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Transition Processes: A Review and Synthesis Integrating Methods and Theory

Paul D. Bliese,[1] Amy B. Adler,[2] and Patrick J. Flynn[1]

[1]Darla Moore School of Business, University of South Carolina, Columbia, South Carolina 29208; email: Paul.Bliese@moore.sc.edu; Patrick.Flynn@grad.moore.sc.edu

[2]Center for Military Psychiatry and Neuroscience, Walter Reed Army Institute of Research, Silver Spring, Maryland 20910; email: Amy.B.Adler.civ@mail.mil

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transitions, discontinuous growth model (DGM), trajectories, resilience, longitudinal research design

Abstract

In this review, we outline how a methodologically based framework, the discontinuous growth model (DGM), can be used to advance research and theory on transitions. Our review focuses on identifying the types of hypotheses and research questions that can be specified and tested using this framework. Three parameters of the DGM are described: the pre-event covariate (TIME^{pre}), a transition covariate (TRANS), and a recovery covariate (RECOV). We discuss relevant parameters by analyzing the relative and absolute changes following a transition event. We illustrate the framework with a variety of studies from different contexts and address the difficulty of interpreting responses to events without TIME^{pre} data. In addition, we discuss the role of large longitudinal databases as sources for advancing research and theory surrounding transitions, particularly for rare and unexpected events. Finally, we discuss ways in which transition research can inform our understanding of individual, team, and organizational resilience and adaptation.

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1. INTRODUCTION

Over time, individuals, groups, and firms encounter acute events that involve transitioning from one state or role to another. Transitions are central to research within organizations, and include topics such as expatriate adjustment (e.g., Black et al. 1991, Kraimer & Wayne 2004, Stahl & Caligiuri 2005, Takeuchi et al. 2002), retiring (e.g., Nahum-Shani & Bamberger 2015, Wang 2007), adjusting to changes in tasks (e.g., Lang & Bliese 2009), job changes (e.g., Ameson 2005, Caplan et al. 1989, Dunford et al. 2012, Gowan et al. 1999), being laid off or fired from a job (e.g., Lucas et al. 2004, Spera et al. 1994), adjusting to a potentially traumatic work-related event or natural disaster (e.g., Adler et al. 2011, Beal & Ghandour 2011, Hochwarter et al. 2008, Rusch et al. 2003), or responding to economic downturns (Kim & Ployhart 2014).

In this review, we provide a methodologically based framework that provides a structure for advancing research and theory on transitions. We illustrate elements of this framework using a variety of studies from different contexts. To frame our review of transitions, we must differentiate among three components: first, the acute discrete event that presumably evokes a transition response; second, the temporal processes surrounding exposure to the acute event; and third, interpretation of patterns over time that inform theory. Our review focuses on studies that have captured and modeled the key elements of the transition process: namely, reactions to the event itself and postevent change trajectories.

Bliese et al. (2007) provide an exemplar of the design underlying the type of studies included in our review. They measured sleep duration (in minutes) over 26 days using wrist-worn actigraphs. On day 17, participants transitioned from sleeping in an Army barracks environment to sleeping in tents in a field setting. By collecting data across 16 days prior to the transition to the field setting, the study had a strong foundation for making inferences about reactions to the transition event (i.e., moving from barracks to the field setting). Furthermore, by collecting data for 10 days following the transition event, the study could draw inferences about postevent recovery patterns. Finally, the study was able to determine that individual participants varied in terms of reactions to the transition event and that older participants showed larger declines in sleep duration when they transitioned from sleeping in barracks to sleeping in the field setting. Our review considers a broad set of studies that have used variants of the same research design (although in most cases the described research used considerably fewer measurement occasions) to examine outcomes relevant to organizational behavior (OB) such as health indices and individual and firm performance.

Central to our review, and also exemplified in the Bliese et al. (2007) study mentioned above, is a description of a methodological approach well-suited to study transitions: the discontinuous growth model (DGM; Bliese & Lang 2016, Singer & Willett 2003). The DGM provides precise information about the form of change associated with an acute event. In turn, the insights afforded by the DGM potentially enhance our theoretical understanding of meta-concepts such as adaptability and resilience. These meta-concepts are central to OB; however, they "must be inferred from indirect evidence" (Lucas 2007a, p. 75). That is, concepts such as resilience are processes that evolve over time as a reaction to certain events and are best measured in that context (see also Britt et al. 2016).

In this review, we focus on transitions in response to acute events. We acknowledge that some transitions are outside of this scope, such as slow and cumulative transitions (e.g., a transition from being physically active to inactive that is associated with aging). We also acknowledge that some acute events are likely to evoke much stronger responses than others. For instance, being exposed to work-place trauma will presumably evoke a much stronger set of responses than being exposed to an unexpected task change as an undergraduate in a university laboratory setting. Regardless of event intensity, however, we show that responses can be captured within the framework of the DGM.

We begin by briefly reviewing event system theory (EST; Morgeson et al. 2015) and theories of transitions. After this review, we present the main characteristics of the DGM. To illustrate the types of theoretical questions researchers have tested, we then review studies that have used the DGM or its variants. We then discuss two fundamental design characteristics necessary for understanding transitions (sufficient pre-transition data and sufficient post-transition data) and illustrate some of the challenges with attempting to draw inferences when data are incomplete. Finally, we provide an integrative summary and identify recent trends that can be used to inform future research.

2. THEORY DEVELOPMENT SURROUNDING DISCRETE EVENTS AND TRANSITIONS

Organizations and the people within them develop and change over time, yet organizational research often underrepresents the temporal elements of relationships and treats phenomena as static (Roe 2008). Studies of change over time can take multiple forms. For instance, studies of gradual change are common in areas such as learning where cumulative processes are assumed to occur. In contrast, one form of change that is not typically studied is the impact of discrete events. Morgeson et al. (2015) introduced EST as a process-oriented approach to understanding organizational reactions to salient events. In EST, habits and automatic processes representing routines, expected behaviors, and actions develop at numerous organizational levels. Typically, these automatic processes and behaviors are maintained until interrupted by a discrete event that has a temporal beginning and end (what we refer to interchangeably as acute or discrete events).

Importantly, Morgeson et al. (2015) posit that discrete events are common and have the ability to influence individual and collective behavior, organizational features, and/or subsequent events. At its core, EST underscores the importance of understanding the interplay between acute events and subsequent reactions. Morgeson et al. (2015) suggest several reasons research on events has lagged, including the recognition that traditional methodological approaches are "not necessarily well-suited" (p. 532) for understanding events that fundamentally exhibit effects over time, particularly when those effects are captured by examining altered trajectories. Therefore, although EST provides a theoretical framework for understanding events and their consequences, alternative research frameworks are needed to understand changes in trajectories during transition processes.

To our knowledge, there are neither comprehensive theories of transition processes in OB nor any comprehensive, integrative methodological discussions of how transition processes can be studied. Elements of transition processes have been discussed within role theory, family theory, life-span theory, and systems theory (Wapner & Craig-Bray 1992). In addition, one well-known transition theory was established by counseling psychologist Nancy Schlossberg, who developed and refined the so-called theory of transition to describe the changes experienced by students beginning college (see also Evans et al. 1998, Schlossberg et al. 1995). Schlossberg's theory provides an interesting summary of factors to consider in a transition (to which we return in Section 6, the Integrative Summary). In her theory, however, individuals are aware of and processing the transition event—a condition that may not always be present in organizational contexts. Moreover, Schlossberg's theoretical framework begins at the point of the transition event, with schematic models originating with the event. In contrast, we emphasize the need to have information prior to the transition event to fully understand transitions. In the next section, we provide an empirical framework that can be integrated into the study of transitions and emphasize methodological language that can facilitate the conceptual framing of transitions and theories about transition processes.

