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ORIGINAL PAPER

Leader Identity on the Fly: Intra-personal Leader Identity Dynamics in Response to Strong Events

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Abstract

Recent theorizing challenges the notion that leadership, and especially leader identities, is static. Yet, we know little about the dynamics that characterize how leader identities change within individuals across short periods of time. The current work integrates theorizing on temporal dynamics in leadership research with event systems theory to describe and predict day-to-day shifts (i.e., unidirectional, sudden changes) and dynamic ebb and flow patterns (i.e., multidirectional, potentially nonlinear changes over multiple days) of individuals' leader identities. Specifically, we argue that the experience of strong (i.e., novel, disruptive, extraordinary) daily events facilitates positive leader identity shifts, and that over time, the resulting identity ebb and flows are more pronounced in unfamiliar compared to familiar contexts. We collected experience sampling data from 69 young adults at a university in the UK across seven-day periods at three different time points during the academic year (1159 data points). Using dynamical systems modeling, we analyze the velocity (i.e., rate of change) and the acceleration (i.e., change in velocity) parameters of individuals' leader identity dynamics. We find that (a) on a daily level, strong events prompt positive shifts in leader identity, and that (b) over time, chains of stronger and weaker events provoke similar patterns of leader identity ebb and flows. However, these relationships are not stronger in unfamiliar compared to familiar contexts. Our research informs the theoretical understanding of events and short-term leader identity dynamics. We discuss implications for theory and research, in particular how events can trigger leader identity formation.

Keywords Ebb and flow · Events · Dynamical systems modeling · Leader identity · Young adults

Nothing is absolute. Everything changes, everything moves, everything revolves, everything flies and goes away — Frida Kahlo.

Social-cognitive theory seeks to explain how one's leader identity becomes salient during a particular period of time (Epitropaki et al., 2017). One explanation is that individuals scan their environment for relevant cues, which they integrate with more enduring information about their leadership related past, present, and future (Ashforth & Schinoff, 2016; Kivetz & Tyler, 2007; Shaughnessy & Coats, 2018). Leader identity describes the extent to which individuals define themselves as "being a leader" during a specific period of time. When a leader identity is more salient than "being a follower," individuals think, feel, and act like leaders (Jennings et al., 2021; Lanaj et al., 2021a, b).

Scholars agree that, similar to other identities (e.g., entrepreneurial; Tripathi et al., 2020), leader identities are malleable and fluctuate within individuals over short periods of time (Epitropaki et al., 2017; Lord & Chui, 2017; Lord et al., 2016). This view contrasts to earlier research in which leader identities have been treated as relatively stable intrapersonal attributes (e.g., Johnson et al., 2012; Kwok et al., 2018; Venus et al., 2019), which develop over longer periods such as weeks or months (Day & Sin, 2011; Middleton et al., 2019; Miscenko et al., 2017). For example, leader identities have been examined from the perspective of skill acquisition

Additional supplementary materials can be found on the Open Science Framework (https://osf.io/wrvye/).

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in response to training (Lang et al., 2021; Wallace et al., 2021) and predicted by individual differences (e.g., learning orientation, motivation to lead; Kwok et al., 2021; Middleton et al., 2019). Recent experience sampling studies (Jennings et al., 2021; Lanaj et al., 2021a, b; Lanaj et al., 2021a, b), however, begin to tap into short-term changes in individuals' leader identities, showing that leader identities are sensitive to contextual stimulation (e.g., self-reflection exercises; Jennings et al., 2021; Lanaj et al., 2021a, b). These short-term changes have been described as unidirectional, sudden, and discontinuous leader identity *shifts*, which happen from one day to another. Over time, however, multiple of these smaller shifts combined may form a dynamic and potentially nonlinear pattern of leader identity *ebb and flows* (McClean et al., 2019).

Knowing why and how leader identities change in the form of short-term shifts and ebb and flows is essential for understanding whether and when a person is likely to exhibit leadership during a particular period of time. We maintain that a strong (person-level) leader identity alone does not fully predict the extent to which a person is likely to exhibit leadership on a specific day. In addition to individuals' general self-schema as a leader, exhibiting leadership requires that their leader identity is salient on a given day and is more salient than other possible identities (e.g., being a follower). Defining individuals' leader identity relative to their follower identity sets a baseline to determine if leadership is going to be the identity that most likely drives cognition, motivation, and behavior. We thus define an *active leader identity* as the extent to which "being a leader" is more salient than "being a follower" during a specific period of time. According to event systems theory, strong (i.e., novel, disruptive, extraordinary) events have the potential to prompt positive leader identity shifts (increases in leader identity activation) as they require individuals to actively make sense of who they are (Hammond et al., 2017; Hoffman & Lord, 2013; Morgeson et al., 2015). Although qualitative findings indicate that strong events can trigger identity change (e.g., Hennekam et al., 2021), research that explains and quantifies the factors that facilitate such changes in leader identities over shorter periods of time remains very limited.

Our research challenges leader identity change as primarily a long-term, gradual development process. Instead, we suggest that leader identities are contextually malleable and that the intra-personal changes in leader identity relative to a follower identity are best characterized as a dynamic pattern of identity ebbs and flows (McClean et al., 2019). We argue that the extent to which an individual's leader identity is salient relative to their follower identity varies around a typical identity state (i.e., an identity-equilibrium), producing small identity shifts from day to day. Over time, the resulting leader identity dynamics can be quantified by the velocity (i.e., rate of change) and acceleration (i.e., change in velocity) at which intra-personal change occurs.

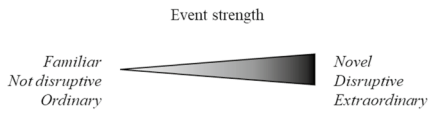
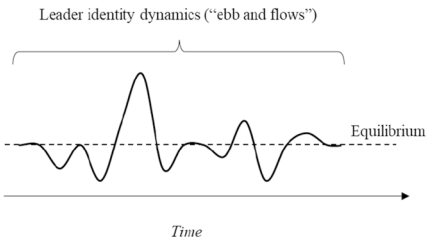
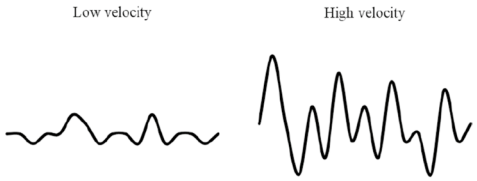
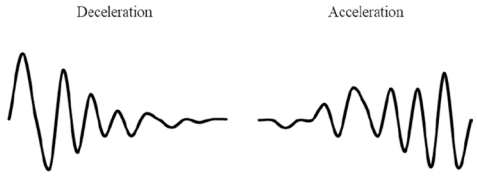
In sum, building on temporal (McClean et al., 2019) and event system theorizing (Hoffman & Lord, 2013; Morgeson et al., 2015), we argue that strong daily events prompt individuals' leader identities to positively shift away from their identity-equilibrium. Over time, the dynamic changes in event strength will predict a similar pattern of changes in leader identity. Table 1 provides an overview of our key study constructs.

Our research makes several contributions. First, we quantify how short-term changes in leader identities occur by examining the daily shifts, and the ebb and flow patterns that these intra-personal dynamics follow over time (McClean et al., 2019). We seek to explain how leader identity ebb and flows are put in motion through experiences of events and in different contexts (Hoffman & Lord, 2013; Morgeson et al., 2015). Events are triggers for sensemaking about situated identities (Ashforth & Schinoff, 2016; Hennekam et al., 2021), and our research shows that strong events prompt positive shifts in daily leader identities. As events do not happen in isolation but follow each other in chains or event clusters (Morgeson et al., 2015), we examine the implications of chains of weak and strong events for leader identity ebb and flows. Thus, we are able to test whether event clusters function as accelerators of individuals' sensemaking processes and over time have the potential to shift individuals away from their chronic leader identity equilibrium.

Second, time is a critical element of leader identity change (Epitropaki et al., 2017; Hammond et al., 2017; Lord & Chui, 2017; Lord et al., 2016). Although the importance of time for organizations has been widely recognized (Aguinis & Bakker, 2021; Ancona et al., 2001; Castillo & Trinh, 2018; Shipp & Jansen, 2021), there remains scope for the empirical integration of time and change into (leadership) research methods. We contribute to the modeling of time in leadership and organizational behavior research (Fischer et al., 2017; McClean et al., 2019; McCormick et al., 2020). Short-term variation within persons is often ignored and considered as an error, rather than being explained scientifically (Lord et al., 2015). Instead, we apply principles of dynamical systems modeling (Boker, 2001; Boker & Nesselroade, 2002; Cole et al., 2017) in order to model two key elements, velocity (i.e., rate of change) and acceleration (i.e., change in velocity), which quantify how leader identities shift in ebb and flow patterns within individuals and over short periods of time (McClean et al., 2019).

Third, we aim to offer insights into the intra-personal relationships between leader and follower identities. Current theorizing suggests that leadership and followership are part of a larger network of self-schemas (Epitropaki et al., 2017; Lord & Chui, 2017). As such, both identities should be considered as drivers of motivation and behavior (Acton et al., 2019; Lord et al., 2016). Yet, current research

Table 1 Key concepts and definitions in our research

Concept	Definition	Illustration	References
Event strength	Events are discrete and discontinuous units of activity that occur in a specific time and location, and that diverge from the routine features of the environment. Event strength describes the extent to which an event is salient, commands attention, and stands out of the day-to-day routine. Event strength is characterized by the three features novelty (i.e., differs from one's current or past experiences), disruptiveness (i.e., reflects a discontinuity), and extraordinariness (i.e., questions established orders).		Hoffman & Lord, 2013; Morgeson et al., 2015
Leader identity dynamics	We define an active leader identity as the extent to which 'being a leader' is more salient than 'being a follower' during a particular period of time. Leader identity dynamics are characterized by multiple smaller shifts in an individual's active leader identity over shorter periods of time (i.e., ebb and flows). Leader identity dynamics represent the pattern of variability that individuals experience around their typical leader identity level (i.e., their equilibrium). These dynamics can be quantified via the velocity and the acceleration at which change occurs.		McClean et al., 2019; Lang et al., 2021; Xu et al., 2020
Velocity	Velocity describes the rate at which change in leader identity occurs over a specified unit of time (e.g., day-to-day). As such, it indicates how quickly change in leader identity occurs over time.		Boker, 2001; Boker & Nesselroade, 2002
Acceleration	Acceleration indicates whether the velocity is increasing or decreasing over a specified unit of time. As such, the acceleration indicates whether the rate of change in leader identity is accelerating, decelerating, or remaining constant.		Boker, 2001; Boker & Nesselroade, 2002

does not explain how the potentially conflicting elements of leader and follower identities relate to each other (Epitropaki et al., 2017). For example, individuals may engage in an intra-personal process of dynamic leader and follower identity switching (Sy, 2010; Sy & McCoy, 2014). We introduced the leader–follower identity grid (LFIG) to assess leader and follower identities. Our measurement approach reflects that both leadership and followership schemas can (but need not) be active to inform an individual's identity on a particular day. Our analysis of general (person-level) and within-person relationships between leader and follower identities addresses whether the two identities can be active at the same time or whether activation of one identity likely de-activates the other identity.

