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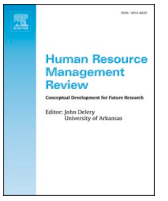

Time is of the essence: Improving the conceptualization and measurement of time

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ABSTRACT

We advance the understanding and measurement of the concept of time by offering a taxonomy of four distinct time constructs: *duration*, *frequency*, *timing*, and *sequence*. On the basis of a literature review of human resource management and allied fields (i.e., organizational behavior, industrial and organizational psychology, general management, entrepreneurship, and strategic management studies), we offer recommendations on how to measure each construct as well as illustrations drawn from different domains and theories on how these recommendations can be implemented. In addition, for each construct, we offer specific, practical, and actionable recommendations regarding critical design choices, dilemmas, and trade-offs that must be considered when investigating time conceptually and empirically. We discuss these recommendations in the form of a sequential decision-making process that can be used as a roadmap by researchers. We hope our conceptualization and recommendations will serve as a catalyst and useful resource for future conceptual and empirical research that aims to formulate better time-sensitive and temporally falsifiable theories.

1. Introduction

Time is critical to human resource management (HRM) theories and research. For example, work-family conflict consists of a series of episodes of work interference with family and family interference with work (Shockley & Allen, 2015), expatriate adjustment is a process that unfolds over time (Kraimer, Bolino, & Mead, 2016), person-organization fit and affective reactions to fit are time-dependent (Gabriel, Diefendorff, Chandler, Moran, & Greguras, 2014), and star performers are produced and emerge over time (Aguinis, Ji, & Joo, 2018). Because of its centrality in organizational life and human activity in general, we have seen repeated calls to pay more attention to time and to study time explicitly (e.g., Ancona, Goodman, Lawrence, & Tushman, 2001; Bakker, 2010; Bluedorn & Denhardt, 1988; Boswell, Shipp, Payne, & Culbertson, 2009; Bridoux, Smith, & Grimm, 2013; George & Jones, 2000; Kenis, Janowicz-Panjaitan, & Cambré, 2009; Leroy, Shipp, Blount, & Licht, 2015; Shipp & Cole, 2015). However, in spite of these repeated "calls to arms," the study of time in HRM and other fields remains challenging because we have yet to develop an unambiguous and explicit conceptual definition of time and we lack clear operational definitions of time. Also, from a practical standpoint, incorporating time explicitly in empirical research requires additional effort and resources, which makes this type of research costly (Balkundi & Harrison, 2006).

The goal of our article is to advance the understanding and measurement of clock (i.e., objective) time by unpacking the construct

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of time, and by offering recommendations on how to investigate time conceptually and empirically.[1] In addition, from a practical standpoint, we offer specific and actionable recommendations that will facilitate future empirical research. Our goal is to make a contribution to not only HRM but also related fields including organizational behavior, industrial and organizational psychology, general management, entrepreneurship, and strategic management studies.

Clearly, it is not the case that prior work has not studied time: there are several exemplary studies that have conceptualized and operationalized specific temporal constructs in an insightful and effective manner. Yet, what we know seems highly fragmented and unsystematic. Building on excellent prior work in this area (Ancona et al., 2001; George & Jones, 2000; Mitchell & James, 2001; Mosakowski & Earley, 2000; Shipp & Cole, 2015; Zaheer, Albert, & Zaheer, 1999), we integrate what we know and offer recommendations that can be used as a roadmap by researchers interested in conducting research that considers time explicitly.

2. The present conceptualization and contributions

An important motivation for our conceptualization is that there is a need to "measure, rather than presume" (Grzymala-Busse, 2011, p. 1272) temporal aspects. For example, time has been conceptualized as linear duration, such as the number of years that pass after the occurrence of an important industry event (e.g., Chittoor, Sarkar, Ray, & Aulakh, 2009), but also as a more malleable and complex concept, such as in the case of studying the intricate ways actors "time" their behavior relative to that of others (e.g., Adair & Brett, 2005). Not considering time explicitly both conceptually and operationally is an obstacle to building and testing theory because it prevents understanding the processes, sequences, and mechanisms by which events unfold and constructs relate to one another.

To address these challenges, we discuss issues regarding (1) theory (i.e., how to define time conceptually), (2) design (i.e., why and how various time constructs can be included in a study), and (3) measurement (i.e., how to measure time given a particular conceptual definition). Regarding theory, we unpack the abstract notion of time and offer a conceptual taxonomy including four distinct constructs that relate to temporality: *duration*, *frequency*, *timing*, and *sequence*. Regarding design and measurement, we focus on how duration, frequency, timing, and sequence can be included in a study's design and also how to measure each.

Our conceptualization makes the following contributions. First, by offering a conceptualization and operationalization of time, we facilitate the formulation of more precise, temporally falsifiable theories (Aguinis & Edwards, 2014). Mitchell and James (2001, p. 544) asserted that "few if any of our theories are ever disconfirmed." We demonstrate how causal effects should be distinguished from temporal effects and how either can be falsified empirically. In addition, we offer recommendations about formulating hypotheses that are not only causally but also temporally falsifiable by specifying, for example, the duration and time lag of an effect between two constructs, their frequency of occurrence, the acceleration or deceleration of a process over time, the effect of the timing of an intervention, and the expected sequence of a series of events.

A second contribution of our conceptualization is that we hope to facilitate future empirical research that investigates time explicitly by offering concrete, actionable, and practical recommendations regarding design and measurement issues. Presently, many articles published in some of the most prestigious journals in HRM and allied fields lament the lack of consideration of time and the use of cross-sectional designs (e.g., Aguinis & Lawal, 2012; Brutus, Aguinis, & Wassmer, 2013). However, in spite of those statements of need, usually in an article's Limitations and Future Directions sections, the situation remains mostly unchanged. The question is: *Why*? We believe that an important reason is the lack of clear and practical guidance on how to investigate time empirically.

The remainder of our article is structured as follows. First, we discuss the role of time from a theory perspective. Second, we rely on results of a literature review of influential time papers to offer recommendations on how to investigate time conceptually and empirically. To make these recommendations useful and actionable, we present them in a sequential form, like a roadmap, and include questions that researchers should ask as they proceed through the conceptual, design, and measurement stages of a study. These questions are also useful to those interested in conceptual and theory development efforts that do not involve data collection and analysis. Finally, we provide a discussion of implications of our review and analysis for the development of time-sensitive and temporally-falsifiable theory.

3. What is time? A taxonomy of four time constructs

Time is all around us—yet it is difficult to capture, define, or even put into words (Aeon & Aguinis, 2017). This elusiveness impedes theory advancement for several reasons. First, if we ignore, miss, or underspecify the role of time, we may overlook important independent and dependent variables (Ancona et al., 2001). As an example, Becker, Connolly, and Slaughter (2010) identified the timing of a job offer as a critical antecedent to offer acceptance.