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3. DISCONTINUOUS GROWTH MODELS

One of the main reasons research on transition and transition processes is increasingly relevant to OB is that statistical methods for studying longitudinal patterns have evolved to the point where methods can be mapped onto clear and specific hypotheses about change. That is, developments in statistical models have identified variants of growth models that expand opportunities to study transition processes. Importantly, many of the variants can be explored in widely used statistical packages, so there are few software limitations associated with estimating the models.

The DGM [also called the piecewise hierarchical linear model (Hernández-Lloreda et al. 2004, Raudenbush & Bryk 2002) or the multiphase mixed-effects model (Cudeck & Klebe 2002)] provides a framework from which to approach the study of transitions. Rather than providing an in-depth statistical description of the models, our review focuses on identifying the types of hypotheses and research questions that can be specified and tested. We use the elements of the DGM to review research and to articulate the types of theoretical questions that can be framed surrounding transitions. We also outline future directions using this class of models.

3.1. Overview of Framework

The DGM is a variant of the common growth model where the usual vector of numbers representing TIME is augmented by a block of two or more additional time-related covariates simultaneously included along with TIME. In typical growth models, TIME represents a sequence of numbers corresponding to measurement occasions to capture a continuous form of change (e.g., Bliese & Ployhart 2002). In a DGM framework, the addition of other time-related covariates fundamentally changes the interpretation of TIME. That is, in DGM models TIME reflects the pretransition slope and thus we refer to this pretransition slope as TIME^{pre} to emphasize the pretransition nature of the information provided by this covariate. In other words, although TIME^{pre} includes all the time periods across the study, the inclusion of additional time-related covariates changes the meaning in that TIME^{pre} results are interpreted as representing only the pretransition slope (Singer & Willett 2003).

In the most direct form of the model, where a single transition event interrupts a longitudinal process and data are collected at regular intervals, two additional time-related covariates are included in the model along with TIME^{pre}: a transition covariate (TRANS) and a recovery covariate (RECOV). TRANS is a dummy-coded variable taking on the value of 0 before the transition and the value of 1 following the transition. Thus, TRANS refers to a direct contrast between values observed before a discrete transition event and the value observed immediately after that event and allows for a step increase (or decrease) at the immediate transition time. RECOV takes on the value of 0 until the point after the transition where it begins recounting (1, 2, 3, etc.). We use the term RECOV to represent the post-transition "recovery" slope, although in practice this post-transition slope may take on forms that do not in fact represent recovery in a formal sense (i.e., after exposure to an acute traumatic event, individuals could show a worsening pattern still captured by the term RECOV).

Figure 1 provides a graphic representation of a hypothetical DGM process. The solid line and associated diamonds (the sample pattern) illustrate that the overall sample increases in performance until encountering the transition event first measured at occasion 7. Upon encountering the transition event, performance drops before subsequently recovering.

A key attribute of the basic model described by the sample pattern in **Figure 1** is that every aspect of the pattern is formally testable. One can test whether the pretransition slope is significant (where TIME^{pre} is the covariate associated with times 1 to 6 in the figure), whether the decline at the transition is significant (where TRANS is the covariate associated with the drop between

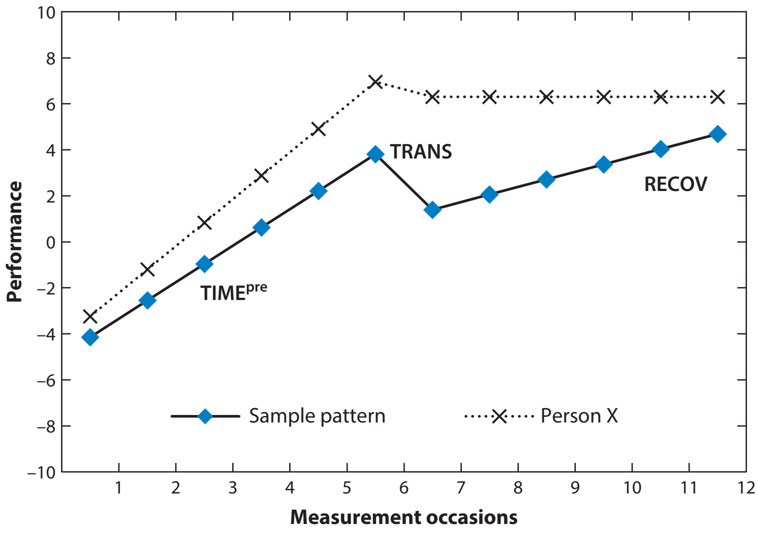

Figure 1

Graphic representation of a hypothetical discontinuous growth model. Abbreviations: RECOV, recovery covariate; TIME^{pre}, pre-event covariate; TRANS, transition covariate.

times 6 and 7), and whether the slope following the transition is significant (where RECOV is the covariate associated with the slope across times 7 to 12) is significant.

By breaking the longitudinal process into the three segments associated with TIME^{pre}, TRANS, and RECOV, researchers can ask focused questions about the pretransition slope, the transition point, and the recovery slope and thus dismantle change associated with the transition. Importantly, minor modifications of the coding of TIME^{pre} allow one to test whether the transition and the recovery slope are significant in relative or absolute terms (Bliese & Lang 2016, Raudenbush & Bryk 2002). For instance, in **Figure 1** the recovery slope (times 7 to 12) may not differ from the initial slope (times 1 to 6) in relative terms (i.e., the RECOV slope may not differ from the TIME^{pre} slope); however, the recovery slope may be positive in absolute terms (performance steadily increasing from 7 to 12). To elaborate, if the data in **Figure 1** represented firm performance over years and the transition event represented the great recession, one could hypothesize that (*a*) the recovery slope would differ when compared to the pretransition slope (a relative change) or (*b*) the recovery slope would be positive when compared to flat or no growth (an absolute change).

Similarly, a change in coding of TIME^{pre} would let one test whether the drop at the transition point was a significant decline in absolute terms or whether it was a significant drop relative to where it would have been had the pretransition slope continued. The ability to test and specify absolute versus relative change provides considerable precision for hypothesis generation and shows why gathering pretransition event data is important for fully understanding transition processes. **Table 1** provides an overview of these three parameters and how they can be used to answer specific types of questions in both relative and absolute terms.

A critical aspect of the DGM with respect to studying transitions is that one can test whether individual entities significantly vary on each segment, and, if they do vary, add individual-level predictors to the model. **Figure 1** illustrates this point and provides the pattern for Person X who (*a*) appears to increase performance more quickly than the rest of the sample before encountering the transition event; (*b*) does not seem to experience as steep a decline upon encountering the

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Table 1 Description of standard discontinuous growth modeling parameters

Modeling parameter	Concept	Description	Example
TIME^{pre}	Pretransition slope	Baseline findings	Determines the trajectory of performance prior to the introduction of a transition event: What did the performance trend look like before the new policy?
TRANS	Change associated with the transition	Contrast between pre-event and postevent	Compares performance change associated with the transition event: ■ Relative change: Did the policy produce an immediate increase in performance relative to what would have been expected from the pretransition trend? ■ Absolute change: Did the policy produce an immediate increase in performance in absolute terms in comparison to the last pretransition observation?
RECOV	Change in slope associated with post-transition recovery period	Contrast between pre-event slope and postevent slope	Compares performance trends before and after the policy change to answer the question. ■ Relative change: After the policy was implemented, was the performance trend different from the pretransition trend? ■ Absolute change: After the policy was implemented, was there a significant performance trend?