Finally, our research contributes to the understanding of leader identity dynamics during the critical time period of young adulthood (Liu et al., 2021; Shaughnessy & Coats, 2018; Zaar et al., 2020). Young adults may experience strong events as "shocks" (Crawford et al., 2019) that can cause uncertainty and liminality (Hawkins & Edwards, 2015), which may hinder their development. Conversely, strong events (or chains of strong and weak events) may function as developmental opportunities for identity play and work that can ultimately help to build or solidify longer-term leader identities (Ashforth & Schinoff, 2016; Ibarra, 1999; Ibarra & Obodaru, 2020). Thus, our research of short-term leader identity dynamics holds the potential to inform approaches to leader (identity) development (Day & Dragoni, 2015), particularly for young adults. It can advise educational institutions and employers on the types of experiences (e.g., strong and weak events) that they should support to foster young adults' development.

Theory and Hypotheses

Leader Identity Dynamics

Leader identity has been described as a momentary state (Ashford & DeRue, 2012), as being created on-the-spot (Lord & Chui, 2017; Lord et al., 2016), frequently moving (DeRue & Ashford, 2010; Sveningsson & Alvesson, 2003), and dynamically shifting within individuals (Epitropaki et al., 2017; Lord et al., 2020). Building on these perspectives, we conceptualize *leader identity dynamics* as the intrapersonal changes in an individual's leader identity activation over time. We apply the term dynamics (or "ebb and flow"; McClean et al., 2019) to describe change processes over time (Lang et al., 2021) and specifically focus on describing and explaining small changes over shorter periods of time (Xu et al., 2020).

Individuals are motivated to establish and re-establish both who they are (I am a leader) and who they are not (I am not a leader; Watson, 2009). As such, leader identities can be understood as equilibria that result from individuals' momentary sensemaking of the extent to which they do or do not feel like a leader. The equilibrium describes the individual's typical leader identity state (Boker, 2015; Deboeck, 2013). Internal and external cues can affect the identity-equilibrium state. The cues are integrated into the momentary self-concept with the goal to understand "'Who am I in this situation?' and 'what should I do?'" (Epitropaki et al., 2017, p. 107). Accordingly, leader identities may change due to new situations or events that the individual encounters (Ashforth & Schinoff, 2016; Lord et al., 2015). However, over time, the net effect of such changes is often the formulation of a new equilibrium of leader identity; this might closely follow the experience and sensemaking associated with strong events (Hoffman & Lord, 2013; Morgeson et al., 2015).

Qualitative research that describes identity formation as a process of identity work (i.e., maintaining, adapting, shaping, or revising an existing identity) and play (i.e., exploring possible new identities; Brown, 2015; Bysh et al., 2022a; Ibarra & Petriglieri, 2010) supports the perspective of identity-as-equilibrium. For example, individuals revise and deconstruct their existing identities and experiment with new ones, rendering some more salient than others (e.g., Nicholson & Carroll, 2013; Sveningsson & Alvesson, 2003). Building on these findings, we argue that the extent to which individuals see themselves as leaders varies around their typical level of leader identity (i.e., the equilibrium).

Events and Leader Identity Dynamics

Events reflect discrete and discontinuous units of activity that occur in a specific time and location (Hoffman & Lord, 2013; Morgeson et al., 2015). Events can disrupt routines, so that individuals need to adjust their behaviors to the new requirements, as well as interpret and connect these new experiences with their previous ones (Hoffman & Lord, 2013; Morgeson & DeRue, 2006; Wallace et al., 2021), as such events, and especially strong events, are a promising avenue to explain change in leadership and identity processes (Bednar et al., 2020; Hoffman & Lord, 2013; Morgeson et al., 2015).

Event strength focuses on the impact that events have on individuals. Event strength is defined as the extent to which an event is salient, commands attention, and stands out of the day-to-day routine (Morgeson et al., 2015). The stronger the events, the more they prompt controlled information processing and influence individuals' affect, cognition, and behavior (Crawford et al., 2019; Hoffman & Lord, 2013; Morgeson, 2005; Morgeson & DeRue, 2006; Morgeson et al., 2015). Event strength is characterized by the three features novelty (i.e., the event differs from current or past experiences), disruptiveness (i.e., the event reflects a discontinuity), and extraordinariness (i.e., the event questions established orders).[1] These three event features function independently, such that for example a novel event (e.g., meeting a new co-worker) is not necessarily disruptive. However, the event features combine in an additive fashion such that their confluence determines the overall strength of an event and the impact it likely has on individuals (Morgeson et al., 2015). Table 2 provides a construct definition for each event feature, and it explains the mechanisms through which they impact individuals' affect, cognition, and behavior.

We argue that strong events trigger leader identity dynamics as individuals respond with experimenting and negotiating their identities (Hammond et al., 2017; Hoffman & Lord, 2013). Strong events have been referred to as awakening events (Seibert et al., 2021), trigger events (Bednar et al., 2020), or even shocks (Crawford et al., 2019; Hennekam et al., 2021; Lee & Mitchell, 1996). They can represent "significant points of tension, change, or challenge" (Lanka et al., 2020, p. 382) for individuals' self-perceptions as a leader. Strong events increase the need for sensemaking and reflection (Bednar et al., 2020; Crawford et al., 2019; Maitlis & Christianson, 2014), which in turn can be a source of leader identity change (e.g., Jennings et al., 2021; Lanaj et al., 2019, 2021a, b). In particular, recent work shows that strong events during work transitions prompt individuals to explore new behaviors in pursuit of their identity aspirations (Seibert et al., 2021). Furthermore, strong events such as the

[1] Morgeson et al., (2015) further include criticality (i.e., high amount of personal significance) as dimension of event strength. While our research does not directly include event criticality, criticality is inherent in our measurement as we asked individuals to rate the most important event on a given day. Supplementary analyses can be found in an Online Supplementary Material at OSF.

Table 2 Conceptual definition of the event features that characterize the strength of event

Feature	Definition	Mechanism	Reference
Novelty	The extent to which an event is a new or unexpected experience that differs from current or past experiences	Novelty drives individuals to actively make sense because no established routines or scripts are available to guide the cognitive and behavioral response to a new or unexpected experience	Crawford et al., (2019); Hoffman & Lord, (2013); Morgeson (2005); Morgeson et al. (2015)
Disruptiveness	The extent to which an event is a discontinuity that disrupts the predictable flow of day-to-day experiences	Disruptiveness requires individuals to actively make sense because they need to identify in which ways to adapt to the discontinuity and how to adjust and change their actions	Morgeson & DeRue, (2006); Morgeson et al., (2015)
Extraordinariness	The extent to which an event questions or threatens established orders of functioning	Extraordinariness drives individuals to actively make sense because these events take the form of opportunities or threats which require the use of new scripts and schemas	Hoffman & Lord, (2013)

confinement during COVID-19 pandemic have been shown to trigger individuals' identity reconstruction (Hennekam et al., 2021).

Daily Events and Change in Leader Identity Activation

Identities change during periods of transition (Ashforth & Schinoff, 2016; Ibarra, 1999; Ibarra & Obodaru, 2020). Emerging adulthood (i.e., the late teens and twenties) is such a time of transition (Liu et al., 2021; Zaar et al., 2020). During this period, individuals are particularly inclined to seek leadership-related experiences that inform their identities (Liu et al., 2021; Murphy & Johnson, 2011; Zaar et al., 2020). Emerging adulthood also provides opportunities for strong daily events to occur, such as through educational experiences, leisure activities, volunteering, or first experiences with internships and jobs (Liu et al., 2021). Strong events unsettle current leadership-related perceptions because they create tensions or challenges to who one is (Lanka et al., 2020), trigger self-related sensemaking and reflection (Bednar et al., 2020; Crawford et al., 2019; Maitlis & Christianson, 2014), and prompt identity exploration (Hennekam et al., 2021; Seibert et al., 2021).

Identity and sensemaking are interdependent. A salient identity facilitates sensemaking. At the same time, sensemaking in response to strong events precipitates a search for meaning that informs identity (Crawford et al., 2019; Weick et al., 2005). The stronger daily events are, the more they depart from an individual's established cognitive schemas and scripts. For a strong daily event, individuals can no longer follow their previously learned cognitive patterns. Rather, they are prompted to explore different perspectives and to construct novel interpretations of a situation, which promotes higher levels of self-complexity, an important ingredient for leader development (Hannah et al., 2009). Strong daily events and the resulting sensemaking can be seen as opportunities for leadership. Individuals are required to actively depart from their prior knowledge and take over responsibility for adapting or newly creating their cognitive (and/or behavioral) response. In that sense, strong events require individuals to be active and adopt leadership to some degree. The fact that strong daily events require individuals to be active makes it likely that the salience of individuals' leader identity increases. Contrarily, experiencing weaker daily events means that events are rather familiar, ordinary, and non-disruptive. For these events, individuals can recognize learned patterns and follow their previous routines. Hoffman & Lord, (2013, p. 561) describe such routine events as "substitutes for leadership," that is, as events that require individuals *not* to show leadership action for success.

Overall, we propose that on days when young adults experience strong events, their daily leader identity will deviate from their typical identity level, such that short-term

changes in leader identity activation become observable. In particular, we expect that the stronger the daily events, the more young adults' leader identity will shift in a positive direction away from their equilibrium (i.e., increased leader identity activation).

Hypothesis 1: The strength of daily events relates positively to changes in leader identity activation.