Second, if we do not adequately capture time, we do not gain an understanding of the temporal dynamics of the relation between independent and dependent variables. For example, we do not know whether an effect has a specific limited duration (George & Jones, 2000) or what is the appropriate time lag to theorize and observe an effect (McGrath, 1988). For example, Waller's (1999) work on airline crews suggested that the effect of task prioritization in response to a non-routine event on crew performance is subject to timing:

[1] Similar to Mitchell and James (2001), our focus is on time as an objective phenomenon. We understand objective time as being independent from human beings, unitary and quantitative, and something that can be meaningfully counted, which is often referred to as "clock time" (Clark, 1985; Lee & Liebenau, 1999; Orlikowski & Yates, 2002). In contrast, subjective notions of time relate to, for example, perceptions of time and temporal focus (Shipp et al., 2009), a person's willingness to adapt one's pace and rhythm to that of a group (Leroy et al., 2015), and individual and group-based perceptions of a deadline (Waller, Conte, Gibson, & Carpenter, 2001). In our view, neither viewpoint is superior per se.

task prioritization only influenced crew performance if the prioritization occurred quickly after the non-routine event, but not afterward.

Third, when temporal constructs are not specified, decisions about when to measure and how frequently to measure critical variables are left to "intuition, chance, convenience, or tradition" (Mitchell & James, 2001, p. 533) and none of these is a particularly good reason. For example, very few studies elaborate on why a specific observation window, frequency of observation, or time lag between observations was chosen—even though these are critical research design decisions (see Kammeyer-Mueller, Wanberg, Glomb, & Ahlburg, 2005, for a rare exception).

Finally, when time is not adequately captured, we miss any "agency" that actors have in shaping aspects of temporality. Aspects of temporality "do not simply arise out of inexorable structures or inherent qualities" (Grzymala-Busse, 2011, p. 1273). Instead, actors often have a degree of control in the way processes are temporally designed, spaced, and executed. For example, entrepreneurs time when to initiate a venture on the basis of constructing time-calibrated internal narratives (Wood, Bakker, & Fisher, 2020). Also, while they cannot increase the overall amount of time available to them, individuals can deliberately space activities in time and also choose how much time to spend with their families or at work (Barnes, Wagner, & Ghumman, 2012).

In the following, we first discuss time conceptually and offer a taxonomy. As a preview and summary, Table 1 includes the four time constructs, their conceptual and operational definitions, and examples of each from published research in HRM and allied fields.

4. Duration

4.1. Conceptual definition

Duration refers to the *temporal length* of a phenomenon, event, or process. Examples include the amount of time that elapses between the start and end of an intervention, the time that an effect of a variable on another variable persists, or the total temporal length of a research study (Grzymala-Busse, 2011). For example, the process of expatriate adjustment has been studied mostly among employees who go to a foreign country to live and work for at least one year (e.g., Kraimer et al., 2016). Bhaskar-Shrinivas, Harrison, Shaffer, and Luk (2005) found that, on average, it takes expatriates about four years to adjust to the new country's culture after which the curve of cultural adjustment stabilizes. In strategy, Choi and Wang (2009) found that good stakeholder relations extend the duration of firm superior financial performance. As an example in entrepreneurship, Beckman and Burton (2008) studied the amount

Table 1
A taxonomy of time constructs: conceptual and operational definitions.

Time construct	Conceptual definition	Operational definitions	Examples
Duration	The *temporal length* of a phenomenon, event, or process	Time units such as seconds, minutes, hours, days, weeks, months, or years	■ The duration of the process of expatriate adjustment (Bhaskar-Shrinivas et al., 2005) ■ The duration of superior and inferior firm financial performance (Choi & Wang, 2009) ■ The temporal length it takes founding teams to receive venture capital and to reach the IPO stage (Beckman & Burton, 2008)
Frequency	The *number of times* a phenomenon, event, or process occurs over the course of a timeline	Number of times events occur over a specific period	■ The frequency of heavy episodic drinking over a one-month period and its relation to workplace absenteeism (Bacharach et al., 2010) ■ The number of times firms invest in R&D to develop their technological capabilities over a 12-year period to develop their technological capabilities (Cuervo-Cazurra & Un, 2010)
Timing	*When* something occurs—its specific placement on a timeline	Points in time such as early morning, on May 5th, right after a merger, or during market expansion	■ The timing of extending a job offer following an interview (Becker et al., 2010) ■ Entrepreneurs who craft narratives including a proximal date for initiating an entrepreneurial endeavor are more likely to take entrepreneurial action compared to those who envision a more distal date (Wood et al., 2020)
Sequence	The *temporal ordering* of phenomena, events, and processes	Time order—the order in which phenomena occur	■ The temporal ordering of individuals' job attitudes, behavioral criteria, lateness, absence, and turnover (Harrison et al., 2006) ■ The ordering of affect and creativity (Amabile et al., 2005) ■ The ordering of exploration and exploitation activities in the start-up processes of entrepreneurial new ventures (Davidsson, 2008; Gordon, 2011)

of time it took Silicon Valley founding teams to receive venture capital and to reach the IPO stage and found that more broadly-experienced founding teams achieved such important milestones faster.

Duration delineates how events, phenomena, and processes unfold (Grzymala-Busse, 2011), which has critical consequences because we can reach different conclusions about the direction and impact of phenomena and effects depending on the specified duration of their occurrence (Grzymala-Busse, 2011, p. 1278). For example, self-enhancement beliefs have a positive effect on the experience of positive feelings in the short-term, but not in the long-term (Robins & Beer, 2001). A different example of the same overall principle is that a firm's market-based performance (e.g., stock price) may improve immediately after an acquisition but may worsen later on (Porter, 1989).

Shorter-term and longer-term outcomes also differ depending on the duration of time during which they are observed. That is, a longer duration of observation makes it possible to examine more complex, non-linear effects that result in different outcomes in the longer and shorter term (Pierce & Aguinis, 2013). For example, Bono, Foldes, Vinson, and Muros (2007) studied the duration of the effects of emotional regulation on job satisfaction and stress in health care workers and probed for concurrent, two-hour interval, and four-hour intervals between observations. They found that emotional regulation only had a fleeting (concurrent) effect on job satisfaction, yet a more longer-lasting (two hour) effect on stress. The notion that the duration of observation affects substantive conclusions resonates with what McGrath, Arrow, Gruenfeld, Hollingshead, and O'Connor (1993) referred to as Type I and Type II temporal errors. Type I temporal errors are positive conclusions about relations derived from cross-sectional designs that do not persist over longer observation periods (Balkundi & Harrison, 2006; McGrath et al., 1993). Type II temporal errors, on the other hand, refer to conclusions about null effects from short-term studies that negate or underestimate the strength of long-term effects (Balkundi & Harrison, 2006; McGrath et al., 1993). The prevalence of Type I and Type II temporal errors foreshadows a point that we will develop in detail later: it is critical to set the duration of a study appropriately in the design phase.