Abbreviations: RECOV, recovery covariate; TIME^{pre}, pre-event covariate; TRANS, transition covariate.

transition event; and (*c*) continues to maintain, but not increase, performance during the recovery period. Correspondingly, perhaps Person X has high general mental ability (GMA) and this characteristic results in (*a*) learning a difficult task system more quickly than others (pretransition slope), (*b*) displaying less of a performance decline when the task is changed, and (*c*) maintaining high performance (but no subsequent increase) during the recovery period.

Additional variants of the DGM allow for considerable flexibility in what is tested: Multiple transition events can be included in the model, nonlinear curves can be incorporated in the segments, and results following transition events can be tested even if the transition events occur at different time points for different individuals (see Bliese & Lang 2016). In the case of multiple transition events, for example, a second transition event would be entered into the model as TRANS.2 and RECOV.2, and these covariates would provide information about patterns associated with a second transition. Also important, variants of the model can exclude any of the described parameters (TIME^{pre}, TRANS, RECOV) to fit different assumptions underlying the nature of the change processes (e.g., Singer & Willett 2003). For the purposes of this article, however, we use the basic model as a template for describing the examples we review and for advancing theory surrounding transitions.

Before reviewing the literature on transition events from the DGM perspective, we conclude this section by briefly noting that growth mixture modeling (GMM) (Muthén & Muthén 2000) is an alternative method often used to study events surrounding transition processes. GMM is similar to the described DGM model in that GMM involves examining trajectories over time; however, unlike DGM, GMM is designed to identify clusters of response patterns, estimate the percent of respondents in each cluster, and then potentially incorporate predictors of the clusters. DGM, in contrast, is used to identify an overall pattern and determine whether entities differ from the overall pattern on each parameter (TIME^{pre}, TRANS, RECOV), but the DGM model does not produce estimates of whether the response from all individuals could be clustered in a relatively small set (e.g., 3 or 4) of different trajectories.

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In an example of GMM, Bonanno and colleagues (Bonanno & Diminich 2013, Bonanno et al. 2011) identified clusters of response patterns in individuals exposed to potentially traumatic events. These analyses resulted in the identification of several clusters of response patterns. Bonanno and colleagues have argued that the most common response pattern (shown by between 60 and 85% of respondents) is a pattern of resilience—high and stable mental health scores before and after a traumatic event. Another relatively common cluster of response patterns suggests a recovery pattern; individuals initially show evidence of a negative reaction to a traumatic event but improve over time. As with any method, refinements related to using and interpreting GMM continue to be discussed in the literature (e.g., Galatzer-Levy & Bonanno 2016; Infurna & Luthar 2016a,b). Despite these discussions and for the purposes of the current review, we simply distinguish between DGM and GMM by noting that GMM incorporates a longitudinal form of cluster analysis absent in DGM. Thus, GMM is often used to answer questions about the percent of respondents that follow a smaller subset (e.g., 3 or 4) of distinct response patterns.

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4. REVIEW OF STUDIES

4.1. Impact of Transitions

The first type of question one can ask within the DGM framework is whether the transition event has a discernible impact. Five examples illustrate the use of the model in this way. First, Halbesleben et al. (2013) examined four time periods of data, two prior to a furlough and two following a furlough, and asked (among other things) how the transition event (the furlough) impacted emotional exhaustion, in-role performance, and organizational citizenship behavior. Their models (which in our DGM framework focus on the TRANS component) suggested that furloughs were associated with more exhaustion, worse in-role performance, and less citizenship behavior. Analyzed in this way, the findings have the potential to inform policy debates about whether furloughs harm employee morale and performance. Halbesleben et al. go on to test for and predict individual differences in response to furloughs, which we discuss in the section reviewing differential responses to transitions (Section 4.2).

In a second study attempting to determine whether a transition event had an impact, the authors examined whether two transition events—becoming a journal editor and then ending one's term as editor—impacted the slopes associated with publication productivity during the editorial tenure and after (Aguinis et al. 2010). Their study focused on what we would refer to as RECOV and RECOV.2 (RECOV.2 representing the third segment in the study after the pre-editor segment and the editor segment). The authors proposed two competing hypotheses. One hypothesis suggested that research productivity after tenure as editor (RECOV.2) would improve compared to the periods before ($\mathrm{TIME}^{\mathrm{pre}}$) and during (RECOV) the editorial term. The alternative hypothesis proposed that research productivity would decrease following the editorial term.

Aguinis et al. (2010) collected data from 58 editors in leading OB-related journals spanning a 50-year period and temporally reconfigured these data using a floating baseline so that time corresponded to editorial events rather than to calendar time. Using these data, the researchers identified three segments: (*a*) pre-editorship, designated as $\mathrm{TIME}^{\mathrm{pre}}$; (*b*) editorship, designated as the RECOV slope; and (*c*) posteditorship, designated as the RECOV.2 slope. Results suggested a general nonsignificant decline in productivity through time as editor (both $\mathrm{TIME}^{\mathrm{pre}}$ and RECOV in the model). In contrast, the models identified a significant positive slope during the posteditorship stage (RECOV.2). The authors concluded that the findings suggested that being an editor had a neutral or even negative impact on productivity during the editor stage. Importantly, however, Aguinis et al.'s examination of the second posteditorship transition (RECOV.2) determined that while editors recover after the period of time as editor, full recovery appears to take time. As the authors note, "it seems that it takes at least a decade for editors to 'recover' from the taxing editorship role in terms of returning to their pre-editorship level of productivity" (Aguinis et al. 2010, p. 690).

In our terminology, Aguinis et al. (2010) primarily focused on post-transition trend lines, examining the RECOV slope following the first transition point and the RECOV.2 slope following the second transition point, instead of the transition points themselves (TRANS and TRANS.2). The focus on RECOV and RECOV.2 was likely a necessity because lags between the outcome (time for a paper to become published) and the event (becoming an editor and then passing the editor role on) would have likely obscured the authors' ability to understand the transition itself. In other words, to interpret results using the transition events (TRANS and TRANS.2), one would generally assume that the outcome of interest was immediately impacted by the event. In the case of publishing, however, given that long lags can exist across paper submission, revision, acceptance, and publication, an assumption of this nature is not reasonable.

In a third study that focused on determining the impact of transition events, Kramer & Chung (2015) examined multiple work- and family-related transitions over a 16-year period as reflected in changes in body mass index (BMI). Kramer & Chung were interested in determining whether alterations in work-related circumstances, such as work hours, work schedules, and work responsibility, or family-related circumstances, such as having children, represented significant transition "events" that would alter the trajectory of BMI change over time. In our terminology, Kramer & Chung (like Aguinis et al. 2010) did not expect a significant TRANS change with the events. That is, they did not expect that taking on more work responsibilities would lead to an immediate increase in BMI. Rather, they expected events to lead to changes in RECOV such that those who experienced specific events would have post-transition event slopes that differed (e.g., increased BMI more quickly) than those who did not experience the event.

Kramer & Chung (2015) estimated their variant of the DGM using a large sample of 4,275 dual-earner families from the National Longitudinal Survey of Youth (NLSY). The results suggested that BMI levels were highly consistent within individuals [intraclass correlation coefficient (ICC) value of 0.91], although BMI increases were also strongly related to time. The variant of the DGM they used revealed that events such as increasing work responsibility led to *decreases* in the BMI slope change (relative to those with no increase in work responsibility), and *increases* in work hours, increases in work hours by one's spouse, and increases in the number of children all led to increases in the BMI slope change. One interesting aspect of these findings is that the effects of these life transitions, although significant, were also quite modest. Overall, the results suggested that the key factor determining BMI is individual physiology (ICC of 0.91), and the key factor leading to increases in BMI is aging; life events such as work hours and having children were significant, but had a relatively minor impact.