Events and Leader Identity Dynamics *Over Time*

Individuals experience different events over time. Events that follow each other can be similarly strong (e.g., two strong or weak events after each other) or differ in their strength (e.g., a strong event is followed by a weak event or vice versa). According to event systems theory, the extent to which different events vary in strength over time will inform how likely they elicit change (Morgeson et al., 2015). Similarly, Hoffman & Lord, (2013) pointed out that event sequences should be considered in order to accurately interpret their consequences for leadership dynamics. In fact, experimental research on painful events demonstrates that what mattered most for participants' experienced pain was not the intensity of pain associated with events but the *pattern of change* in an event's pain intensity (Ariely, 1998).

We argue that leader identity dynamics increase with the abruptness of change in event strength. Over time, the extent to which leader identities are salient for individuals likely varies around a typical identity state so that periods of relative identity stability alternate with periods of identity change (Ibarra & Petriglieri, 2010). We previously theorized that strong daily events result in a positive shift in leader identity activation (Hypothesis 1). In addition to that, we argue that over time the rate of change and the acceleration in an individual's leader identity is predicted by the experienced rate of change in event strength. Individuals are more likely to be affected by strong events where these events are clearly noticeable and differ in their strength from previous events. That is, the more the strength of events shifts (i.e., high rate of change, meaning that stronger and weaker events are rapidly occurring after each other), the more an individual's leader identity will be likely to shift away from their equilibrium. Based on Hypothesis 1, we would expect these leader identity shifts around the equilibrium to occur in the same direction as the event strength. That is, over time increases in event strength should predict increases in leader identity activation. Similarly, over time decreases in event strength should predict decreases in leader identity activation. In contrast, when the strength of events remains relatively stable over time (i.e., low rate of change, with events of similar strength following each other), there will be no noticeable difference in event strength for individuals such that their identities remain in similar states. That is, previously active leadership identities will remain active, or previously active follower identities will maintain their activation.

Finally, acceleration of leader identity is a core concept of dynamical systems modeling (Chow et al., 2005). Whereas velocity represents how much leader identities shift, acceleration represents how fast these identity shifts occurs, that is, whether the rate of change itself is decreasing (deceleration), increasing (acceleration), or remaining stable over time. We argue that increases in event strength over time will affect not only *how much* leader identities shift, but also *how fast* these shifts occur. The higher the rate of change in event strength, the more noticeable are strong events and the more likely their experience will really kick in, such that individuals will move faster away from their leader identity equilibrium. Thus, we would argue that an increase in event strength over a period of time should provoke an increasing rate of change in leader identity shifts.

In sum, we propose that a higher rate of change in event strength results in leader identity dynamics with a pronounced ebb and flow pattern over time, characterized by high velocity and acceleration. That is, the more the strength of events changes over time, the more likely individuals' leader identity is to shift (i.e., higher rate of change) at an increasing rate (i.e., acceleration).

Hypothesis 2: Over time, the rate of change in event strength (i.e., event strength velocity) is positively related to the rate of change in leader identity activation (i.e., leader identity velocity).

Hypothesis 3:Over time, the rate of change in event strength (i.e., event strength velocity) is positively related to the acceleration in leader identity activation.

Contexts and Leader Identity Dynamics

Contexts are essential to the impact of events: The more an event fits the emerging needs of a developmental stage, the larger its potential impact (Morgeson et al., 2015). Young adults' developmental needs for leadership may change as they become more accustomed to previously unfamiliar contexts (Ashforth & Schinoff, 2016; Ashforth et al., 2014). Upon entering unfamiliar contexts (e.g., at university), young adults do not have a framework to guide their perceptions and behaviors (Hirsh et al., 2012). Their identities will be more malleable, which renders the identity-relevant cues in their environment more salient (Ashforth & Schinoff, 2016). Thus, in unfamiliar contexts, young adults are more likely to be receptive to external cues that can inform their leader identities. In contrast, in familiar contexts, young adults may have already formed situated leader identities and

thus strong events may be less likely to unsettle these identities. In sum, we argue that the relationship between changes in event strength and young adults' leader identity dynamics (i.e., velocity, acceleration) will be stronger in unfamiliar as compared to familiar contexts.

Hypothesis 4: The positive relationship between the rate of change in event strength (i.e., event strength velocity) with (a) the rate of change (i.e., velocity) and (b) the acceleration of leader identity will be stronger in unfamiliar as compared to familiar contexts.

Method

Data were analyzed using R, version 4.0.0 (R Core Team, 2021). The analysis code and the Online Supplementary Material (OSM) containing additional analyses can be accessed at https://osf.io/wrvye/.

Research Context

We conducted an experience sampling study with undergraduate students at a large university based in the United Kingdom (UK).[2] At three times of the academic year 2019–2020, we collected one week of daily data corresponding to the three terms of one academic year in the UK. At *time 1* (t1), the first term of the academic year in October/November 2019, participants experienced various new situations (e.g., starting university courses and projects; meeting instructors and fellow students) and social roles (e.g., engaging in formal college activities; becoming members in sport and leisure clubs). Thus, t1 represents an unfamiliar context. At *time 2* (t2), participants returned after the winter break to enter their second term of study in January 2020. They returned to previously established roles and tasks (e.g., in college or sports clubs) and resumed their studies. Thus, t2 represents a familiar context. Finally, at *time 3* (t3), the third term started in May 2020 and was shaped by the COVID-19 pandemic. The campus shut down, and students were taught and examined virtually. The social distancing guidelines restricted face-to-face interactions to a minimum, resulting in feelings of isolation (Hamza et al., 2021). In addition, many students relocated to their home countries. Accordingly, while originally proposed to be the most familiar context, t3 represented an unexpected context for which we did not have propositions.

[2] The university has a collegiate system, where all students belong to a college for the duration of their study. While the academic departments deliver the formal teaching, the colleges play a key role in providing the social contexts in which students engage in extra-curricular activities.

Participants and Procedures

We collected self-report data via a baseline survey at the onset of the academic year and a series of daily surveys at the onset of each of the three time points (i.e., academic terms) with seven measurements (Monday to Sunday), respectively. The baseline survey assessed socio-demographics and construct validation variables for our measure of leader identity. We blended a daily assessment of identity activation with an episodic experience sampling approach (Beal & Gabriel, 2019). Participants rated one discrete daily event along multiple features (Hoffman & Lord, 2013). Such event-based assessments help to access episodic (i.e., context-specific) rather than semantic (i.e., context-independent) memories, which improves the accuracy of ratings (Hansbrough et al., 2020; Hoffman & Lord, 2013; Shondrick et al., 2010). This approach allowed us to capture important daily events, which we expected to drive leader identity dynamics.

The daily surveys were sent out at 5 pm and assessed participants' most important daily events, as well as their leader and follower identities on the respective day. Self-report data were most appropriate since participants themselves were in the best position to evaluate their daily experience of events as well as their leader identities (McClean et al., 2019).

We recruited students in collaboration with one college at the University (via email, flyers, and approaching them in common areas). As reimbursement for completing a minimum of 75% of daily surveys, participants entered a lottery for a formal college event and received a leadership reflection certificate and £20 ($25). We received 110 baseline surveys with 78 participants at t1 (458 assessments; 84% of daily surveys completed), 60 at t2 (371 assessments; 88% of daily surveys completed), and 54 at t3 (346 assessments; 92% of daily surveys completed).

For our analyses, we included participants with a minimum of two daily assessments per time point, resulting in a sample of 69 participants for t1 (449 assessments, 93% of daily surveys completed), 56 participants for t2 (367 assessments, 93.6% of daily surveys completed), and 51 participants for t3 (343 assessments, 96.1% of daily surveys completed). Out of the 69 participants, 55.1% were female (42% male, 2.9% other) with an average age of 19.24 years ($SD = 1.22$, ranging from 18 to 23 years). Most were in their first year of studies (60.9%; 17.4% second year; 18.8% third year; 1.4% fourth year; 1.4% missing), 68.1% lived in the college, and 26.1% currently or formerly held a formal position within the college (e.g., year-group representative). Some participants had prior work experience (44.9%) of 2.47 years on average ($SD = 1.55$, ranging from 0.4 to 6 years). Out of those with prior work experience, 41.9% reported that they had supervised others.

Table 3 Descriptive statistics of the event features and their correlations with the overall event strength measure

Event features	M	SD	Time 1 (unfamiliar)	Time 2 (familiar)	Time 3 (COVID-19)
Novelty	3.58	1.91	.51	.62	.63
Disruptiveness	4.01	1.79	.49	.52	.59
Extraordinary	3.62	1.67	.53	.62	.65

Means (M) and standard deviations (SD) are calculated across the three study contexts

Measurement

Event Strength

We prompted participants to recall the most important event that happened to them during the day and to describe it in a few sentences. Participants then rated the event along the three features of event strength (Hoffman & Lord, 2013; Morgeson et al., 2015): novelty (Was the event familiar to you? From 1 = *familiar* to 7 = *novel*); disruptiveness (Did the event disrupt your normal routine? From 1 = *not at all* to 7 = *highly disruptive*); extraordinariness (Was it an ordinary or an extraordinary event? From 1 = *very ordinary* to 7 = *very extraordinary*).

Based on the theoretical premise that all three event features add equally to the experienced strength of events, we combined the three ratings to measure event strength via mean scores. The multilevel correlations (i.e., days nested within individuals) of the three event ratings were moderate to strong across t1 (0.40–0.46), t2 (0.43–0.61), and t3 (0.49–0.57). We further calculated the correlation of each of the event features with the composite score (Table 3). Correlations were high, indicating that all three event features substantially contributed to event strength (see OSM for results from additional confirmatory factor analysis). Cronbach's α for the event strength measure was on average 0.69 (t1), 0.76 (t2), and 0.78 (t3). Findings from intraclass correlations (ICC2) further indicated that the event strength ratings were reliable for individuals over time ($ICC(2)_{t1} = 0.56$; $ICC(2)_{t2} = 0.67$, $ICC(2)_{t3} = 0.66$) (Bliese, 2000).