Finally, duration encapsulates some other often-referred to temporal labels. As the above examples illustrate, duration encapsulates terms like "period of time," "time lag," and "amount of time," among others.

4.2. Operational definition

Duration is measured in time units such as seconds, minutes, hours, days, weeks, months, or years. For example, Curhan and Pentland (2007) used computer micro-coding to study whether conversational dynamics occurring within the first 5 min of a negotiation can predict negotiation outcomes. As another example, Chittoor et al. (2009) used longitudinal data on Indian pharmaceutical firms from 1995 to 2004 to assess whether the number of years since the liberalization of the pharma market in India conditioned the association between international resources and markets. While these two examples illustrate the use of very different time units, both are similarly concerned with duration. Moreover, the advent of the Big Data movement is likely to open up opportunities to assess duration using different time units such as milliseconds, which was unimaginable just a few years ago (Tomczak, Lanzo, & Aguinis, 2018).

5. Frequency

5.1. Conceptual definition

Frequency refers to the number of times a phenomenon, event, or process occurs over the course of a timeline. Frequency has also been referred to as rate (e.g., Lichtenstein, Carter, Dooley, & Gartner, 2007) and has been studied from a variety of perspectives. For example, Bacharach, Bamberger, and Biron (2010), in a study of alcohol consumption and workplace absenteeism, investigated the frequency of heavy episodic drinking by counting the number of days participants consumed an alcoholic beverage over a one-month period. Cuervo-Cazurra and Un (2010) studied the frequency of research and development (R&D) investments by Spanish firms to develop their technological capabilities by counting the number of times these firms invested in R&D over a 12-year period.

The frequency with which things occur affects our understanding of phenomena. The organizational learning literature provides a useful example of this assertion. The standard assumption is that firms learn, gain experience, and are able to produce at a lower cost per unit through the repetition of highly frequent operating decisions (e.g., Argote, 2013; Zollo, 2009). However, the accumulation of experience is not an effective learning mechanism regarding infrequent (i.e., rare) events because rarity "reduces the number of opportunities for managers to base their implicit or explicit inferences about the performance effects of particular decisions on actual evidence" (Zollo, 2009, p. 895). In other words, frequency of occurrence (from frequent to rare) changes our understanding of the fundamental process that leads to organizational learning.

5.2. Operational definition

As the above examples illustrate, the way to measure frequency is by the number of times events occur over a specific period. Referring back to the aforementioned example, Bacharach et al. (2010) assessed the frequency of days participants consumed an alcoholic beverage over a one-month period. Cuervo-Cazurra and Un (2010) measured the number of times Spanish firms invested in R&D between 1990 and 2002. Precisely spelling out a frequency in measurable units is important because the frequency of occurrences across a timeline may not be spaced evenly (Grzymala-Busse, 2011). As Lichtenstein et al. (2007) showed with regard to the frequency of organizing activities in entrepreneurial start-ups, the relative degree of concentration of these activities varies significantly between start-ups. That is, some start-ups cluster organizing activities together in occasional flurries of activity, whereas others keep a steadier

and more regular pattern of activities.

6. Timing

6.1. Conceptual definition

Timing is concerned with when something occurs—its specific placement on a timeline (Grzymala-Busse, 2011). For instance, Becker et al. (2010) noted that firms often have some discretion in how quickly to extend a job offer following an interview and found that quicker offers are more likely to be accepted. Also, Wood et al. (2020) proposed that entrepreneurs who craft narratives including a more proximal date for initiating an entrepreneurial endeavor are more likely to take entrepreneurial action compared to those who envision a more distal date.

As the last example indicates, the timing of occurrence affects how events, phenomena, and processes unfold. For example, Katila and Chen (2008) investigated how the timing of firms' search to innovate relative to competitors influenced innovative performance. In addition, Adair and Brett (2005), in a study on deal-making negotiations, found that negotiators who reciprocated priority information in the second stage of a negotiation received higher joint gains. Reciprocal priority information, however, was not related to joint gains in the other three stages of the negotiation. That is, besides what an actor does, when the actor does it, influences outcomes as well.

What the above examples have in common is that timing invokes the importance of context as a source of change that is exogenous or semi-exogenous to the focal actor (Grzymala-Busse, 2011). Even in instances when the characteristics and actions of agents stay relatively constant, changes in contextual factors due to timing can have noticeable effects. Grzymala-Busse (2011) delineated three of those effects. First, timing changes the set of options available. For example, Dowell and Swaminathan (2006), in a study of the early evolution of the U.S. bicycle industry, showed how technological advances throughout the early years of the industry changed what options were available to bicycle producers, leading some but not others to make the conversion to the dominant design. Second, timing influences early-mover and late-adopter advantages. For example, Lavie, Lechner, and Singh (2007), in a study of the distribution of benefits in multi-partner alliances, found that both early and late alliance entrants enjoyed productivity gains over those firms that entered into the alliance intermediately. Finally, timing can affect which events are more likely to unfold and the importance of those events. For example, Chittoor et al. (2009) hypothesized that the relative importance of international technology resources on product market internationalization of Indian pharmaceutical firms was greater in the earlier than in later period of postliberalization.

6.2. Operational definition

The operational definition of timing is in terms of *points in time* such as early morning, on May 5th, right after a merger, or during market expansion. As is clear from this short list of examples, points in time can have specific relevance depending on the research question and context of a study. For example, Sonnentag, Binnewies, and Mojza (2008) examined the relation between public administration employees' recovery experiences during leisure time, sleep, and affect in the next morning. To do so, they chose to investigate the following relevant time points: (a) bedtime and (b) the following morning before going to work.

7. Sequence

7.1. Conceptual definition

Sequence refers to the *temporal ordering* of phenomena, events, and processes. Researchers have studied the temporal ordering of individuals' job attitudes, behavioral criteria, lateness, absence, and turnover (Harrison, Newman, & Roth, 2006); the ordering of affect and creativity (Amabile, Barsade, Mueller, & Staw, 2005); and the ordering of exploration and exploitation activities in the start-up processes of entrepreneurial new ventures (Davidsson, 2008; Gordon, 2011).

An important distinction in the sequencing of processes is whether the theory under investigation suggests a directional order or an iterative process (Gordon, 2011). In the context of entrepreneurial start-up activities, for example, the difference between these two perspectives revolves around a debate about whether entrepreneurial exploration activities necessarily precede exploitation activities (i.e., a directional process; Shane & Eckhardt, 2003) or whether the entrepreneur goes back and forth between exploration and exploitation activities throughout the start-up process (i.e., an iterative process), sometimes do both concurrently, and occasionally do neither (see Davidsson, 2003; Gordon, 2011).