A fourth study examined how turnover events associated with employees and managers impacted sales performance in 524 bank branches over a 12-month period (Hale et al. 2016). Hale et al. specifically proposed a two-phase theoretical model. In the first phase, disruption referred to the immediate change in collective performance when a turnover event occurred and was captured by the TRANS variable in the DGM framework. In the second phase, recovery referred to the gradual increase in collective performance as the remaining branch employees adapted to the loss of a team member and was captured by the RECOV variable. Hale et al. found that a turnover event involving either an employee or a manager was associated with an immediate decline in collective performance. They also found branch sales performance recovered more quickly following the turnover of an employee than following the turnover of the manager suggesting that the turnover of a manager has a negative and lasting effect on performance that persists beyond the disruption phase.

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A fifth study (or, more precisely, set of studies) has focused on a range of transition events to include experiencing unemployment (Lucas et al. 2004), undergoing a change in marital status (Lucas et al. 2003, Lucas 2005), and experiencing events associated with long-term disability (Lucas 2007b). This line of work is impressive in several ways, not the least of which is in the use of large, longitudinal datasets. The underlying question is also an interesting variant of transition research in that Lucas and colleagues were interested in examining the stability of subjective well-being when individuals experience a variety of significant events (Lucas 2007a). A focus on stability is subtly different than trying to determine whether a specific event such as a furlough or becoming an editor has an impact. Nonetheless, whether one's focus is on the stability of a single construct (e.g., subjective well-being) across multiple types of events (e.g., divorce and unemployment) or whether one's focus is on the impact of a single event (e.g., experiencing a furlough) on multiple outcomes (e.g., emotional exhaustion and citizenship behavior), the DGM and its variants provide a valuable framework from which to obtain information.

To illustrate details of the research conducted by Lucas and colleagues, consider the study of the effects of unemployment reported by Lucas et al. (2004)—a study based on 15 waves of data from the German Socio-Economic Panel Study (GSOEP). At the time, the panel study contained 24,000 respondents of which 5,184 reported at least one episode of being unemployed during the study, and 3,733 of this group reported being subsequently re-employed. The primary variant of the DGM used by Lucas et al. for this study focused on understanding mean differences in subjective well-being across three stages (pre-unemployment, unemployment, and re-employment). In our DGM terminology, the model would have included TRANS.1 and TRANS.2 variables without the corresponding TIME^{pre} and RECOV parameters. This variant essentially ignores information about the slopes before and after the transition events. In other words, one can think of their model as containing two dummy codes for two transition events (becoming unemployed and becoming re-employed) with the pre-unemployment period as the referent. Alternative models also included a recovery slope for the re-employment period to fully explore the nature of the changes.

Lucas et al. (2004) were interested in the question of whether individuals have a set point for subjective well-being that would be quickly re-established following a period of unemployment. They found evidence to suggest that individuals did shift back to baseline; however, the data also suggested that the recovery was not complete even following re-employment. The overall pattern of results is congruent with the idea that the acute event of becoming unemployed has long-term negative effects on the set point of individual well-being, and being re-employed does not fully eliminate the effects of that negative event.

4.2. Differential Responses to Transitions

Our examples surrounding furloughs, becoming an editor, performing after the turnover of an employee or manager, or becoming unemployed are fundamentally about understanding the impact of an acute event (or in the case of set points and subjective well-being, understanding how a variety of events impact the stability of an outcome). As Morgeson et al. (2015) point out, one must also understand ways in which individuals differentially react to events. Within the DGM framework, differential reactions are examined by focusing on understanding why entities respond differently to each of the three segments (initial slopes, response to the transition event, and recovery slopes). Formal tests allow researchers to judge whether differences between entities on each of the three segments are significant and additional tests can be used to explain what attributes of the entity explain the differences.

For an example of this kind of analysis, we turn back to the study by Halbesleben et al. (2013) regarding the impact of furloughs. In addition to assessing overall reactions to the event, the authors also examined whether characteristics of employees explained discontinuous patterns in the days prior to and following the furlough. Halbesleben et al. found that employees who engaged in recovery experiences (e.g., relaxation, mastery, and control) as assessed by the Recovery Experiences Questionnaire (Sonnentag & Fritz 2007) during the furlough responded less negatively in the post-transition phase.

Research on set points in subjective well-being by Lucas and colleagues also contains strong evidence of individual variability. Indeed, Lucas (2007a) highlights the observation that "for all events we have studied, there are large individual differences in the amount of adaptation that occurs" such that "the average trajectory does not tell the whole story about the potential for life events to have a major impact on people's long-term levels of [subjective well-being]" (p. 77).

Kim & Ployhart (2014) used ideas behind the DGM to understand firm performance trajectories prior to and then following the Great Recession of 2008. Finding that the Great Recession had a negative impact on firm performance would not have been particularly informative; however, Kim & Ployhart found that performance varied among firms in response to the Great Recession. More importantly, they found that a firm's level of investments in human capital explained some of the differences, such that those with high investments in human capital recovered significantly more quickly that those with low investments in human capital. Findings of this nature have important implications for a variety of firms and may be particularly relevant for firms routinely facing rapid change and uncertainty.

Several examples from the sleep literature also illustrate the types of questions regarding differential response to transition events that can be addressed using DGM. These examples, although not typically reported in organizational journals, provide useful illustrations of laboratory-based variants that allow one to model individual differences. For example, Bliese et al. (2006) describe results from a study conducted in a sleep laboratory where individuals provided one baseline day (Time 0) and were then randomly assigned to four sleep restriction conditions (e.g., 3, 5, 7, or 9 hours in bed) for seven nights followed by what we regard here as the point of transition: three days of normal sleep (RECOV). Across all time points, the authors tracked cognitive performance using a simple computer-based vigilance task.

With respect to differential responses to model parameters, the analyses suggested that individual performance differed on the TIME^{pre} slope and on the TRANS parameter even after removing research design effects associated with sleep condition (e.g., 3, 5, 7, or 9 hours in bed). That is, one would expect random assignment to different sleep restriction conditions to produce variability in TIME^{pre}, TRANS, and RECOV, but importantly the models suggested that even after controlling for the design effects associated with the experimental manipulation, significant individual variability in TIME^{pre} and TRANS was present. Subsequent analyses determined that the individual difference of participant age played a role in the response patterns such that older individuals had slower initial reaction times on the cognitive vigilance task than younger individuals, but older individuals also had less pronounced slope declines during TIME^{pre}. In other words, older individuals were more resilient in terms of maintaining their reaction times during sleep restriction than younger individuals.

Another sleep study further illustrates ways to examine differential responses to transition using DGM. Rupp et al. (2009) used DGM to examine the impact of sleep banking (10 hours of time in bed prior to sleep restriction) in a sleep restriction study similar to that described in Bliese et al. (2006). Rupp et al. specifically tested whether a period of sleep banking would have a demonstrable impact on cognitive performance (lapses or completely missing vigilance cues) during sleep restriction. In the design, participants were randomly assigned to either 10 hours of time in bed or sleep as usual for 1 week prior to sleep restriction followed by one baseline day, seven days of sleep restriction (3 hours of time in bed), and five days of recovery.