Leader Identity

A leader identity is an aggregated construct that is composed of multiple and interrelated leadership self-schemas (Epitropaki et al., 2017). Scholars have argued that these schemas are entangled within a larger network of self-schemas containing followership schemas (Epitropaki et al., 2017; Lord & Chui, 2017). As such, both leader and follower identities should be considered simultaneously to determine which identity is more salient to drive motivation and behavior (Acton et al., 2019; Lord et al., 2016). We thus operationalized leader identity as the level of leader identity that goes beyond a follower identity. To do so, our analysis used participants' leader identity scores as the criterion variable, while introducing their follower identity scores as a separate predictor. This parcels out the variance in participants' leader identity that is explained by their follower identity. As such, we predict the extent to which a leader identity is salient or active beyond a follower identity.[3]

We used the leader–follower identity grid (LFIG) to assess daily leader and follower identity. We built upon Sy and colleagues' work (Sy & McCoy, 2014; Sy & Reiter-Palmon, 2018) for the LFIG, which is similar to the Affect Grid (Russell et al., 1989). The LFIG comprises a two-dimensional space: follower (*x*-axis) and leader (*y*-axis), resulting from participants' response to the question "Today, I considered myself a…": 1 = *not at all* to 10 = *very much so.* With a single click, participants indicated both their daily leader and follower identities (Fig. 1). A short video instruction prior to the study ensured participants' familiarity with the response format. At the outset of the survey, we indicated that leadership and followership not only are roles or positions but also concern how one feels about oneself in social contexts, and that both are equally valuable.

We validated the LFIG via the baseline data, which assessed participants' general leader and follower identities with 10-item Likert scales (Hiller, 2005; Rus et al., 2010), respectively (items in Appendix). For the baseline assessment, participants indicated a leader identity strength of 6.36 ($SD = 2.09$), and a follower identity strength of 5.43 ($SD = 5.43$), as measured via the LFIG. Correlations between the baseline assessments of the LFIG and the Likert scales were strong ($r = 0.73$ for leader identity; $r = 0.71$ for follower identity, both $p < 0.001$).

Analyses

We tested our hypotheses with dynamical systems modeling (DSM; Boker, 2001; Boker & Nesselroade, 2002). DSM utilizes differential equations (i.e., equations that relate to a variable and its derivatives) to study intra-personal variability (Bisconti et al., 2006; Boker & Nesselroade, 2002). Building on DSM, we used the *residual score* of each participants' daily assessment of our focal variables (i.e., event strength, leader identity, follower identity) to assess their deviation from their equilibrium as a measure for their intra-personal variability. While residuals are traditionally viewed as noise, they carry meaningful information about within-person variability (Bisconti et al., 2004, 2006; Nesselroade,

[3] As a robustness check, we repeated our analysis without including follower identity as a control variable and report the findings in the OSM. Excluding follower identity as a control variable did not change the results.

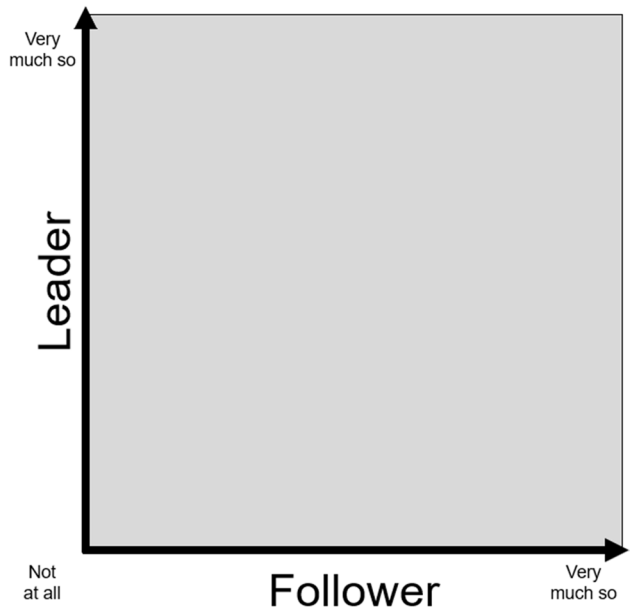


Fig. 1 The leader–follower identity grid (LFIG). Note. The LFIG was applied as a daily measure with the instruction: We are interested in knowing how you felt about yourself today. Did you consider yourself more of a leader, a follower, none, or both? Please click at the position that best represents how you considered yourself today. We are asking you to rate on both leader and follower simultaneously with a "click". Today, I considered myself a...

1991). Based on these residual scores, we calculated the first and second derivatives to characterize the velocity (i.e., the rate of change) and acceleration (i.e., change in velocity) of each participant's intra-personal dynamics in our focal variables. By relying on residuals and their derivatives, we overcome disadvantages associated with the common approach in psychology and management to measure intra-personal variability via the person-level standard deviation (e.g., Johnson et al., 2012). The person-level standard deviation is disadvantageous when aiming to describe variability over time (Deboeck, 2009; Deboeck et al., 2008; Wang et al., 2012), as the same standard deviation may result from different ebb and flow patterns (illustration in Fig. 2); as such, relying on it may overlook fine-grained information such as the frequency of change (Deboeck et al., 2008; McClean et al., 2019). Table 4 summarizes the advantages of the DSM approach in comparison to more traditional approaches, such as growth modeling.

Obtaining Residual Scores

As the first step, we calculated each person's daily deviation from their equilibrium. To do so, we obtained each person's daily residuals from their estimated linear trend in our focal variables (i.e., event strength, leader identity, follower identity), separately for each time point. Using a linear imputation function based on the R package "imputeTS" (Gasimova et al., 2014; Moritz & Bartz-Beielstein, 2017), we imputed missing data for each time point separately and performed linear mixed effect modeling. These models included a separate intercept and slope for each person. Residuals were calculated as a form of level-1 residuals since data points were nested within individuals (i.e., lowest level). Thus,

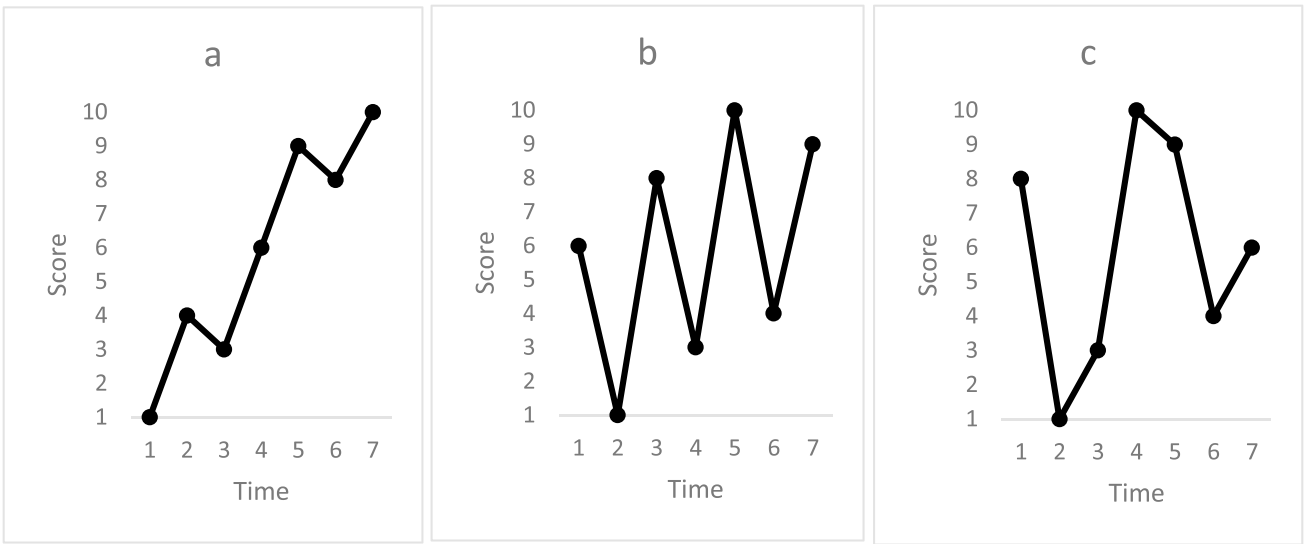


Fig. 2 Three hypothetical persons with different ebb and flow patterns. Note. Figure adapted from Deboeck, (2009) and applied to our study. Three figures with different identity ebb and flows based on different arrangements of seven assessments. The variance of all three time series data is the same ($s^2 = 9.55$). However, if calculating difference scores for each time series ($x_t - x_{t-1}$), which are related to the estimates of the first derivative (i.e., velocity), the variance of these difference scores differs largely ($s^2_a = 5.50$, $s^2_b = 34.83$, $s^2_c = 22.00$)

Table 4 Summary of the DSM approach for answering questions about leader identity dynamics

Concept	Dynamical Systems Approach	Traditional Approaches (e.g., longitudinal growth modeling)
Predicted score	*Focal question: What predicts a person's equilibrium state?* The predicted score in a regression equation is an individual's equilibrium (i.e., typical state). In a regression line representing leader identity over time, a predicted value is each value on the regression line *Example:* The "typical" level of leader identity that a person tends to shift back to over a specific period of time (e.g., days, weeks). Therefore, the predicted value represents the reference point used to detect a shift rather than treated on its own like in more traditional approaches	*Focal question: What is the current level of leader identity?* The predicted score in a regression equation is what is traditionally used to measure the expected level of identity. The predicted values are the values on the regression line. This can only evaluate overall trends, but not smaller shifts. Additionally, traditional approaches utilize the predicted value in a regression solely
Residual score	*Focal question: What predicts how much a person's assessment deviates from their equilibrium state?* The residual score represents the extent to which an observed score has fluctuated from an equilibrium at the one-time point. Larger scores represent larger shifts from the equilibrium *Example:* A positive (negative) sign indicates that the level of leader identity shifts above (below) the individual's leader identity equilibrium	*Focal question: What error is observed in the data?* The residual is treated as an error term and thus is not directly incorporated into models of change. This ignores the potentially meaningful shifts from equilibrium states and what predicts them
Change over time	*Focal questions: How can we quantify a person's intra-personal fluctuations around their equilibrium over time?* Two change parameters are used: velocity, acceleration. The velocity represents the rate of change at which fluctuations around a person's equilibrium occur across a defined unit of time. The acceleration captures whether and how this rate of change at which fluctuations occur is changing over time *Example:* Larger velocity scores represent larger fluctuations of a person's leader identity around their leader identity equilibrium. Positive (negative) acceleration indicates that these fluctuations are accelerating (decelerating) over time. An acceleration of zero indicates that a person's fluctuations around their leader identity equilibrium remain stable across time	*Focal question: How can we quantify a person's overall change in the level of leader identity over time?* Change is considered linearly. That is, the rate of change of the predicted level of leader identity is observed, but not how much the levels of leader identity are fluctuating *around* an equilibrium. Questions about change around an equilibrium state cannot be answered

the residuals were centered at the person level and aligned more closely to the raw residuals found within ordinary least squares regressions. Residuals represented the difference in an individual's observed response from the one that would be predicted by their overall regression line at t1, t2, or t3 respectively[4]:

$$\widehat{e}_{ij} = \widehat{y}_{ij} - \left(\widehat{B}_0 + \widehat{\beta}_1 x1_{ij}\right) - \widehat{U}_j$$

$$i = day\ i$$

$$j = person\ j$$

These residuals served as the data for computing the dynamic parameters in our focal variables (i.e., velocity, acceleration).