7.2. Operational definitions

Sequence is captured by time order—the order in which phenomena occur. That is, if a study is concerned with three constructs such as predictor X, mediator M, and outcome Y, the time order captures the order in which X, M and Y affect each other: the occurrence of an increase in Y may be preceded by an increase in M, which in turn is preceded by a decrease in X. For example, Amabile et al. (2005) used time lags in a multi-level study to assess whether affect is an antecedent of creativity, whether affect is a direct consequence of creativity, whether affect is an indirect consequence of creativity, whether affect occurs concomitantly with creativity, or all of the above.

Next, based on the conceptualization relying on the four time constructs, we describe a literature review and then we offer

recommendations for designing and implementing empirical research that includes time explicitly. Also, we provide guidance on how to address conceptual and practical challenges, trade-offs, and questions researchers face when attempting to study time conceptually and empirically.

8. Recommendations for conducting research that includes time explicitly

We conducted a literature review by systematically searching nine influential journals[2] that publish empirical research in HRM and allied fields using the keywords duration, frequency, timing, sequence, time lag, acceleration, deceleration, time, temporal, and dynamic. We chose these particular terms because they have been identified by previous work as being the most critical for the study of time (i.e., George & Jones, 2000; Grzymala-Busse, 2011; Mitchell & James, 2001).

Similar to Kraimer et al. (2016), we focused on the 100 most frequently cited articles.[3] In other words, we focused our attention on those that have had the most impact (based on citations) and in which time played an important role regarding theory, design, or measurement. This is a non-trivial issue because many articles mentioned the word "time," particularly in the Introduction or Discussion sections, but the construct was not actually part of the research design. The recommendations we offer on the basis of our review are structured around a systematic list of questions. We suggest that researchers ask three initial questions before proceeding any further:

(1) Do I need to include time in my study?
(2) What is the conceptual definition of time in my study?
(3) What is the operational definition of time in my study?

Fig. 1 includes these questions and the criteria for answering them by depicting a decision-making tree summarizing the initial steps and decisions in designing and conducting empirical research. Note that our recommendations are also useful for theory building. In other words, researchers interested in including time in their conceptual models in a theory, rather than empirical, manuscript would focus on answering the first two questions only. Next, we address each of these questions and then discuss critical design choices, dilemmas, and trade-offs that must be considered—including practical considerations.

8.1. Question #1: Do I need to include time in my study?

Early on in our article, we mentioned that neglecting or underspecifying the role of time impedes theory advancement. However, this statement certainly does not apply to all research. Thus, the first question to address is whether there is a need to include time in a study. Researchers can assess this need by answering the following three questions (see Fig. 1).

First, *is there a theoretical rationale suggesting that time is important?* For example, if we are interested in the duration (persistence) of superior firm financial performance (Choi & Wang, 2009), or the timing of firm entry into a new technology market (Eggers & Kaplan, 2009), the answer to this question should be yes. However, the answer might not always be as clear-cut as it is in these examples. Particularly in those instances, we should ask a second question, namely: *Is there prior empirical evidence suggesting that time is important?* Such evidence can suggest that time should be included. For example, Kammeyer-Mueller et al. (2005), in their study of employee turnover, drew on previous empirical findings that indicated how different psychological processes play out over time in the decision for individuals to leave their job. Similarly, Boswell et al. (2009) drew on prior research on the temporal nature of job attitudes to inform their study of employee job satisfaction among organizational newcomers.

Finally, we should ask: *Are there research questions that involve testing causal relations?* Causal relations inherently involve time because they rest on the notion that the independent variable temporally precedes the dependent variable (Aguinis & Lawal, 2012; Eden, 2017). Hence if the study involves causal relationships, temporal considerations should in principle come into play.

Taken together, the answers to the above three questions serve as a guide to decide on whether to include time in a given study. Only if the answers to all three of the above questions is no, time could conceivably be left out. If the answer to any of these questions is yes, including time is likely to lead to theory advancements and therefore it should be included.

8.2. Question #2: What is the conceptual definition of time in my study?

Once we have decided that time should be included in our study, the next question is: How do I actually do it? An important contribution of our conceptualization is that it unpacks the broad and abstract concept of time into four tangible constructs that are distinct from each other, play different roles in different theories, and are also measurable and therefore can be studied empirically. As shown in Fig. 1, if a study is related to the duration of something, like the time it takes an entrepreneurial start-up to reach the IPO stage (Beckman & Burton, 2008), then Duration is the conceptual definition of time. If the study is mostly concerned with a frequency-related topic, as in the case of the number of times someone drinks heavily over a one-month period (Bacharach et al., 2010), then

[2] Academy of Management Journal, Administrative Science Quarterly, Journal of Management, Journal of Management Studies, Organization Science, Personnel Psychology, Strategic Management Journal, Journal of Applied Psychology, and Journal of Business Venturing.

[3] Our review covered the period 2005–2015. A cursory examination of articles published between 2016 and 2019 did not affect our substantive conclusions, so we did not see a need to go beyond our initial review period.