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The DGM analysis revealed that participants randomly assigned to a sleep banking condition prior to the study showed a less pronounced performance decline slope ($TIME^{pre}$) and a more pronounced improvement after sleep restriction ended, and participants were given 8 hours of time in bed (TRANS). In the previous sleep study example (Bliese et al. 2006), the differential responses associated with age were based on nonexperimentally manipulated characteristics of individuals. In contrast, Rupp et al. (2009) showed that a simple intervention (like sleep banking) might enhance the resilience of individuals who, for a variety of reasons, experience acute episodes of sleep restriction (e.g., international travelers, deploying military members or graduate students during final exams). Again, however, the key questions addressed in the sleep studies focus on understanding characteristics of individuals (age, sleep history) that explain differential responses in DGM parameters associated with sleep restriction ($TIME^{pre}$, TRANS, RECOV).

So far, the ideas and illustrations have involved linear change, but the basic ideas can also be expanded in ways that allow for nonlinear expressions of linear terms. For instance, in complex learning-based tasks, it is common for individuals to display a negative accelerating performance curve such that performance increases quickly when first learning a task and then plateaus over time. Lang & Bliese (2009) used a variant of the DGM with a curvilinear effect to model performance on a complex computerized task. In this study, Lang & Bliese were interested in differential responses to an unexpected change (TRANS) and in understanding differential responses following the unexpected change (RECOV). Perhaps not surprisingly, the models identified significant differences in initial performance (the $TIME^{pre}$ phase) as well as differences in TRANS and RECOV.

In terms of individual differences, the models suggested that GMA was significantly related to the TRANS parameter such that those with high GMA experienced a significantly larger performance drop when faced with an unexpected change than those with low GMA. Interestingly, GMA was unrelated to RECOV. One interpretation of these findings is that high GMA confers no particular benefit in terms of being resilient to unexpected change in a complex computerized learning task.

As noted, each of the examples above could be framed as a study of resilience or adaptability. Halbesleben et al. (2013) found that engaging in recovery behaviors during the weekend was associated with being more resilient to the effects of a furlough. Kim & Ployhart (2014) found that having strong investments in human capital makes a firm more resilient to the effects of economic downturns. The Bliese et al. (2006) study suggests that being older may be associated with being more resilient to the effects of sleep restriction. The Rupp et al. (2009) study suggests that banking sleep makes one more resilient to the negative effects of sleep restriction. (One can use causal language here because participants were randomly assigned.) Finally, the Lang & Bliese (2009) study suggests that having high GMA is not associated with being more adaptable to an unexpected transition in a computerized task.

One study explicitly framed around the idea of adaptability was conducted by Niessen & Jimmieson (2016), who examined "adaptive task performance" (i.e., how individuals respond to and cope with change) using the task-change paradigm. Niessen & Jimmieson specifically focused on immediate TRANS and RECOV in an experiment that manipulated whether participants performed differently in a simulated flight under either a threat of resource loss (risk of losing lottery tickets) or a nonthreat control condition. The study revealed that TRANS and RECOV were influenced by threat of loss. More specifically, participants in the threat condition crashed more simulated airplanes when the task changed (TRANS) than did those in the control condition. Post-transition recovery (RECOV), however, was steeper in the threat condition than in the control condition, perhaps because of the more pronounced immediate decline.

Niessen & Jimmieson (2016) also examined two individual differences, emotion control and task focus. High levels of emotion control were associated with better performance when the task

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changed (i.e., at TRANS). In addition, high levels of task focus were associated with faster post-transition recovery (i.e., RECOV). One of the most interesting findings was that the combination of low emotion control and being assigned to the threat condition produced a particularly pronounced negative impact at TRANS. That is, individuals with low emotion control in the threat condition were more likely to crash their simulated flights when the task changed than individuals with high emotion control.

Overall, the Niessen & Jimmieson (2016) study provides a good example of testing specific hypotheses about the transition and the transition process and exploring differences that include environmental context (threat versus no threat) and individual differences (low versus high emotion control and low versus high ability to focus on tasks). Moreover, the study shows the value of being able to link individual differences to specific phases of the transition process.

For an impressive example conducted in a field setting, the influential nonprofit RAND Corporation (a group whose research often informs US policy) used a variant of DGM to examine positive and negative adaptation in US service members and family members (Meadows et al. 2016). In the study design, 2,724 service members and family members provided three years of data collected over nine waves prior to, during, and following deployment to Afghanistan. In DGM terminology, the time-based covariates would be equivalent to $\mathrm{TIME}^{\mathrm{pre}}$ (predeployment preparation), TRANS.1 (deploying), RECOV.1 (being deployed and separated from family), TRANS.2 (returning home), and RECOV.2 (reintegrating at home).

Meadows et al. (2016) acknowledge some limitations, perhaps the most significant being that recruitment began in 2011 and ended in 2015—a period of diminished combat intensity in Afghanistan; nonetheless, the design is noteworthy because it allowed the researchers to (*a*) estimate "changes in family outcomes after a deployment, controlling for preexisting differences between families prior to deployment" (p. xviii); (*b*) examine whether outcomes changed over the preparation, separation, and reintegration phases; and (*c*) determine what accounted for variability in change parameters. On the latter point, the researchers found, for instance, that spouses of injured service members reported elevated mental health problems and binge drinking compared to spouses of noninjured service members. The authors also found that service members who separated from the military or retired reported elevated mental health problems compared to those who remained in the military.

The RAND study illustrates the value of framing differential responses to significant transition events around larger questions of adaptability. The design, although complex, covered the elements of the basic DGM and provided precision in terms of understanding a complex process. A key element of the design was the inclusion of robust baseline data. As we note in the next section, studies that attempt to determine responses to events or postevent recovery trajectories without $\mathrm{TIME}^{\mathrm{pre}}$ data are remarkably difficult to interpret.

5. STUDIES WITHOUT BASELINE DATA

The studies discussed in the previous section represent the core of our review on transitions because their design included measures before and after acute transition events. As explained in our discussion of DGM, one must have data prior to the acute event to be able to answer detailed questions about transitions. In other words, if research seeks to delineate reactions to the event itself (TRANS) and postevent change trajectories (RECOV), it is necessary to have measurements prior to the transition event in order to estimate slopes associated with $\mathrm{TIME}^{\mathrm{pre}}$. Based on experience, we would encourage at least three measurement occasions in $\mathrm{TIME}^{\mathrm{pre}}$, although variants of the DGM can be estimated with as few as one baseline or two baselines (see Lang & Kersting 2007, Halbesleben et al. 2013).

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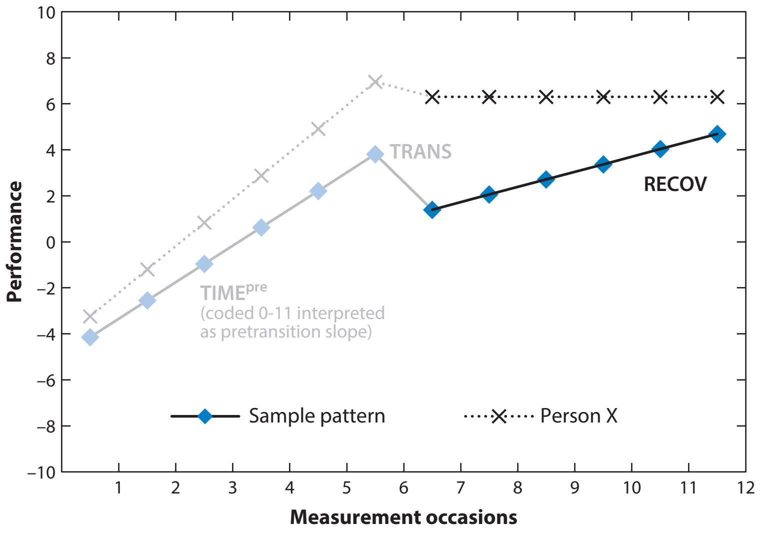

Figure 2

Graphic representation of a hypothetical discontinuous growth model without pre-event data. Abbreviations: RECOV, recovery covariate; TIME^{pre}, pre-event covariate; TRANS, transition covariate.