Testing for Time-Dependent Processes

As the second step, we tested the core assumption that the within-person residuals of our focal variables have a systematic ordering and are not random (Boker & Nesselroade, 2002). We simulated 1000 scrambled versions of the residual data[5] and applied a Kolmogorov–Smirnov test to compare them to the original data. If the scrambled data is significantly different from the original data, one can assume that the residuals in the original data have a systematic time-ordering. At all three time points, the residuals of our focal variables in the original data were significantly different from those in the scrambled datasets (Table 5).

Table 5 Comparison of residuals from the original data to scrambled data sets

Time point	Residual Scores	5% CI of *D*	95% CI of *D*
t1	Leader identity	0.72**	0.74**
	Follower identity	0.73**	0.76**
	Event Strength	0.28**	0.30**
t2	Leader identity	0.75**	0.77**
	Follower identity	0.73**	0.76**
	Event Strength	0.25**	0.28**
t3	Leader identity	0.68**	0.72**
	Follower identity	0.69**	0.73**
	Event Strength	0.22**	0.25**

Residuals were obtained for each person separately for each of the three time points. We simulated 1000 scrambled versions of the residual data and compared them to the original data via a Kolmogorov–Smirnov test. Significant differences imply that the residuals in our data have a systematic time-ordering and are not random

** $p < .001$

Velocity and Acceleration Parameters

As the third step, based on the residual scores, we calculated approximations to the first and the second derivatives of our focal variables for each time point separately. The first derivative expresses the direction and rate of change (i.e., velocity), with higher values indicating a higher rate of change and positive (negative) values indicating an increase (decrease). Applied to leader identity, positive velocity values thus indicate increased leader identity activation, whereas negative values indicate reduced leader identity activation. The second derivative expresses changes in the first derivative (i.e., whether the rate of change is accelerating or decelerating; Bisconti et al., 2006; Boker & Nesselroade, 2002). Positive values indicate acceleration, negative values deceleration, and a value of zero indicates a constant pattern of intra-personal leader identity shifts.

Following previous guidelines (e.g., Boker & Nesselroade, 2002; Deboeck, 2009), we applied the Generalized Orthogonal Local Derivative (GOLD) method (Deboeck, 2010) to estimate the derivatives via a time-delay embedded matrix, which contains lagged replications of the original data. That is, the original data is reorganized such that short time-ordered sequences of the data appear as rows of a matrix (Boker et al., 2018; Chow et al., 2016). For the structure of this matrix (i.e., the number of row/columns), one decision relates to the number of consecutive measurements to be included. Past literature suggested to select smaller "bursts" within the larger time frame (Bisconti et al., 2006; Boker & Nesselroade, 2002), with a minimum of four measurements for accurate estimations of the second derivative (Boker et al., 2018). We thus chose sequences of four consecutive measurements (e.g., four consecutive measurements of leader identity: LI1, LI2, LI3, LI4) to construct the time-delay embedded matrix based on which the derivatives were estimated:

$$\mathrm{LI}^{(4)} = \begin{bmatrix} LI1 & LI2 & LI3 & LI4 \\ LI2 & LI3 & LI4 & LI5 \\ LI3 & LI4 & LI5 & LI6 \\ LI4 & LI5 & LI6 & LI7 \end{bmatrix}$$

Based on this matrix, we estimated the first (i.e., velocity) and the second (i.e., acceleration) derivative from *each* sequence of four occasions of measurement (i.e., each row) within each of our three time points, respectively. At each time point, an individual's velocity and acceleration scores were thus estimated based on four sets of 4-day sequences each.

[4] We include a visual representation of the leader identity residuals in the OSF repository.

[5] To calculate residuals for the scrambled data, we utilized a linear regression approach (Gasimova et al., 2014) used previously to avoid model convergence issues.

Table 6 Examples of young adults' stronger and weaker daily events at each time point

Stronger events	Weaker events
Time 1 (Unfamiliar)	
• [When playing pool, I] potted 4 balls in a row including the black in pool (7)	• Organised all of my stuff and tidied my room (1)
• Took my friend to [Accident & Emergency] along with another girl helping who I don't really know but is her friend (7)	• I went to the library alone to do some dissertation research (1)
• Did a big rowing thing for charity (6.67)	• Chatting in the kitchen with my housemates (1.33)
• Came home for the first time since moving to [Name of the city the university is placed] via a six-hour overnight bus journey (6.33)	• I had a dissertation meeting with my supervisor to discuss what I am going to learn about next (1.33)
• I developed my social media presence (6.0)	• Watched TV with a friend (1.67)
Time 2 (Familiar)	
• A friend had a serious accident last night while a lot of us were present and so today has been digesting that and making sure everyone is ok (7)	• I had a Business Ethics seminar on trust in business practice which was very interesting (1)
• I had a meeting with the [student committee] president to discuss an issue (6.67)	• I started working on a summative assignment [an assessment of learning] for one of my modules (1)
• Went on a date and it went really well (6.33)	• Did some discrete homework (1)
• Completed a research project field trip (6.33)	• Going to strength and conditioning [refers to sports training] (1.33)
• Mentored a young person (6.33)	• Saw a good friend and [it] was nice to catch up (1.67)
Time 3 (COVID-19)	
• My grandma had a stroke (7)	• Ate lunch with my family (1)
• Took a walk outside for the first time in two months (6.33)	• Took my dog for a walk in the park (1)
• Had an argument with my girlfriend (6.33)	• Played games with friends online (1.33)
• Had my first online exam and completed around half of it (6.33)	• Facetimed my boyfriend (1.33)
• Social distanced street party (6)	• Read a book (1.67)

Examples of the most important events that young adults indicated in their daily surveys. Event strength is indicated in brackets and calculated based on the ratings of event novelty, disruptiveness, and extraordinariness

Hypothesis Testing

We retrieved two datasets. The first contained individuals' daily event strength and their daily leader and follower identity residuals, at each of the three time points respectively. We used this dataset to test Hypothesis 1. The second dataset included individuals' velocity (i.e., event strength velocity, leader and follower identity velocity) and acceleration parameters (i.e., leader and follower identity acceleration) at each of the three time points, respectively. We used this dataset to test Hypotheses 2 to 4. As both datasets were nested across three levels (i.e., days or sequences nested in time points, nested in individuals), we utilized 3-level random coefficient modeling via the lme4 R package (Bates et al., 2015).

Results

Daily Events

Tables 6 and 7 display examples of daily events. In Table 6, examples of strong and weak events are displayed for each time point. In order to better understand the daily events, we coded them along two identity-relevant dimensions that comprise (a) their domain (i.e., work, home, community; Hammond et al., 2017) and (b) their level of inclusiveness (i.e., personal, relational, collective; Brewer & Gardner, 1996; Hammond et al., 2017; Lord & Hall, 2005). Table 7 gives prototypical examples for daily events within each of these dimensions, and Fig. 3 illustrates their relative frequencies at each time point.

Descriptive Analyses

The means, standard deviations, and correlations among the focal study variables (i.e., event strength, leader identity, follower identity) at the person-level are presented in Table 8. The ICC(1) demonstrated that at all time points, there was substantial variance at the within-person level for event strength (ICC(1) = 0.17, 0.23, 0.23), leader identity (ICC(1) = 0.39, 0.33, 0.47), and follower identity (ICC(1) = 0.29, 0.39, 0.55).

After calculating each individual's leader identity equilibrium within each time point, we compared these equilibria ranges to the general leader identity strength that participants had indicated in the baseline survey. As shown in Fig. 4, the

Table 7 Examples of young adults' daily events as characterized by their domain (work, home, community) and level of inclusiveness (personal, relational, collective)

Level of inclusiveness (Brewer & Gardner, 1996)		
Personal	Relational	Collective
The personal self is a part of the differentiated, individuated self-concept. Events at the personal level represent the basic social motivation of self-interest. These events are often experienced alone.	The relational self is a part of the self-concept derived from connections and role relationships with significant others. Events at the relational level represent the basic social motivation of benefitting others. These events often take place in meaningful relationships with others.	The collective self corresponds to the concept of social identity as represented in social identity and self-categorization theory. Events at the collective level represent the basic social motivation of collective welfare. These events often take place in a collective.
Work domain: Events directly related to formal university requirements or work (e.g., internships, course attendance, studying, exams)		
• Getting a bonus for my performance in a job • I completed my first session as a tutor • I submitted a summative essay • Revising for my exam • Taking a video interview for internship	• Bar shift I'm a supervisor and was training a new member is staff • I talked to a friend on my course about revision and we decided to make a shared document for putting our notes on • I went to my seminar without my friend. I tried to persuade her to go also but she did not • I worked through a past paper with my friend • Mentored a young person	• Chaired my first [student committee] meeting • I led a group revision session • I took part in a team briefing for a field trip tomorrow. • Small group work in my tutorial, I had to explain our thoughts to the rest of the group • We were allocated into different group to prepare presentation in today's seminar
Home domain: Events linked to the home domain, such as home arrangements (e.g., food shopping, cleaning), activities in leisure time (e.g., cinema, shopping, sports), and activities with family and friends (e.g., partner, parents)		
• Beat my 5K running time • I ran the furthest I ever have • Today I found my clothes are not neatly arranged and then organized them in the closet. • Today I decided to stop eating meat • Went to see doctor because I'm ill	• I caught up with my friends while having brunch together • I paid highly attention to my parents' healthy condition • I visited a friend in hospital • Today is Mother's Day. I prepared a meal and bought flowers for my mother • Went on a second date with the guy I've been seeing	• Creating a menu in Spanish with my group • Got invited into a group for housing next year • I prepared a dinner for my family • Telling someone they won't be in our house • Zoom call with lots of my extended family telling their memories of the war
Community domain: Events during leisure time that are linked to communities (e.g., charities, college activities unrelated to university work, sports club, religious communities)		
• I attended a [university student society] assembly meeting and applied for a position • I had [university] trials this morning to make the first team, and I really tried my best, but I don't think I played as well as I could have so I'm quite disappointed in that aspect. • I went to church in the evening and the sermon was on numbers and the fulfilment of god's promises. I found it intriguing as I had never considered that book that way before • My sports training got moved but no one had told me about it so I ended up just running around for ages trying to find it	• Had brunch with some rowing friends • I celebrated the Chinese spring festival with my friend • I was praying the Rosary with my girlfriend when I noticed that she was feeling tired, so I started putting on her shoes and we went out for a prayer walk to finish it with a breath of fresh air • I went to go and watch my friend play for the [university sports team] • Reading the bible with a friend	• Conducting my duties as a sports club executive • Hanging the poster for [a campaign for re-evaluating the costs of college accommodation] • Helping organise/lead the Remembrance Sunday parade • Phone meeting about an outreach strategy for a charity I'm involved in. Spoke to the staff member responsible about where it came from and how it fits with our work • Volunteering at a homeless shelter

leader identity equilibrium scores were related to the general leader identity strength, especially at time 1. However, there was also not a clear overlap among the general leader identity strength and the leader identity equilibria, suggesting that the general leader identity strength as indicated via the baseline survey may not necessarily represent where a person tends to drift back to empirically.