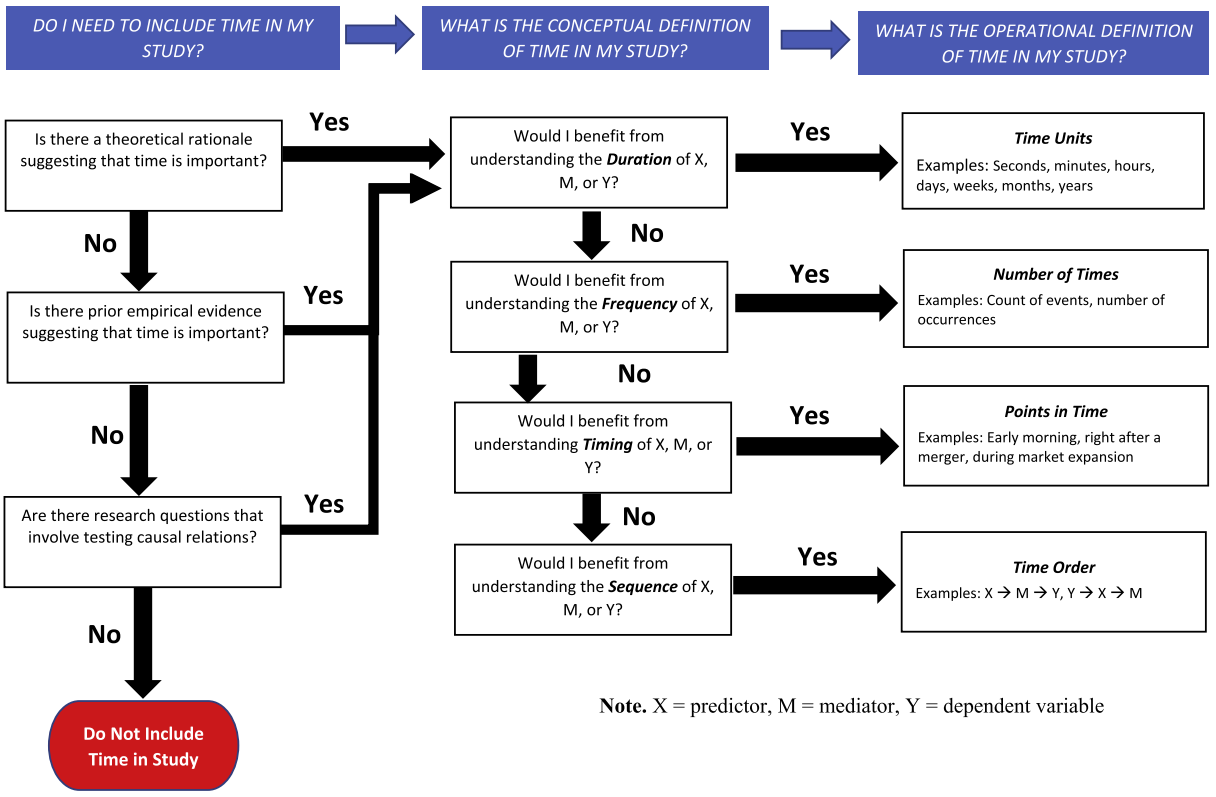

Fig. 1. Decision tree summarizing research design and measurement choices in conducting research that includes time explicitly.

Frequency is the conceptual definition. If the study is mostly concerned with the timing of something, like the point in time for the entry into an inter-firm alliance (Lavie et al., 2007), then Timing is the conceptual definition. Finally, if the study is concerned with a sequence-based issue, like the ordering of affect and creativity (Amabile et al., 2005), then Sequence is the conceptual definition.

We now make the following important clarification. Because the four time constructs are distinct, it is certainly possible and useful, and in some cases even be necessary, to examine two or more constructs simultaneously within the same study. For example, consider the relation between duration and frequency. Rare events can be studied over a long or short duration of time and frequently occurring events can take place over longer or shorter periods of time. As a second example, consider the relation between sequence and timing. Specifically, the temporal ordering of a phenomenon (i.e., sequence) can be studied using different types of timing (e.g., beginning of each quarter). In short, the study of the four time constructs is certainly not mutually exclusive within a given research domain. Moreover, it is likely that a study's contribution to theory will be enhanced if time is examined using more than just one of the four conceptual definitions.

8.3. Question #3: What is the operational definition of time in my study?

Another consideration of our conceptualization is that the constructs are useful for creating recommendations regarding measurement issues, which is often considered one of the most difficult aspects of organizational research (Dalton & Aguinis, 2013). As we discussed earlier, for Duration the operational definition is time units (e.g., the time in months that an expatriate has been on an assignment before cultural adjustment stabilizes; Bhaskar-Shrinivas et al., 2005). For Frequency, it is the number of times something occurs, like the number of times firms invest in R&D over a specific period (Cuervo-Cazurra & Un, 2010). For Timing, it is a specific or multiple specific points in time, like the date of entry of a new company into the U.S. bicycle industry relative to the first entrant (Dowell & Swaminathan, 2006). Finally, for Sequence, it is time order such as the ordering of exploration and exploitation activities in the start-up processes of entrepreneurial new ventures (Davidsson, 2008; Gordon, 2011).

9. Critical design choices, dilemmas, and practical trade-offs in conducting research that includes time explicitly

The aforementioned decision-making process allows researchers to specify the conceptual and operational definitions of time. However, there are several additional follow-up questions that must be addressed. Specifically, each time construct is associated with a critical research design decision as follows. For Duration, *for how long* should I measure the variables under study (i.e., what is the appropriate time unit)? For Frequency, *how often* should I measure variables (i.e., what is the appropriate number of times)? For

Timing, *when* should I measure variables (i.e., at what points in time)? And, finally, for Sequence, in *what order* should I measure variables (i.e., what is the time order)?

In the following section, we present a set of questions and considerations to guide researchers on how to answer each of these questions. Our recommendations emerged from the studies that we included in the literature review, and we illustrate each of the steps by referencing exemplary published research that has tackled these issues successfully. To make our recommendations tangible, practical, and actionable, and serve as a catalyst for future research, Table 2 summarizes them in the form of a list of critical design choices and questions. Although we list the four constructs in the same order in which we described them earlier in our article, researchers can begin the process by asking questions about each of them in no particular order.

9.1. Duration

The kind of phenomena and questions studied in organizational research rarely afford neat, obvious durations for which the designated time unit is obvious (Grzymala-Busse, 2011). Therefore, a critical design choice for investigating duration is: *For how long should I measure the variables?* In other words, what is the appropriate time unit? This is by no means an easy question to answer. From our review of the literature, however, we were able to deduce a number of key conceptual and practical considerations to help make this determination.

A first consideration in assessing the appropriate duration of a study is to ask: What is the supposed time lag for an effect to occur? For example, Waller's (1999) research on airline crews performing a complex simulation suggested that the effect of task prioritization in response to a non-routine event on crew performance could occur in seconds. Waller hence studied pilot crews performing a 60-min simulation, and coded her data in 10-s segments. In contrast, Chittoor et al. (2009) studied the process by which Indian pharmaceutical firms adapted to a new environmental context, a process that can take many years, and therefore used a 9-year time unit. In some instances, especially in novel fields of research, we may lack theoretical guidance on the appropriate time lag between constructs. In those situations, we can probe for the appropriate time unit by experimentation or via a pilot study as was done by Foo, Uy, and Baron (2009) and Fritz and Sonnentag (2009).

A second consideration to finding the appropriate time unit is: Does the context of the study delineate any natural starting or stopping times? If present, these can form the bookends to a study and help shape its time frame. For example, a starting time can be a triggering event. Returning once more to Chittoor et al. (2009), their research question focused on economic development in a postliberalization era. Hence, the start-time of their study had to coincide with a liberalization triggering event. In their case, it was the year 1995, which was when India's pharma market, their research setting, was liberalized. As an example of a stopping time, Chen, Hambrick, and Pollock (2008) chose the moment in time a firm went public, which was the event that concluded the temporal measurement window.

Third, we should consider: Are there context-based or informant-based constraints on the window of time? Clearly, context- and

Table 2
Recommendations for addressing critical design choices in conducting research including time explicitly.