To illustrate the challenges associated with interpretation when baseline data are absent, consider **Figure 2**. The figure illustrates a case where data collection begins following a transition event. As the figure shows, the implication of failing to collect data prior to the transition event is that one can only examine the recovery slope. Notice in the figure that differences surrounding the post-transition period are ambiguous with respect to what occurred at the transition and how the post-transition slope should be interpreted. One can interpret the post-transition slope in absolute terms as being significantly positive (or not), and one can also examine individual differences in the post-transition slope (Person X differs from the rest of the sample), but one loses the ability to understand the pattern in reference to the pretransition slope. Hence, one loses the ability to make inferences about the importance of the event or about individual differences in reaction to the event.

In the example depicted in **Figure 2**, Person X could have high performance because he or she had higher performance at Time 6 and experienced a small decline between Time 6 and 7. The problem, however, is that without data points 1 to 6, we have no way of knowing whether the scenario described by the faded lines is accurate or whether other scenarios occurred. For instance, if we do not have visibility on the faded pattern it is equally possible that (*a*) Person X mirrored the rest of the sample across times 1 to 6, but reacted positively to the transition by Time 7, (*b*) Person X was flat-lining performance across all trials and was completely unimpacted by the event, or (*c*) some other alternative. Our point is simply that one is limited in the ability to understand responses to the transition event itself and to the postevent period without having data before the event.

There is one important exception to the general rule that robust baseline data is necessary to study transitions associated with acute events. The exception is that if participants can be randomly assigned to an event or levels of an event, then one can reasonably infer that each participant would have had a similar baseline pattern. If we had random assignment such that some individuals experienced the event and others did not, the differences in the starting point at measurement occasion 7 and differences in the slope associated with measurement occasions 7 to 12 would be

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more clearly interpretable. For instance, in the Bliese et al. (2006) sleep study, participants were randomly assigned to sleep restriction conditions, so the TIME^{pre} slope differences associated with sleep restriction have an unambiguous interpretation. Slope differences in that example can be interpreted as the form of cumulative performance declines associated with alternative levels of sleep restriction. Similarly, Adler et al. (2015) randomly assigned soldiers to different conditions when studying the transition occurring among soldiers in basic training. Without baseline, the authors could not examine what we refer to as TRANS, but could examine soldiers' use of self-talk principles during what we refer to as the RECOV phase and unambiguously attribute differences in self-talk usage to treatment condition.

For obvious ethical and practical considerations, many interesting discrete events associated with transitions cannot be randomly assigned. Furthermore, some acute transition events may be virtually impossible to predict [e.g., a terrorist attack (Bacharach & Bamberger 2007), a hurricane (Beal & Ghandour 2011)]. Indeed, baseline data is absent and randomization is impossible in most research examining the impact of potentially traumatic events. Research on work-related trauma is important for military, police, and other high-risk occupations, and (unfortunately) appears increasingly relevant for understanding employees' reactions to work-related violence, and other forms of potentially traumatic workplace events in non-high-risk occupations as well.

One of the fundamental challenges associated with studying exposure to potentially traumatic events is the recognition that individuals vary presumably both with respect to immediate reactions (TRANS) and in terms of postevent trajectories (RECOV). Because baseline data are generally absent, however, almost all existing research is forced to analyze data in ways that confound the two presumably distinct components of TRANS and RECOV by focusing only on RECOV. That is, existing research collected postevent reveals that individuals differ, but the typical design provides an unclear picture of the temporal nature of that difference. (Several exceptions, primarily within the GMM framework, exist, e.g., Galatzer-Levy et al. 2013.)

To illustrate the degree to which individuals differ when exposed to acute events, consider US Army data collected during the Iraq war. Bliese et al. (2011) reported results from randomly sampled platoons in Iraq showing that perceptions of combat exposure among platoon members was remarkably consistent as indexed by an ICC value of 0.43 (43% of the variance in ratings of combat exposure could be explained by the platoon to which the soldier belonged). ICC values in nested data are typically less than 0.15 in organizational data (Bliese 2000, 2006) and in settings such as education (Bloom et al. 1999, 2007). Thus, the ICC value of 0.45 indicates that platoon members reported a high degree of similarity with respect to exposure to potentially traumatic combat-related events.

Given that exposure to combat-related traumatic events are highly correlated with mental health problems (Adler et al. 2011, Dohrenwend et al. 2006, Thomas et al. 2010), we would expect that platoons experiencing high numbers of combat events would also experience high rates of mental health problems such as posttraumatic stress disorder (PTSD). In contrast, however, reports of acute stress as indexed by the PTSD Checklist (Weathers et al. 1993) displayed an ICC of 0.026 (Bliese et al. 2011). That is, only 2.6% of the variance in posttraumatic stress symptoms could be explained by platoon membership. This low shared variance is within the range of ICCs for mental health outcomes in other settings such as classrooms in education (Murray & Short 1995).

The difference in ICC values between the presumptive cause (combat exposure) and the outcome (posttraumatic stress symptoms) cleanly illustrates that other variables besides combat exposure are related to the development of posttraumatic stress symptoms and demonstrate the challenge of trying to determine the impact of an event given only postevent data. In the absence of pre-event data, we are not able to understand whether Person X (applying the framework of **Figure 2** to this example) reported stress levels because he or she was always highly stressed,

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because he or she had a strong reaction to the event, or because some other variable influenced the development of symptoms. To understand why individuals differ when exposed to presumably similar events, the research design needs information from data collected prior to the event.

To further illustrate the challenges associated with trying to understand transition processes while relying primarily on postevent data, we briefly discuss the concept of post-traumatic growth. The concept of post-traumatic growth, originally developed by Tedeschi & Calhoun (1996, 2004), posits that individuals experience personal development in response to traumatic events and these changes occur over time (during the RECOV phase). This growth can occur across a range of domains, including personal strength, enhanced relationships with others, spiritual change, appreciation of life, and openness to new opportunities (e.g., Tedeschi & McNally 2011).

Post-traumatic growth is often measured using the Post-Traumatic Growth Inventory (PTGI) in which individuals are asked to rate themselves on a series of statements by comparing how they were prior to the traumatic event, using a response scale ranging from "I did not experience this change as a result of my crisis" to "I experienced this change to a very great degree as a result of my crisis." The statements address components of post-traumatic growth, such as "I discovered that I'm stronger than I thought I was," "I established a new path for my life," and "I developed new interests" (Tedeschi & Calhoun 1996).

The nature of the response scale fundamentally illustrates the authors' recognition that one is limited by having access to data in only the RECOV component of the transition process. The solution (asking individuals to compare themselves to how they were prior to the event) raises concerns that responses may be biased by retrospective recall when individuals are asked to attribute any perceived change to the crisis in question. In the end, it is unclear how much perceptions are colored by retrospective bias, cognitive dissonance (e.g., it was worth experiencing this event because I gained from it), or self-deception (Frazier et al. 2009).

Concerns about trying to understand a complex and interesting phenomenon such as post-traumatic growth based only on data from the RECOV part of the model has prompted additional research. For example, Frazier et al. (2009) prospectively compared individuals' ratings of themselves pre-event to post-event and found that actual growth (comparing pre- and post-event self-evaluations) and perceived growth (retrospective recall) appeared to reflect different processes. The authors concluded that perceived post-traumatic growth may not accurately represent actual change (TRANS).