Hypothesis Testing

We hypothesized that the strength of daily events would relate positively to leader identity shifts (Hypothesis 1). To test this prediction, we utilized the person-centered leader and follower identity residuals, which represented each participant's daily deviation from their equilibrium in leader and follower identity respectively. Using 3-level multilevel modeling (i.e., days nested in time points, nested in persons), we regressed the daily leader identity residual onto daily event strength, while controlling for the daily follower identity residual. Results supported Hypothesis 1 as, after accounting for follower identity, daily event strength positively predicted change in leader identity ($\widehat{\beta} = 0.14$, 95% CI [0.08, 0.21]. $t(240) = 4.60$, $p < 0.001$). That is, stronger daily events predicted increases in leader identity away from equilibrium.

Hypothesis 2 proposed that over time, the rate of change in event strength (i.e., event strength velocity) positively relates to the rate of change in leader identity (i.e., leader identity velocity). Using 3-level multilevel modeling (i.e., 4-day sequences nested in time points, nested in persons), we regressed leader identity velocity onto event strength velocity, while controlling for follower identity velocity. Results supported Hypothesis 2 as over time, after accounting for the rate of change in follower identity, the rate of change in event strength predicted the rate of change in participants' leader identity ($\widehat{\beta} = 0.23$, 95% CI [0.11, 0.35], $t(701) = 3.73$, $p < 0.001$). Over time, increases in event strength thus predicted increases in leader identity activation.

Hypothesis 3 predicted that over time, the rate of change in event strength (i.e., event strength velocity) positively relates to acceleration in leader identity. Again, we utilized 3-level multilevel modeling with event strength velocity as predictor for leader identity acceleration, while controlling for follower identity acceleration. Results did not support Hypothesis 3, although the trend was in the predicted direction. Over time, when accounting for acceleration in follower identity, the rate of change in event strength was not significantly related to the acceleration in leader identity activation ($\widehat{\beta} = 0.22$, 95% CI [-0.03, 0.47], $t(701) = 1.71$, $p = 0.089$).

For Hypothesis 4, we predicted that at t1 (unfamiliar context) as compared to t2 (familiar context), the positive relationship between event strength velocity with (a) leader identity velocity and (b) leader identity acceleration would be stronger. For t3 (COVID-19), we did not have specific predictions. Results for Hypothesis 4a are shown in Table 9. The event strength velocity predicted leader identity velocity for each time point (t1: $\widehat{\beta} = 0.23$, $p = 0.03$; t2: $\widehat{\beta} = 0.23$, $p = 0.03$; t3: $\widehat{\beta} = 0.22$, $p = 0.04$), and model fit statistics did not indicate the expected differences between unfamiliar (t1) and familiar (t2) contexts. Thus, Hypothesis 4a was not supported. Results for Hypothesis 4b are shown in Table 10. The event strength velocity was not related to leader identity acceleration at any time point (t1: $\widehat{\beta} = 0.17$, $p = 0.452$; t2: $\widehat{\beta} = 0.33$, $p = 0.122$; t3: $\widehat{\beta} = 0.14$, $p = 0.551$). These results did not support Hypothesis 4b.

Exploratory Analysis: Relationship Between Leader and Follower Identities

Our study offers exploratory insights into the intra-personal relationships between leader and follower identities and identity dynamics, respectively. Correlations at the person-level indicated that leader and follower identities were positively related at t3 ($r = .36$, $p < 0.05$), but unrelated at t1 or t2 ($r = 0.13$ and .22). This suggests that while generally the strength of participants' leader identity was not dependent on their follower identity, during the COVID-19 pandemic, the strength of leader and follower identities was co-dependent.

Furthermore, for our main analyses, we used follower identity as a covariate that predicts leader identity. At all three time points, leader identity velocity was negatively related to follower identity velocity (see Table 9). This suggests that increases in individuals' leader identity co-occurred with decreases in their follower identity and vice versa. Findings further showed that at t1 and t2 (but not t3), leader identity acceleration was positively related to follower identity acceleration (see Table 10). That is, the more individuals' leader identity de-stabilized (i.e., increased in rate of change), the more their follower identity de-stabilized as well. However, at t3 (COVID-19), there was no relationship between leader and follower identity acceleration.

Discussion

Time and context are critical to leader identity change (Epitropaki et al., 2017; Hammond et al., 2017; Lord & Chui, 2017; Lord et al., 2016). Integrating temporal approaches to leadership (McClean et al., 2019) with event systems theories (Hoffman & Lord, 2013; Morgeson et al., 2015), we demonstrate that the experience of stronger and weaker events provokes variability in individuals' leader identities, best described as intra-personal dynamics in the form of leader identity ebb and flows. Our findings support that strong (i.e., novel, disruptive, extraordinary) daily events predict positive shifts in

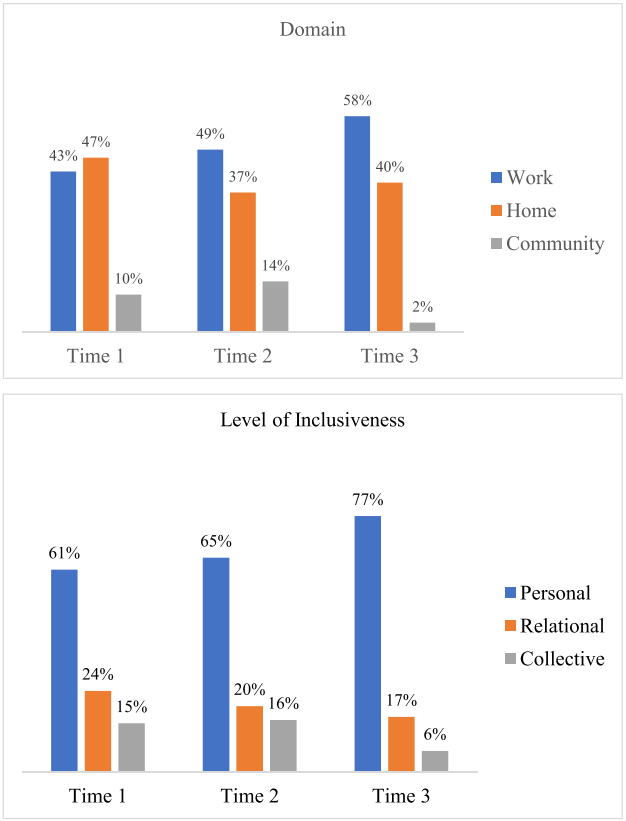


Fig. 3 Relative frequencies of event domain and level of inclusiveness at each time point. Note. Two independent coders (i.e., the first author and a research assistant) categorized the daily events for their domain (1100 events categorized; 6% of events too ambiguous to categorize) and their level of inclusiveness (967 events were categorized; 17% were too ambiguous to categorize). The inter-coder reliability via Cohen's Kappa (Cohen, 1960) was .86 for event domain and .65 for event level of inclusiveness, indicating perfect (event domain) and satisfactory (event level of inclusiveness) agreement (MacPhail et al., 2016). After the initial coding, the first authors met with the research assistant to discuss disagreeing event coding, and to reach agreement. The domain percentages are calculated based on 429 (time 1), 347 (time 2), and 324 (time 3) events. The percentages for the level of inclusiveness are calculated based on 377 (time 1), 288 (time 2), and 302 (time 3) events

leader identities, making them more salient relative to a follower identity. Moreover, we show that over time, the more events changed in strength, the more individuals' leader identity changed too. As such, the more strong and weak daily events alternated, the more individuals experienced similar shifts in their leader identity activation. We did not find this relationship to be stronger in unfamiliar as compared to familiar contexts. Furthermore, we found exploratory evidence for the intra-personal co-occurrence of leader and follower identities, such that changes in leader and follower identities were negatively related (i.e., negative relation of velocity) while the de-stabilization of leader and follower identities were positively related (i.e., positive relation of acceleration). That is, leader and follower identities shifted together and were aligned in increasing or decreasing their rate of change. However, change was in opposite directions, such that positive shifts in leader identity co-occurred with negative shifts in follower identity.

Theoretical Contributions

Our study makes several contributions. First, we explain and quantify why and how short-term changes in leader identity occur. Scholars have argued that leader identities are highly dynamic states that fluctuate within short periods of time (DeRue & Ashford, 2010; Epitropaki et al., 2017; Lord & Chui, 2017; Lord et al., 2016), and more recently, studies provided quantitative support for this notion (Jennings et al., 2021; Lanaj et al., 2019, 2021a, b). Yet, more can be done to understand the patterns that these intra-personal dynamics follow and how they are put in motion.

One of our key contributions is that we characterize individuals' leader identity dynamics as ebb and flow patterns that are affected by the experience of strong events. According to our findings, strong daily events shifted individuals away from their leader-identity equilibrium, that is, to see themselves more as a leader than they usually did. When considered over time, changes in event strength further provoked corresponding changes in leader identity. For example, shifts upwards in event strength from equilibrium predicted similar shifts upwards in leader identity from equilibrium. Similarly, shifts in an individual's event strength may become more negative across a series of days. This illustrates a decrease in event strength, and our results suggest that a person's leader identity would also become less salient across that period.