Time construct	Critical design choice	Information needed to make appropriate and useful design choices
Duration	Choosing the appropriate time unit: *For how long should I measure the variables?*	■ What is the supposed time lag for an effect to occur? ■ Does the context of the study delineate any natural starting or stopping times? ■ Are there context-based or informant-based constraints on the window of time? ■ Does the phenomena or process under study have a pre-specified duration? Is the duration of the phenomenon or process the outcome to be explained? ■ Can I probe for durations and time lags using a pilot study?
Frequency	Choosing the appropriate number of times: *How often should I measure variables?*	■ At what rate do we expect variables to be related? ■ How fine-grained should measurement be to capture the process under study? ■ Does the process under study suggest a complex relation, for example with multiple inflection points? ■ Does theory propose an accelerating or decelerating effect and are effects likely to erode or accrue over time? ■ Are there limits to how often the variables can be measured?
Timing	Choosing the appropriate time point(s): *When should I measure variables?*	■ Is there a meaningful contextual era or episode in which the study should take place? ■ Are there potential exogenous circumstances that should be avoided? ■ Does the theory delineate any (internal) time points that need to be observed, or any (external) temporal reference points for comparison? ■ How far apart should measurement points be spaced? Should they be temporally concentrated or spread evenly? ■ Are there indications of when and at what stage the phenomenon under study is supposed to have an effect, and when is it not?
Sequence	Choosing the appropriate time order: *In what order should I measure variables?*	■ Does the theory under study suggest a particular directional order of constructs? ■ Does the theory suggest in what order variables relate to one another? ■ Does the theory under study suggest an iterative process?

information-based constraints can form important practical limitations to research and, if present, should be balanced against the temporal requirements posed by theory. For example, Haas and Hansen (2007), in a study of the utilization of knowledge resources in a management consultancy company, had potential access to numerous bids but decided to only include those with start dates in the 3 months prior to the data collection and end dates no later than 1 month afterward. In this way, respondents could recall a proposal's details so that the investigators could gather more accurate information on their outcomes.

Sometimes, the phenomenon or process under study has a pre-specified duration itself, or it is the duration of the phenomenon or process the outcome to be explained. Regarding the former, the topic of temporary and project-based organization is a good example, as researchers often attempt to study projects for the duration of their limited existence (Bakker, 2016; Bakker, Boros, Kenis, & Oerlemans, 2013; Manning & Sydow, 2011). In those instances, the project's lifetime becomes the study's time frame. For situations when the duration of the phenomenon is the outcome to be explained, all questions in this section can be used to choose the appropriate time unit. For example, Geroski, Mata, and Portugal (2010) studied how long the effects of firms' founding conditions last and chose an available data source that was sufficiently long to capture the hypothesized effects.

For those remaining situations for which answering the aforementioned questions does not provide sufficient guidance, we recommend implementing a pilot study. Chen, Ployhart, Thomas, Anderson, and Bliese (2011) is an excellent example of how to do so. They stated that it was not clear what the ideal time frame would be to observe changes in the relation between job satisfaction and turnover intention at the time of their data collection. Hence, they combined multiple studies using different time frames to observe the effects ranging from 8 weeks in one study to 6 months in another. Such a trial-and-error design, or pilot study, is a useful tool to determine the appropriate time units and is certainly a superior approach compared to making this decision using intuition, chance, convenience, or tradition (Mitchell & James, 2001).

9.2. Frequency

A critical design choice for studies including frequency as the time construct is: *How often should I measure variables?* In other words, what is the appropriate number of times?

First, we should ask the following question: At what rate do we expect variables to be related? How fine-grained should measurement be to capture the process under study? In some occasions, the theory or research question will guide the answer to these questions. Chen et al. (2008) is a good example because they focused on the year before a firm went IPO and therefore collected data 12 times on a monthly basis to measure new hires during that particular year. However, theory and prior evidence may not always provide unequivocal guidance. For example, Boswell, Boudreau, and Tichy (2005) stated that because it was the first investigation of the pattern of job satisfaction as a function of voluntary turnover, they did not know the optimum observation frequency. Therefore, they conducted repeated surveys in yearly intervals as a starting point for future research.

Second, does the process under study suggest a complex relation, for example with multiple inflection points? More complex relations such as quadratic, cubic, and quartic terms in a polynomial model require more observations (Pierce & Aguinis, 2013). The study by Boswell et al. (2005) is a good example. Their results indicated that low job satisfaction precedes a voluntary job change, job satisfaction increases subsequent to the job change, and then declines again later. They captured this pattern using five annual waves of data collection.

A third issue to consider in establishing the frequency of measurement is: Does theory propose an accelerating or decelerating effect and are effects likely to erode or accrue over time? Similar to the above point, such effects are likely to require a larger frequency of observations. For example, Bentein, Vandenberg, Vandenberghe, and Stinglhamber (2005) studied a sample of university alumni at three points in time to capture the steepness of a decline in commitment and how it affected the rate of increase in that individual's intention to quit.

Finally, research investigating frequency needs to balance the aforementioned considerations with practical and logistical concerns. Hence, we should ask: Are there limits to how often the variables can be measured? For example, one of the reasons Wanberg, Glomb, Song, and Sorenson (2005) decided to stop their study after 10 waves of data collection involving unemployed individuals was related to concerns about asking too much of their study participants.

9.3. Timing

Studies including the timing construct face the following critical design choice: *When should I measure variables?* In other words, at what point(s) in time?

To address this critical design choice, we need to answer the following question: Is there a meaningful contextual era or episode in which the study should take place? The presence of such a desired temporal context can be instrumental in identifying the suitable timing. For example, Dowell and Swaminathan (2006) studied the early evolution of industries until industry standardization and measured their variables over a historical episode particularly relevant to their research question. Specifically, they examined the early years of the U.S. bicycle industry since its inception in 1880 until the dominant design (i.e., the pneumatic safety bicycle) was established. As another example, Halbesleben, Wheeler, and Paustian-Underdahl (2013), studying the effect of mandatory furloughs (i.e., the placement of employees on leave with no pay), examined the first occurring furlough at a state government that did not extend an already existing holiday break and placed their data collection points at varying theoretically relevant intervals prior and after.

Second, we should ask: Are there potential exogenous circumstances that should be avoided? For example, Heller and Watson (2005) split their sample into two batches of individuals who began participating in the study separated by a month and a half to minimize the impact of any idiosyncratic events.

Third, we should consider: Does the theory delineate any (internal) time points that need to be observed or any (external) temporal reference points for comparison? In many instances, internal time points are directly provided by the theory under study. For example, in studies relating a firm's timing of market entry to outcomes (Mitchell, 1991), or in those in which entry is the dependent variable (Eggers & Kaplan, 2009), the important time points are those when firms enter the market. However, timing is often relative such as in Dowell and Swaminathan's (2006) study of the U.S. bicycle industry, in which they considered the timing of entry of new companies relative to the first entrant. Specifically, they subtracted the firm's year of birth from 1880 (i.e., the year of the first entrant).

A particularly thorny issue, given the aforementioned considerations, is: How far apart should measurement points be spaced? In addition, should they be temporally concentrated or spread evenly? For example, Meyer, Gaba, and Colwell (2005) referred to this issue in the context of continuous and discontinuous change. While in some studies the concentration of occurrences in time is a subject of study itself (e.g., Lichtenstein et al., 2007), often the spacing of measurements reverts to convenience or opportunity, such as with archival data that are compiled annually or quarterly without a particular theoretical reason for such spacing. An excellent but rare example of an empirical study carefully considering the temporal timing and spacing of measurements is Kammeyer-Mueller et al. (2005), who selected their 4-month time intervals on the basis of the literature on socialization and newcomer adjustment. They noted that previous studies had found that substantial change in work attitudes occurs in the period between initial hire and the 3rd month of employment, but much less major changes from the 3rd to the 6th month of employment, and therefore timed their data collection points accordingly.