The challenge, of course, is that many contexts involving sudden crisis events, such as a terrorist attack in a workplace (e.g., Blix et al. 2013) or an unexpected serious medical diagnosis (Danhauer et al. 2013) lack pre-transition data. Thus, it is difficult to know how much growth has actually occurred relative to pre-trauma values. Such a challenge provides additional reasons to pursue systematic analysis using the transition process approach presented here. We suggest that theoretical specificity surrounding post-traumatic growth (and other similar constructs) could be improved by using the DGM framework to specify the exact elements of the change process. For instance, assume in a simple design that one is assessing general well-being. One could ask whether post-traumatic growth can occur if individuals are unaffected by exposure to a potentially traumatic event in terms of their well-being (i.e., is a significant TRANS parameter necessary for the conceptual definition of post-traumatic growth?). Similarly, one could ask what pattern is necessary in the RECOV period to represent post-traumatic growth. The questions we pose have no simple answer, but rather show how the DGM can help articulate theoretical advances associated with studying complex ideas such as post-traumatic growth.

The broader issues we raise with respect to post-traumatic growth are also common in many areas of organizational research. For instance, in examining research related to expatriate assignment, the theoretical foundations for much of the literature is based on the notions of anticipatory adjustment and in-country adjustment (Black et al. 1991), which recognize an acute transition event (the international move) and the importance of the periods both before and after the event. However, empirical work in this area has not captured this entire process in one model as most of the data are cross-sectional and self-report (Kraimer et al. 2016). Kraimer et al. point out that much of the research in this area has been driven by practitioners and has been limited by access to data because expatriate data are more challenging to collect than data collected in domestic samples (especially before the use of electronic surveys). Thus, longitudinal studies are rare (for an exception, see Firth et al. 2014), and we failed to find any including studies with data collected prior to the expatriate assignment. Interestingly, modeling the entire transition process is not routinely highlighted as an area that could advance research (e.g., Kraimer et al. 2016, Takeuchi 2010). We suspect, however, that with electronic data collection, at least a few such studies will be feasible in the upcoming years.

Besides studies of the transition experience of expatriates, research on job loss appears to be in a similar state, although there are exceptions such as Lucas et al. (2004). Observations about the lack of pretransition data can also be made about studies of retirement and studies of transitioning to new job roles such as becoming a manager for the first time. With regard to pretransition data, such limitations occurring across a range of research domains demonstrates the challenge affecting the field as a whole. We recognize that many areas of research involving the study of acute transition events and associated transition processes will need to continue to use incomplete data (by necessity); however, we encourage researchers to find ways to study the entire spectrum of the transition process and in so doing to refine theory surrounding transitions. We elaborate on these ideas in Section 6, below, the Integrative Summary.

6. INTEGRATIVE SUMMARY

Our review has focused on longitudinal studies where researchers have been able to fully examine transition processes in response to acute events. We have reviewed literature in which researchers have had access to pre- and post-transition event data and where researchers have used variants of the DGM to test hypotheses about the nature of change. We observed that much of the literature surrounding everything from sleep restriction and job furloughs to changes in computer-based tasks and military deployments captures the meta-concepts of resilience and adaptability. We have also pointed out that the framing of the research questions often focuses on understanding reactions to events (e.g., examining who responds positively or negatively to an event) or understanding whether constructs such as well-being are stable and have set points when individuals are exposed to transition events (e.g., Lucas 2007a).

Part of our goal in reviewing the literature is to encourage refinement in theory development surrounding transitions to inform our understanding of resilience and adaptability. The DGM provides the following set of tests. Did the transition event lead to an immediate change (*a*) relative to prechange patterns or (*b*) in absolute terms? Did the event lead to a change in trajectories over time (*c*) relative to the prechange pattern or (*d*) in absolute terms? On the surface, these four potential questions seem straightforward; however, the ability to specify the exact nature of change and the ability to combine the four elements provides an effective way to advance theory.

For instance, there may be different forms of resilience. One form of resilience may be characterized by performance being unaffected by an event (i.e., both the TRANS and RECOV parameters are nonsignificant). Another pattern may be characterized by a strong initial reaction (a significant TRANS) but with a pronounced recovery slope (a significant RECOV). A third pattern may be characterized by a nonsignificant TRANS parameter but a significant RECOV slope, indicating that exposure to the event accelerated a positive outcome. By presenting each

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of these alternatives, we can enhance the precision by which we conceptualize, define, and test resilience.

Besides using global patterns to inform theory, elements of the DGM provide a window into individual differences in response patterns. As noted, individuals often differ in terms of their baseline patterns ($TIME^{pre}$), their immediate reaction to the event (TRANS), and their post-transition event trajectories (RECOV). These differences can be used to identify predictors of individual resilience.

For example, presumably one's first formal leadership role in an organization is a difficult transition (Ameson 2005). It is not clear whether this transition is characterized by an immediate increase in constructs such as burnout (TRANS) or whether this transition is characterized by a steeper slope of burnout following the event (RECOV). It would be valuable to understand both the form of the overall transition pattern as well as individual differences. Given individual variability, researchers could gain insights into how pretransition circumstances (e.g., existing job demands), the type of transition event (e.g., an unexpected leadership change), and individual differences (e.g., ratings of self-efficacy) combine to predict the differential reactions to the event.

Although the research we cite here comes from different fields of study, some of Schlossberg's work on the theory of transition mentioned in the introduction may also be useful as a foundation for developing a comprehensive theory in organizational research. For example, in defining the pretransition period ($TIME^{pre}$), one would likely need to consider what Schlossberg termed "the situation" or the degree to which the transition is developmentally consistent (e.g., retirement versus furlough). In addition, individual differences need to be considered. Schlossberg's term for "the self" represents characteristics such as individual demographics (e.g., age), training, and preparation, and these could be included in an analysis of how the transition process differentially affected individuals. Furthermore, the theory's components of social support and coping strategies would also need to be included in fully developing ideas about resilience and adaptability.

In adapting Schlossberg's framework for an organizational context, several modifications would be necessary. A comprehensive theory of transition would need to expand upon the transition event itself: What is the nature of the acute transition event in terms of intensity and valence (positivity versus negativity)? As noted in the opening to the review, we acknowledge that some acute events are likely to evoke much stronger responses than others, and theory should take this into account. Beyond these adaptations, theories of transition in an organizational context might be expanded to consider the horizontal and vertical relationships in an occupational context (e.g., Chen & Bliese 2002) and may ultimately include multilevel constructs as predictors of response patterns (e.g., Hale et al. 2016). These theories would need to consider characteristics of the team and organization (just as Schlossberg identified characteristics of the individual), including team affect (e.g., Barsade & Knight 2015, Barsade & Gibson 2007) and cognitive culture (e.g., Barsade & O'Neill 2014). Similarly, theories of transition might consider the degree to which individuals, teams, or organizations have input into or control over the transition-related event (recall the effects of threat of resource loss in Niessen & Jimmieson 2016). In sum, emerging theories of transition should consider developing transition models that take into account the characteristics of the situation prior to the event, the nature of the event itself, and potential multilevel components influencing the response to that event.

7. PRACTICAL CONSIDERATIONS AND CONCLUSION

In this final section, we discuss the nature of data needed to study transitions and trends in data availability that support research on transitions.