This finding has important implications for the role of events in leader identity development (e.g., leader identity play and work). In line with prior theorizing, our findings identified a distinctive "event cluster" (Morgeson et al., 2015) that describes how leader identities shift when individuals experience sequences of weaker and stronger events following each other. Knowing that events facilitate leader identity dynamics suggests that experiencing strong events is a powerful sensemaking source that may ultimately inform individuals' formation of new typical leader identity states (i.e., new identity equilibrium). When a strong event renders an individuals' leader identity more salient than other possible identities (e.g., follower identity), individuals will be channeled to see their environment through the lens of their leader identity and encode information most effectively when it aligns with the salient identity (i.e., "I am a leader"). Each time a strong event prompts a positive shift in a person's leader identity activation, this person is likely to build leadership skills and experiences. As such, the events that happen on a day-to-day basis

Table 8 Means, standard deviations, and correlations of study variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. Gender[a]	1.57	0.5										
2. Age	19.24	1.22	−.26*									
3. Leader identity (t1)	5.15	1.54	−0.09	0.08								
4. Leader identity (t2)	5.06	1.6	−0.14	0.04	.59**							
5. Leader identity (t3)	4.13	1.77	−0.02	−0.09	.47**	.73**						
6. Follower identity (t1)	4.66	1.49	0.12	0.05	0.13	0.08	−0.12					
7. Follower identity (t2)	4.37	1.61	−0.04	0.21	0.22	0.22	0.16	.74**				
8. Follower identity (t3)	3.78	1.93	−0.04	−0.11	0.14	0.22	.36*	.54**	.71**			
9. Event strength (t1)	3.72	0.8	−0.25	−0.12	0.13	0.23	0.06	0.02	0.05	0.13		
10. Event strength (t2)	3.79	0.91	−0.17	0.03	−0.04	.35*	0.24	−0.04	0.05	0.13	.63**	
11. Event strength (t3)	3.62	0.81	−0.12	−0.14	0.03	0.05	0.14	−0.15	−0.01	0.2	.64**	.70**

M and *SD* are used to represent mean and standard deviation, respectively. Between-person correlations are based on $N = 69$

[a]Gender is coded as 0 = male, 1 = female

*$p < .05$; **$p < .01$

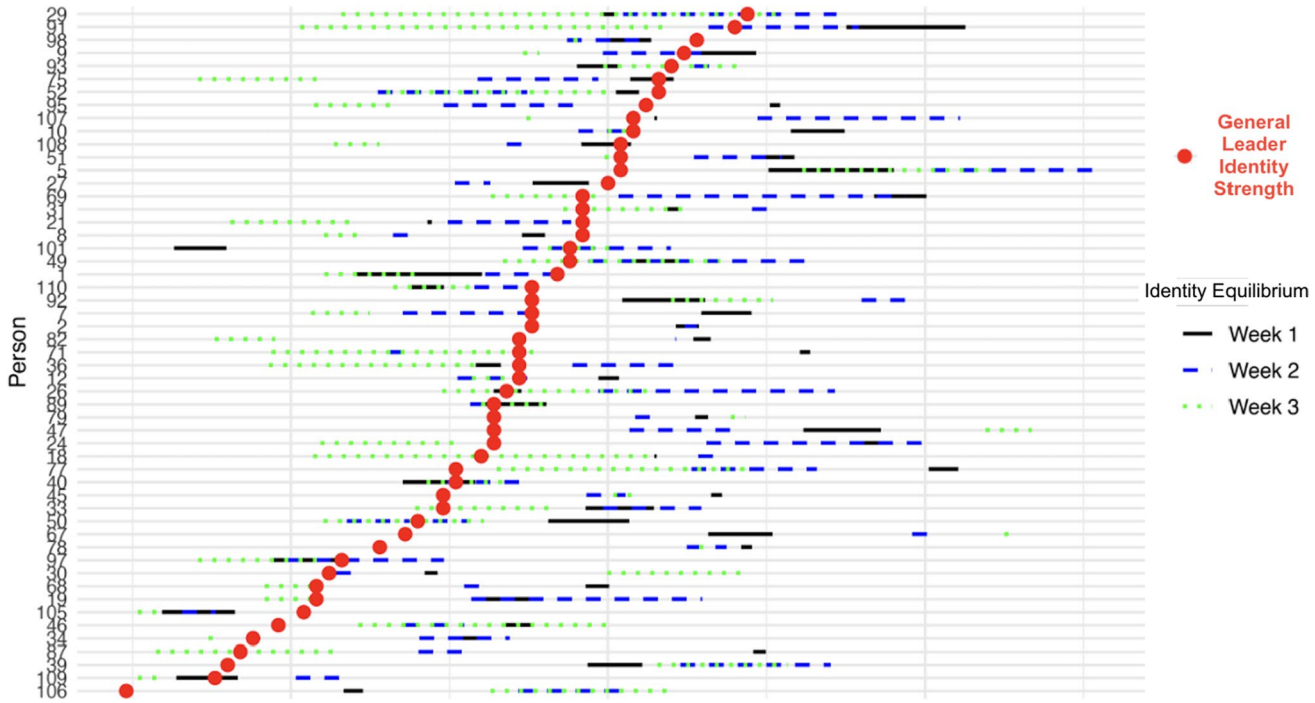


Fig. 4 Participants' general leader identity strength (baseline survey) and leader identity equilibria (times 1–3). Notes: Figure represents the general (between-person) leader identity strength and the empirically determined leader identity equilibrium for each participant that provided data at all time points. The general leader identity strength was assessed via the baseline survey at the onset of the study. The leader identity equilibria represent the predicted values of leader identity based on linear trend line of a person's values in each of the three time points. *Y*-axis was ordered by the general leader identity strength

can consolidate into the longer-term knowledge an individual has about leadership and themselves. At the same time, the identity ebb and flows that happens over short periods of time around a person's leader identity equilibrium can further result in the sudden emergence of a new leader identity equilibrium. Dynamic systems theory argues that systems (such as a person's self-concept) change due to energy, and that systems require an increase in energy so that "new ordered structures may spontaneously appear that were not formerly apparent" (Thelen & Smith, 1998; p. 272). Applied to our study, this means that the higher the variability in a person's leader identity activation over a short period of time, the more there is energy as

Table 9 Event strength velocity as predictor of leader identity velocity (Hypothesis 4a)

	Time 1 (unfamiliar)			Time 2 (familiar)			Time 3 (COVID-19)		
Predictors	Estimates	CI	*p*	Estimates	CI	*p*	Estimates	CI	*p*
(Intercept)	0.04	−0.07 to 0.14	0.493	0.02	−0.09 to 0.13	0.708	0.02	−0.09 to 0.10	0.921
Follower identity velocity	−0.2	−0.32 to −0.08	**0.001****	−0.2	−0.34 to −0.06	**0.006****	−0.18	−0.33 to −0.04	**0.015**
Event strength velocity	0.23	0.02 to 0.44	**0.029***	0.23	0.03 to 0.44	**0.027***	0.22	0.01 to 0.42	**0.042***
Model fit statistics									
R^2 (marginal)	0.056			0.053			0.050		
RMSE	0.869			0.826			0.721		
AIC	725.988			570.363			460.471		

*$p < .05$; **$p < .01$

Table 10 Event strength velocity as predictor of leader identity acceleration (Hypothesis 4b)

	Time 1 (unfamiliar)			Time 2 (familiar)			Time 3 (COVID-19)		
Predictors	Estimates	CI	*p*	Estimates	CI	*p*	Estimates	CI	*p*
(Intercept)	−0.06	−0.28 to 0.17	0.621	−0.14	−0.36 to 0.08	0.214	0.01	−0.21 to 0.23	0.932
Follower identity acceleration	−0.15	−0.27 to −0.03	**0.018***	−0.23	−0.35 to −0.10	**< 0.001*****	−0.13	−0.28 to 0.02	0.086
Event strength velocity	0.17	−0.27 to 0.61	0.452	0.33	−0.09 to 0.74	0.122	0.14	−0.32 to 0.60	0.551
Model fit statistics									
R^2 (marginal)	0.023			0.063			0.015		
RMSE	1.856			1.657			1.562		
AIC	1141.968			879.482			777.828		

*$p < .05$; ***$p < .001$

greater cognitive and emotional processing is needed. With increasing cognitive and emotional processing, the spontaneous emergence of a new and previously unknown leader identity equilibrium becomes more likely. In that sense, with increasing leader identity dynamics, it is more likely that current identity equilibria de-stabilize. Figure 5 illustrates how the leader identity dynamics that arise from a chain of successive events can de-stabilize an individual's leader identity state and inform a new leader identity equilibrium. Based on this theorizing, an important implication from this work is that effective leadership may occur at the level of events, not at the level of long-term stable traits.

Knowing how sequences of stronger and weaker events put leader identity formation in motion has further implications for how identities inform dynamic leadership processes, such as when leadership behaviors vary over short periods of time (Kelemen et al., 2020). Strong events in the environment seem to de-stabilize the individual's typical identity level (Nicholson & Carroll, 2013) such that new identities — as potential drivers of leadership behavior — become salient. This corresponds to Barsalou, (2008) who argued that concepts such as identity are tightly coupled to situational features because they prepare the individual for action. This implies that self-views are situated, and that deviations from an identity equilibrium could be precipitated by the features and response requirements of a particular event. In other words, leader identities and events are linked by the demands for actions and the fact that the person is part of a situation or event. This is particularly true if people perceive the event as meaningful and personally significant.