Finally, we need to consider the following: Are there indications of when and at what stage the phenomenon under study is supposed to have an effect, and when it is not? We previously mentioned the study by Adair and Brett (2005) on deal-making negotiations suggesting that those who reciprocate priority information in the second stage of a negotiation receive higher joint gains, but not so in the other three stages of the negotiation process. As an illustration of an alternative approach, Balkundi and Harrison's (2006) meta-analysis tested the importance of integrative networks in the life of a team by using coded time lags (i.e., −1, 0, +1).

9.4. Sequence

The critical design choice for researchers studying sequence is: *In what order should I measure variables?* In other words, what is the time order?

A first, obvious starting point is to consider the present state of theory: Does the theory under study suggest a particular directional order of constructs? If it does, then this should be used as a starting point, particularly if theory suggests in what order variables relate to one another. As an example of this approach, Harrison et al. (2006) meta-analytically confirmed the ordering of job attitudes, behavioral criteria, lateness, absence, and turnover.

In other situations, prior theory may suggest that the process is not directional. That is, if the answer to the previous question is no, we can ask: Does the theory under study suggest an iterative process? For example, Gordon (2011) used optimal matching, a method that inherently accounts for order because it consists of collecting data on and then analyzing different sequences simultaneously. Then, Gordon used multinomial logistic regression models to establish whether sequence differences coincided with venture outcomes.

10. An Example of How to Put it All Together: The Production and Emergence of Star Performers

In this section, we offer a brief illustration of how to use the recommendations summarized in Fig. 1, Table 1, and Table 2 in a specific research domain: The production and emergence of star performers. We hope this illustration will be instrumental in showing how to use our recommendations. Clearly, our choice of this illustrative research domain is arbitrary and we could have chosen many others. But, we selected the domain of star performance given its centrality in human resource management theory and practice (Call, Nyberg, & Thatcher, 2015; Kehoe, Lepak, & Bentley, 2018).

Star performers are individuals who produce disproportionately large amounts of cumulative output compared to their peers (O'Boyle & Aguinis, 2012). Because of their outsized contributions, these individuals have a large positive influence on key outcomes such as firm survival, retention of clients, new product development, and many other criteria (Aguinis & O'Boyle, 2014). Accordingly, the documented effects of star performers on organizational outcomes highlight the need to gain a better theoretical understanding of the production and emergence of stars.

The process of applying our recommendations begins with answering questions in Fig. 1. As shown in this figure, the first set of questions refers to whether there is a need to include time in a study examining star performers. The answer is yes because there is a theoretical rationale suggesting that time is important to understand star performance. Specifically, Aguinis and O'Boyle (2014) noted that "time is an important element to star identification because stars are identified by their exceptional output over time and not just a single exceptional result" (p. 315). In addition, there is prior evidence suggesting that time is important. For example, Aguinis, Ji, and Joo (2018) referred to the emergence of star performers through the mechanism of self-organized criticality. This is a process where individual workers accumulate small amounts of output (e.g., sales, publications) before reaching a critical state (i.e., a situation where components accumulated by an individual interconnect), resulting in star performance status. Answering the third question about the need to include time, there is an interest in investigating causal relations. For example, Aguinis and O'Boyle (2014) hypothesized a causal relation between features of a compensation system and their effects on star performer turnover. Specifically, they proposed that "Compensation systems that follow a normal [performance] distribution will retain average workers at the expense of losing stars, whereas compensation systems that follow a power law distribution will retain stars but lose average workers" (p. 337). This proposition, however, is yet to be examined empirically.

The second set of questions in Fig. 1 is about which conceptual definitions of time should be investigated. For our illustration

involving star performers, it seems the constructs of duration and timing are particularly relevant. Specifically, we are interested in understanding how long star performance lasts (i.e., duration) and when star performance occurs (i.e., timing). For example, why and how are some employees able to sustain a star level of performance for longer periods of time compared to others? And, why and how do some employees demonstrate star levels of performance earlier rather than later in their careers?[4]

Now that we have decided that studying time is necessary to advance our knowledge of star performers and which time constructs we should investigate, we turn to the third column in Fig. 1, which addresses choices about operational definitions (i.e., measures). This information, including examples, is included in more detail in Table 1. Given our interest in duration, our measures could include performance spaced out by weeks if we study the performance of star athletes in sports such as football in the United States or soccer in Europe that include games taking place usually once a week. In addition, our measures could include performance spaced out by years if we study the performance of researchers based on the number of scholarly articles given that it usually takes at least a number of years to publish a journal article. For timing, our performance measures would include specific points in time such as a particular date or particularly meaningful events. For example, if we examine the performance of baseball players, we could measure performance when a player is recruited by a Major League team and when the player is traded to another team. For researchers, we could collect data at the time when they receive their Ph.D. and when they are promoted and tenured, and also when they move to another university. All of these points in time are meaningful theoretically given the existing literature on star performance (Aguinis, O'Boyle, Gonzalez-Mulé, & Joo, 2016).

We can now turn to Table 2, which offers guidance regarding research design and practical considerations and, again, we focus specifically on duration and timing. Regarding duration, the main question to answer is for how long we should measure the variables. As noted in Table 2, answering this question is related to the supposed time lag for an effect to occur, whether the context of the study delineates natural starting or stopping times, contextual constraints, whether the phenomenon has a pre-specified duration, and whether a pilot study may be needed. Aguinis and O'Boyle (2014) noted that the minimum amount of time required to identify a star performer is the same as the minimum amount of time needed for important results to be produced and observed in various organizational contexts. For example, the minimum amount of time that a CEO's actions generate a stable estimate of firm financial performance is typically considered to be a quarter—and this is why the performance of CEOs is usually evaluated on a quarterly basis. Accordingly, in studying star performers in collegiate and professional sports, O'Boyle and Aguinis (2012, Study 4) included measures of single-season performance (i.e., shorter duration) as well as measures of career performance (i.e., longest possible duration). In this way, Aguinis and O'Boyle were able to test whether different durations affected the number of star performers in a team. Regarding timing, Table 2 asks: "When should I observe variables?" To answer this question, we need to consider whether there are meaningful episodes, potential exogenous circumstances that should be avoided, theory-based time points, the spacing of data collection points, and whether we know at what stage the phenomenon we study should have an effect. Accordingly, in studying the performance of star CEOs, Aguinis, Martin, Gomez-Mejia, O'Boyle, and Joo (2018) began collecting data a year after each CEO took over the position because a CEO's performance during their very first year on the job is likely influenced by predecessors. Similarly, in their examination of the gender productivity gap in STEM, applied psychology, and other fields, Aguinis, Ji, and Joo (2018) collected data on number of publications on a yearly basis (i.e., at the end of each calendar year). Doing so allowed for an examination of fluctuations in performance over time—as well as the total number of publications for men compared to women across fixed time intervals.