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7.1. Data Characteristics

As addressed in this review, one needs fairly comprehensive longitudinal data to study transitions using variants of the DGM. Researchers using variants of the DGM described here used data starting from four time points (Halbesleben et al. 2013) to more than 15 time points (Lucas 2007b, Kramer & Chung 2015, Niessen & Jimmieson 2016). In general, datasets with between 6 and 30 observations are well-suited for DGM analyses (Bliese & Lang 2016). Many longitudinal databases contain sufficient repeated observations for DGM. For instance, longitudinal data collected from employees within organizations are likely to occur on a yearly basis (during annual performance reviews)—thus yielding one time point per year. Similarly, healthcare data such as health screenings are typically annual events and would therefore result in sufficient observations over the course of time.

In addition to needing longitudinal data, some kind of transition event is clearly necessary. In some cases, the events underlying the study of transitions will occur at the same chronological time for all entities. For instance, the Great Recession or a specific hurricane such as Hurricane Katrina occurs at the same chronological time. Similarly, policy changes in Federal law can represent an event that occurs at the same time for all entities. One must keep in mind, however, that the events do not need to occur at the same point chronologically to be analyzed within a DGM framework. Recall that Aguinis et al. (2010) used a floating baseline to realign the transition event of becoming an editor to make the analyses event-focused. It is also possible to analyze transition events without creating a floating baseline, as reported by Kramer & Chung (2015) in their analysis of career-related events (i.e., increases in work responsibility). In the Kramer & Chung example, the variant of the DGM allowed analyses even though events occurred at numerous points over the 16-year period (see also the analysis of turnover events in Hale et al. 2016).

Finally, with respect to data characteristics, our explanation of the DGM with TIME^{pre}, TRANS, and RECOV, and our explanations involving the ability to test TRANS and RECOV as either absolute change or change relative to TIME^{pre}, are used as research design exemplars. In almost all the cases we have reviewed, the authors used variants of the DGM to meet the specific characteristics of their data and questions. In our review, we have shown how the conceptual framework provided by the idealized DGM helps make precise hypotheses about the transition process.

7.2. Data Sources

One impetus for reviewing research on transitions and for providing an empirical framework is that longitudinal data are becoming increasingly available. The availability of data has considerable relevance for modeling transition events, as evidenced by Lucas and colleagues' work using databases such as the GSOEP, or Kramer & Chung's (2015) using databases such as the NLSY. The increase in research-oriented projects such GSOEP or NLSY provides important sources of data. At the same time, longitudinal data are also being collected in ways that are not necessarily designed for research purposes but that may nonetheless lend themselves to research. One example is Hale et al.'s (2016) use of data tracking turnover and sales performance. Another example where data are being routinely collected is in the area of electronic medical records to track patient healthcare (see Blumenthal & Tavenner 2010). Electronic medical record implementation is designed to improve patient care, but may also provide a rich source of data for studying the health effects of events.

Organizations are also becoming systematic about collecting diverse longitudinal data. In some cases, these data collection efforts may be relatively passive, but in other cases organizations are actively collecting longitudinal data. For instance, Bock (2014) reported on Google's gDNA initiative in a *Harvard Business Review* blog. In Google's gDNA initiative, 4,000 randomly selected

Google employees complete two detailed surveys each year. By collecting these longitudinal data, Google can track the impact of work- and career-related transition events and can also track and test work-related interventions designed to improve employee quality of life. Google acknowledges that the program is somewhat exploratory, but the project will undoubtedly provide insights surrounding work- and family-related transitions that employees encounter over the years.

Similar initiatives have been implemented in the US Department of Defense. First, the Millennium Cohort Study was instituted in 2001 (prior to 9/11) as a decades-long prospective assessment of service member health (Gray et al. 2002, Smith 2011). These data have yielded numerous epidemiological findings associated with points of transition such as departure from military service (e.g., Littman et al. 2015) and exposure to environmental hazards (e.g., Powell et al. 2012), and as more follow-ups are obtained, longitudinal data analyses will be increasingly possible (see, for example, an analysis of three waves of data in Bonanno et al. 2012). Second, the US Army launched the Global Assessment Tool (GAT; Lester et al. 2011, Peterson et al. 2011), which is an assessment of psychological resilience domains that soldiers complete on an annual basis, yielding a rich set of data that can be linked to numerous sources of organizational data. Third, the US Army has also supported a large-scale study designed to assess risk and resilience in soldiers (STARRS; Ursano et al. 2014). Although it is not yet fully evident what insights will emerge from these ongoing longitudinal assessments in the GAT or Army STARRS, the development of the infrastructure to collect these data is a significant organizational investment, and there is a real possibility that these data can be used for targeting transition-oriented research.

Not only can these kinds of longitudinal databases (e.g., gDNA, the Millennium Cohort Study, GAT, STARRS) be used to assess the impact of traditional transition-related events (e.g., relocations, promotions), such database initiatives increase the likelihood that the impact of unexpected or rare events can be studied prospectively. By capturing low-base-rate events such as job demotions or a natural disaster, these databases allow for a deeper and more accurate understanding of transitions that would otherwise be difficult to examine.

7.3. Software Requirements

As indicated earlier, the basic DGM and variants of the DGM are conducted within a mixed-effects (i.e., multilevel) model framework. Therefore, any statistical package that can perform mixed-effects models can be used to estimate a DGM. Nearly all mainstream packages to include M-Plus, R, STATA, SAS, and SPSS have options to estimate mixed-effects models. In practice, however, it can be challenging to set up the time-related predictor matrices when data are not chronologically synchronized and/or where individual entities may experience zero or multiple events. The first author has developed functions in R that can help facilitate creating predictor matrices in complex situations.

7.4. Conclusions

The articles we have reviewed illustrate the types of research questions that can be examined within the DGM framework, and much of our review has focused on considering how theory can be tested and advanced using the DGM. At the same time, there are practical considerations with the use of the DGM, and **Table 2** provides a summary of these considerations including data characteristics, types of events, and software requirements for conducting the DGM. At a practical level, **Table 2** shows that the DGM can be applied in numerous settings with multiple sources of data to examine a variety of interesting outcomes and can be analyzed using many different software packages. Our goal in presenting a discussion of practical considerations along with a detailed review of the theoretical questions that can be answered by the DGM is to continue to

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Table 2 Practical considerations for conducting discontinuous growth modeling analyses

Data characteristics
■ Between 6 and 30 observations
■ Ideally at least 3 observations before the transition event
Types of events
■ Chronologically synchronized, such as a new federal policy, a hurricane, or a designed task change in a laboratory setting
■ Chronologically desynchronized, such as a work promotion or losing one's job
Representative outcomes of interest
■ Annual performance ratings
■ Healthcare screening data (e.g., BMI, blood pressure)
■ Output from biomedical monitoring devices (e.g., sleep, activity)
■ Firm-level performance indices (annual stock prices, etc.)
■ Laboratory-based performance measures
Potential sources of data
■ Existing organizational personnel-related data
■ Electronic medical records
■ Large longitudinal datasets (e.g., German Socio-Economic Panel Study or the National Longitudinal Study of Youth)
■ Systematic organization-specific initiatives (e.g., Google gDNA, Army STARRS)
■ Randomized laboratory studies designed around transition events
Software requirements
■ Any statistical package that can estimate mixed-effects/multilevel models (e.g., HLM, SAS, R, STATA, SPSS, M-Plus)
■ Some data manipulation functions, such as setting up the design matrix for chronologically desynchronized events when individuals can experience no events or multiple events, have been developed in R

Abbreviations: BMI, body mass index; STARRS, study to assess risk and resilience in service members.

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motivate interesting research on transition events. We believe such work will ultimately shed light on understanding numerous concepts to include meta-concepts such as adaptability and resilience.

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