were categorized in terms of MAC topics, research methods, and psychology subfields, and we discussed possible implications of the recent developments. Thereby, our overview offers a variety of insights into the use of psychology in recent MAC research to further develop the current understanding of the effects of MAC practices. We complement and extend existing discussions of psychology-based studies (e.g., Birnberg et al. 2007; Luft and Shields 2009; Kaplan et al. 2018b) by including articles that draw upon theories and concepts from four bigger subfields of psychology. Therefore, we discuss articles employing theories or concepts from the previously examined subfields of social psychology, cognitive psychology and motivation theory. In addition, we significantly extend the scope of prior studies by including articles that draw upon personality psychology, multiple subfields, and several smaller subfields. To our knowledge, this review is the first to systematically collect, analyze, and synthesize such a broad spectrum of psychology-based research from the selected journals to illuminate the characteristics and knowledge generation of this research stream during this time period. Further, we draw a picture of an evolving research landscape, with several future research opportunities, as well as emerging new facets, e.g., the growing influence of personality psychology or participation in various MAC contexts. Moreover, by synthesizing and contextualizing 125 articles, we show that there are specific domains, where reactions to implemented MAC practices are

significantly affected by psychological aspects. Among others, reactions to, e.g., PME systems, compensation, rewards or incentives benefit from psychology-based explanations of behavioral patterns. For instance, following basic economic theory, incentivizing should motivate favorable behavior; however, there may be, e.g., social aspects like existing social norms, that reinforce or aggravate the assumed behavioral reactions. Thus, our findings advocate the consideration of such aspects and may provide food for thought for practitioners, and the design and implementation of MAC practices beyond common economics-based recommendations.

Nevertheless, we recognize that our systematic review is subject to some limitations. The selection criteria and the selection process itself are designed to include only a fraction of recent MAC research. Especially owing to the restrictions on journals and the publication period, potentially relevant articles that do not meet the proposed criteria are excluded a priori. Moreover, the journal selection, which is based on leading accounting journals and prior research (e.g., Hesford et al. 2007; Lachmann et al. 2017), is not exhaustive and may be adjusted by future reviews. The article selection was conducted using the best of our knowledge, but it nevertheless relies on our subjective judgments of inclusion eligibility. Furthermore, our analysis relies on the simultaneous investigation of MAC topics, psychological concepts, and the research methods employed, which generates a comprehensive overview of the trends and main themes in this stream of research but may also hinder more detailed investigations of specific topics or concepts. Future research may complement our work with more specific reviews, potentially focusing, for instance, on experimental studies employing social or cognitive concepts.

Regardless of these limitations, we believe that our review is a valuable resource for researchers and practitioners seeking an overview of the knowledge in the MAC field that has been generated by drawing on different subfields of psychology. By offering insights into this stream of MAC research, this review may encourage researchers to investigate future developments in this field or even to conduct psychology-based MAC research themselves.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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Appendix 1: Overview of coding dimensions, categories and subcategories

Subject of coding All articles marked as “included” after scanning relevant articles for final inclusion criteria

Code 1: Topic

Description:	<p>Refers to the subfield of MAC that the primarily examined topics can be assigned to</p> <p>The topic categories were developed based on prior literature (e.g., Hesford et al. 2007; Lachmann et al. 2017; Shields 1997) and findings of the content analysis of our included articles</p> <p>To describe the subjects in greater detail, the topics of the included articles were recorded in detail during content analysis and harmonized afterwards. Thereby, the identified topics have been summarized under several generic terms to further classify the articles into the respective categories</p>	
Category 1	Budgeting	Includes articles on, e.g., budgetary slack, participative budgeting or budget reporting
Category 2	Compensation, rewards and incentives	Includes articles on, e.g., the design of compensation contracts or choices regarding reward types and incentives
Category 3	Costing systems	Includes articles on, e.g., participation in costing system design, effects of costing system change or costing system choices
Category 4	Decision-making	Includes articles on, e.g., factors that influence decision-making processes and decision quality
Category 5	Organizational control	Includes articles on, e.g., internal control systems, project controls, creativity controls, and other internal control systems not covered by the other categories of this review
Category 6	Performance measurement and evaluation	Includes articles on the evaluation process and its outcomes, e.g., effects of subjectivity in weighting performance measures on employee performance, or on performance measurement system design, e.g., the choice of performance measures
Category 7	Roles in management control systems	Includes articles on the role perception of management accountants
Category 8	Strategic management accounting and control	Includes articles on strategic performance measurement systems

Code 2: Subfield of psychology

Description:	Refers to the subfield of psychology that the employed psychological theories and concepts originated from. The psychological concepts were identified in the titles, keywords, abstract or full text of the respective article. The basic framework for code 2 relies on the often-researched psychological theories and constructs from Birnberg et al. (2007)'s comprehensive overview. During the content analysis, two additional categories, i.e., personality and multiple, were added	
Category 1	Social	Studies employing concepts derived from the domain of social psychology, its theories and phenomena
Category 2	Cognitive	Studies employing concepts derived from the domain of cognitive psychology, its theories and phenomena
Category 3	Motivation	Studies employing concepts derived from motivational theories and associated phenomena
Category 4	Personality	Studies employing concepts derived from the domain of personality psychology, its theories and phenomena
Category 5	Multiple	Studies employing multiple concepts derived from more than one of the abovementioned dimensions or single concepts based on more than one of the abovementioned dimensions

Code 3: Research method

Description:	Refers to the research methods employed Relies on the categorization scheme of Lachmann et al. (2017), who use a modified version of the categorization scheme by Hesford et al. (2007)	
Category 1	Survey	Studies collecting data using standardized (online) questionnaires disseminated by mail or e-mail (Lachmann et al. 2017; Van der Stede et al. 2007; Birnberg and Shields 1990)

Category 2	Experiment	<p>Studies involving manipulations of independent variables and observations of their effects on dependent variables (Hesford et al. 2007; Lachmann et al. 2017; Birnberg and Shields 1990). Further, this review distinguishes between laboratory experiments and field experiments</p> <p>Laboratory experiments occur in a setting primarily created to conduct research with a standard subject pool, i.e. students (Harrison and List 2004; Birnberg and Shields 1990). The laboratory experiments-category also comprises online experiments. Harrison and List (2004) name six factors that can be used to distinguish between laboratory and field experiments: the subject pool, information the subjects bring to the experimental task, nature of the commodity, nature of the experimental task, nature of the stakes and the nature of the experimental environment (Floyd and List 2016). We follow the classification scheme by Harrison and List (2004) and the remarks of Floyd and List (2016) and refer to an experiment with a non-standard subject pool, e.g., managers, as field experiments in terms of this review</p>
Category 3	Field study	<p>Investigations of more than one organization employing techniques such as interviews, observations and internal documents. It occurs in natural settings not created primarily for conducting research (Hesford et al. 2007; Lachmann et al. 2017; Birnberg and Shields 1990)</p>
Category 4	Archival study	<p>Studies using publicly available or proprietary data as the primary data source and applying quantitative methods to analyze these data (Moers 2007; Lachmann et al. 2017)</p>

Category 5	Case study	Investigations within one single organization, employing techniques such as interviews, observations, and internal documents. It occurs in natural settings not created primarily for conducting research (Hesford et al. 2007; Lachmann et al. 2017; Birnberg and Shields 1990)
Category 6	Multiple	Articles applying more than one research method

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