Our preceding discussion describing the four time constructs from conceptual and operational perspectives and how to address critical design choices has a number of implications for theory advancement. We discuss these implications next.

11. Discussion

We offered a conceptualization of four time constructs (i.e., duration, frequency, timing, and sequence) based on a review of the literature in HRM and allied fields (i.e., organizational behavior, industrial and organizational psychology, general management, entrepreneurship, and strategic management studies). Also, we offered specific and actionable recommendations regarding critical design and practical choices, dilemmas, and trade-offs that must be considered when investigating time empirically.

First, by offering conceptual clarity around the concept of time, we hope to contribute to the formulation of more precise and temporally falsifiable theories (Aguinis & Edwards, 2014). Recent debates have centered on the proliferation of theories over time in many organizational science subfields (Leavitt, Mitchell, & Peterson, 2010). Mitchell and James (2001) made the observation that this is due, at least in part, to the fact that few of our theories are ever falsified. Why is that the case? There are multiple reasons but one is, as Mitchell and James (2001) pointed out, that few theories are specifically formulated to the degree that they lead to falsifiable hypotheses. By facilitating the proper assessment and inclusion of time, our article opens up opportunities for researchers to formulate hypotheses that are more temporally specific. For example, over and above claiming that "X has an effect on Y," our taxonomy allows future research to specify, for example, the duration and time lag of that effect, how often that effect would occur, and when (i.e., in which temporal context). Similarly, we can and should question not only the effect of, for example, the occurrence of an intervention, but also check the effect of its timing, and the expected sequence in which we expect subsequent effects to unfold.

Second, it is clearly not the case that time has not been studied in the past. However, the study of time as a focal construct of interest is fragmented and unsystematic. We incorporated conceptual work outside of HRM, particularly the seminal piece by Grzymala-Busse

[4] In addition to duration and timing, we could also investigate the order in which events (e.g., mentorship, receiving more or less resources and opportunities, lucky breaks) leading up to star performance take place. Such research would focus on sequence as the focal time construct. But, for the sake of this brief illustration, we discuss duration and timing only.

(2011) in the field of political science. Our conceptualization advances this previous work as well as our more general understanding of time. First, regarding Grzymala-Busse's taxonomy, we adapted and expanded it to make it more applicable and useful specifically for organizational research. For example, we added Sequence as a construct because of its relevance for many organizational science theories. Second, Grzymala-Busse (2011) focused on conceptual issues exclusively. Expanding upon this work, we offered operational definitions and actionable advice on how to include time explicitly in empirical research. In spite of their importance, research design and measurement are among the most difficult and intractable stages in the entire research process (Aguinis & Vandenberg, 2014; Dalton & Aguinis, 2013). In addressing previous calls to arms to study time explicitly, we offered specific advice and actionable "how-to" recommendations that we hope will facilitate future empirical research.

Third, by offering a flow chart summarized in Fig. 1 and criteria that specifically help researchers to assess the need for the inclusion of time, we contribute to limiting the risk of temporal under-specification in theory development and refinement. Temporal under-specification refers to situations in which time is either neglected or narrowly conceptualized as some sort of boundary condition (Ancona et al., 2001; George & Jones, 2000)—when it should be a central variable of interest. The detrimental theoretical consequences of temporal under-specification include the risk of overlooking important independent or dependent variables, misinterpreting the relations between them, and missing deliberate timing strategies that influence the occurrence of events.

Finally, by helping clarify and measure dynamic models, our framework helps distinguish between temporal and causal mechanisms in theory development. When temporal and causal mechanisms are confounded, temporal constructs are used as placeholders for underspecified mechanisms and processes (Bakker & Josefy, 2018; Grzymala-Busse, 2011). One implication of the confounding of temporal and causal effects is that it can lead researchers to settle for weak proxy measures. We acknowledge that some research domains face practical constraints in terms of data collection and, particularly in archival research, researchers need to make do with the proxies that are available (Ketchen, Ireland, & Baker, 2013). However, as Ketchen et al. (2013) demonstrated, the use of weak proxies complicates the interpretation of results and obfuscates the accumulation of knowledge. As a further example of the use of temporal proxies, consider the use of duration as a measure of the success of an interfirm partnership (e.g., Harrigan, 1986). There are several reasons why research has used duration as a measure of success, including the fact that lack of change is assumed to reflect a solid initial design of the partnership in terms of avoiding conflict and the fact that the duration of a partnership can be relatively easily coded and traced in archival datasets (Olk, 2002). There are two downsides to this proxy, one specific and one general. In the specific case of interfirm partnerships, using duration as an indicator of success is likely to confound planned termination and unplanned termination because almost 50% of all alliances are formed for a specific time window (Bakker & Knoben, 2015). The more general downside is that when broad proxies are used across different studies (like in the way age and duration have been used to measure many different constructs), different researchers are using the same or similar measure to represent different concepts, resulting in important threats to construct validity (Ketchen et al., 2013). By pointing out the ways in which researchers can clarify and then more adequately capture time, we hope to steer researchers toward a more careful specification of temporal versus causal effects.

12. Limitations and additional suggestions for future research

First, we readily acknowledge that we focused on quantitative research exclusively. However, much of our discussion transcends the quantitative-qualitative divide. For example, the material on deciding whether there is a need to include time in a study, which particular time construct should be measured and why, and how to make choices about critical design choices summarized in Fig. 1 and Table 2 are applicable to both quantitative and qualitative research (Aguinis & Solarino, 2019). However, we did not address specific measurement issues pertaining particularly to qualitative research. This offers a good opportunity for future research.

Second, as mentioned earlier, we focused on clock time. Rather than being just our own epistemological position, the predominance of an objective clock time perspective in our article reflects the nature of the predominant body of empirical literature that we reviewed—in which the objective notion of time was clearly dominant. Clearly, subjective notions of time can form an important causal factor because actors are likely to adapt their strategies based on their perceptions of anticipated time horizons (Grzymala-Busse, 2011; Tang, Richter, & Nadkarni, 2020). A prominent example is Gersick (1988, 1989) indicating that the evolution of groups was triggered to a larger extent by members' awareness of time and deadlines than by completion of some amount of work. Future research could build on ours by developing design and measurement recommendations for studies including subjective rather than objective time.

13. Concluding remarks

Time is a fundamental yet elusive construct in research in HRM and allied fields. We hope that our conceptualization of time as duration, frequency, timing, and sequence, together with recommendations on how to include time explicitly in future research, will serve as a catalyst for the formulation of more precise, temporally falsifiable theories. Also, we hope that our research will form a useful conceptual and practical roadmap for researchers interested in conducting conceptual and empirical research that considers time explicitly.

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