Second, we contribute to the theoretical understanding of how individuals form their leader identities during the critical time period of young adulthood (Liu et al., 2021; Shaughnessy & Coats, 2018; Zaar et al., 2020). The process of forming one's identity is complex, as identities are constantly under construction (Ashforth & Schinoff, 2016; DeRue & Ashford, 2010; Swann et al., 2009). Our research implies that young adults' leader identities change through strong daily events, especially when alternating with weak events. Such experiences not only trigger identity exploration, but also likely feed into their longer term identity formation and development processes (Shalley et al., 2004). Qualitative findings from biographical analyses of outstanding leaders suggest that different types and contents of events experienced during young adulthood shaped their leadership pathways (Ligon et al., 2008). We

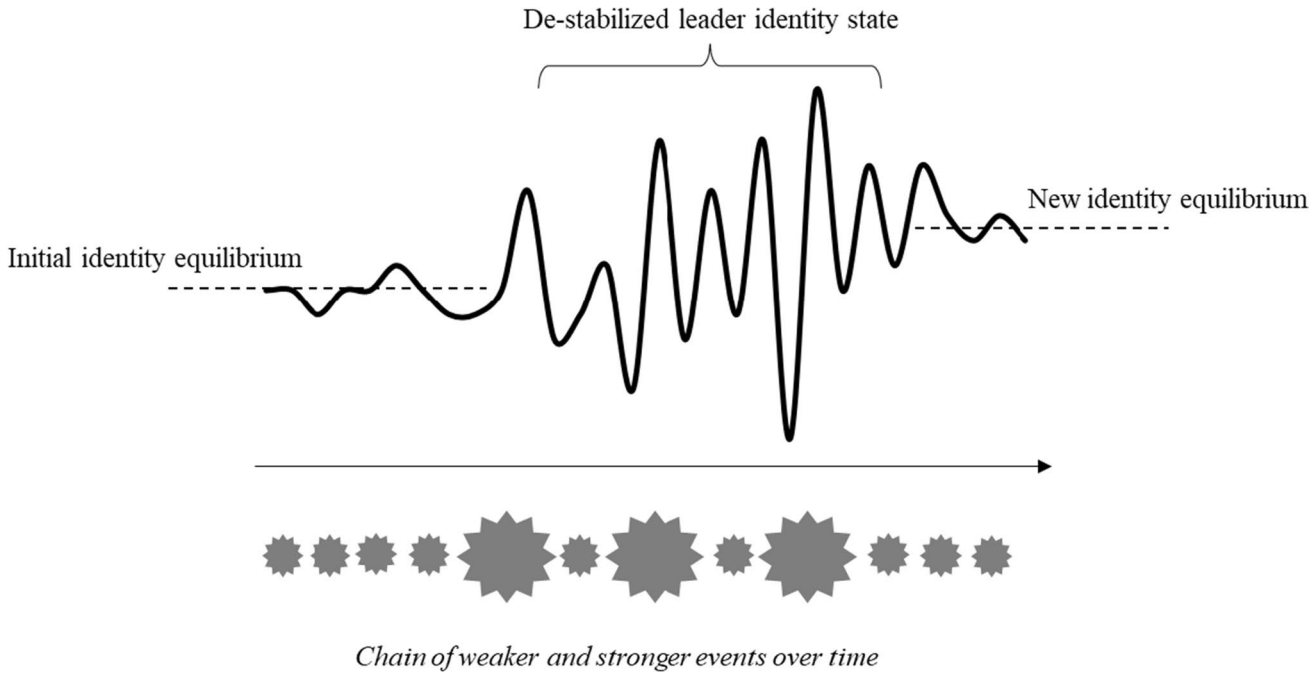


Fig. 5 Leader identity dynamics and formation of a new leader identity equilibrium

expand these insights by showing quantitative evidence that short-term variation in leader identities is triggered by strong events. When leader identities form, they may represent the contextual experiences associated with the strong events that individuals encounter. Leadership self-knowledge is in part represented as a contextually embodied structure that includes the environment, in addition to the human body and brain (Lord & Shondrick, 2011). Building on our results, future research could test whether the physiological experience of strong events might inform young adults' case-based knowledge of leadership, which has been argued as a key requisite for leadership development (Mumford et al., 2017). Contrary to our expectations, strong events impacted leader identities in both unfamiliar and familiar contexts, which emphasizes the power of experiencing strong events for leader identity change irrespective of individuals' familiarity with the context. It may further emphasize that for young adults, leader identities are consistently under construction even when they operate in well-known contexts.

Third, we contribute to understanding the importance of time in leadership research (e.g., Ancona et al., 2001; Castillo & Trinh, 2018). Scholars have offered advanced conceptual and measurement frameworks (e.g., Aguinis & Bakker, 2021; Shipp & Jansen, 2021; Shipp & Richardson, 2021). Our modeling of velocity and acceleration parameters informs the theoretical understanding of short-term intra-personal dynamics in leadership (Kelemen et al., 2020). Particularly, modeling the velocity and acceleration of leader identity dynamics supports ebb and flow approaches in leadership research. As such, our research offers a nuanced perspective on how short-term and non-linear changes can be described (McClean et al., 2019).

Finally, our exploratory findings offer insights into the intra-personal relationship between leader and follower identities. Our results showed that, generally, leader and follower identities were not related (i.e., no relationship in person-level correlations at t1 and t2). However, *changes* in individuals' leader and follower identities were co-occurring, such that when individuals' leader identity increased over time, their follower identity decreased (i.e., a negative relationship in the velocity parameters). This finding aligns with theoretical assumptions that the cognitive schemas individuals hold about leadership are stored within a larger network of domain-specific schemas that include followership (Lord & Chui, 2017; Lord et al., 2016, 2020), and our exploratory findings support this view. The two identities are unlikely to be active at the same time so that activation of one identity de-activates (or at least de-emphasizes) the other identity. Which of these identities becomes salient is arguably driven by the events that individuals encounter as well as the relational cues they meet in a specific situation. It would be of interest to understand if the finding that *solely-one-identity-is-active* is unique for young adults who are in a sensitive period with regards to leader identity development or if it is transferrable to individuals in late or mid-adulthood. Furthermore, we found that the more one identity de-stabilized, the more the other identity de-stabilized too

(i.e., positive relationship in the acceleration parameters for t1 and t2). That is, while leader and follower identities may not be active at the same time, the changes in their identity equilibria are intertwined. A person's leader and follower identity equilibria thus remain connected even though activating a leader (follower) identity at a particular period of time likely de-activates a follower (leader) identity. Based on this finding, we may conclude that when individuals form a new typical leader identity state, this will have consequences for their typical follower identity state, too.

The positive association between acceleration in leader and follower identities may further indicate that some events destabilize both identities. In sum, these exploratory findings could be interpreted as an occurrence of leader–follower identity switching, that is, the intra-personal process of dynamically switching between leader and follower identities (Sy, 2010; Sy & McCoy, 2014).

Practical Implications

Practically, our research highlights the importance of strong events for young adults' leader identities. McCall, (2004, p. 127) notes that "while experience is at the heart of [leadership] development, not all experiences are created equal." Our research pinpoints the experience of strong events as developmental opportunities that can shape a leader identity. Although such events might be seen as "shocks" (Crawford et al., 2019) that can cause uncertainty and liminality (Hawkins & Edwards, 2015), our findings imply that young adults should seek out contexts that offer the potential to experience strong (i.e., novel, disruptive, extraordinary) events that prompt them to explore new leader identity states. Likewise, our results can inform organizations about the importance of events for developing leaders, especially for their new members (e.g., in graduate schemes). In addition to assessing readiness for leadership development (an individual difference approach; Kwok et al., 2021), organizations might do well to focus on the types of events that are part of leadership development experiences. Since identities can facilitate leadership motivation and behavior, fostering leader identities has become increasingly important (Hawkins & Edwards, 2015; Wallace et al., 2021; Zaar et al., 2020). Playfulness has been argued as a key to leader identity development as it intrinsically drives individuals to seek out surprise and uncertainty and try out new identities (Bysh et al., 2022a, b; Kark, 2011). We advise organizations to offer safe spaces for leader identity play, which will allow especially less experienced members to embrace strong events with a discovery-oriented mindset (Petriglieri, 2010).

Furthermore, our findings inform a better practical understanding of the ways in which the COVID-19 pandemic affected young adults' identities. We found that during the pandemic as compared to the other two time points, the strength of young adults' leader and follower identities was lower, and positively related. Furthermore, the relationship between their acceleration parameters was diminished. The pandemic may have unsettled previously more stable notions of young adults' leader identities and affected the extent to which they were able to integrate leadership and followership schemas into their self-concepts. One interpretation is that the experiences of social isolation (e.g., university campus closure, virtual learnings, loss of in-person social activities) may have reduced self-perceptions of leadership, throwing young adults back to earlier stages of their identity formation (Ashforth, 2020; Gibson et al., 2021). The fact that young adults' leader and follower identities were positively related during COVID-19 pandemic emphasizes the role of social interactions for both leader and follower identities, and that contexts can create liminal experiences of being betwixt and between leader and follower identities (Ibarra & Obodaru, 2016). This may mean that in contexts of extensive social isolation, some situations may restrict the experience of any identity related to leadership and followership (e.g., I feel neither as a leader nor as a follower), while other situations may render both identities salient (e.g., I feel as being both a leader and a follower). During the COVID-19 context, young adults may have lacked a clearly salient identity that differentiates being a leader from being a follower.

Limitations and Future Directions

The contributions of our study need to be considered in reference to its limitations, which can inform future research. The longitudinal character of the study (i.e., multiple daily assessments across three time points during one academic year) presented challenges for participant recruitment and retention. Similar to other studies that relied on principles of DSM (e.g., Bisconti et al., 2006), our participant sample was comparatively small. For ecological reasons, we restricted daily assessments to seven days per timepoint. While this corresponds to the recommended minimum of six data points (Boker, 2001), future research may determine the leader identity dynamics across multiple, consecutive weeks (e.g., for newcomers in organizations).

Our research relied on self-assessments which is the typical approach for measuring identities. We aimed to counteract potential rating biases by accessing episodic rather than semantic memory for the recall and rating of their daily event experience (Hansbrough et al., 2020). Nevertheless, future research could add objective and other-rated outcomes of leader identity change (e.g., study or career success, promotion, leadership development activities).

While the focus of our work was on drivers of intra-personal leader identity dynamics, future work may incorporate outcomes of leader identity dynamics. One interesting question will be, whether momentary increases in young adults' leader identities strengthen their leadership motivation or whether this would require that young adults reach more stable notions of leader identity. Furthermore, how successfully participants dealt with strong events may moderate the effects of events on leader and follower identity activation. As DeRue & Ashford, (2010) emphasize, the leader identity construction process depends on both claims and grants, which may depend on how successful the outcomes of events were.

In terms of future research perspectives, we further hope to inform studies of leader–follower identity switching such as when leadership is shared between multiple individuals (Adriasola & Lord, 2020; Denis et al., 2012; Sy & McCoy, 2014). Connectionist perspectives suggest that identities are complex and composed of multiple elements that form part of an interconnected cognitive network (Hanges et al., 2000; Lord & Hall, 2005; Lord & Shondrick, 2011; Lord et al., 2001). Both leadership and followership have been argued to be part of such a larger network of self-schemas, which raises the question how individuals manage "the dual (follower vs. leader) tensions and successful integration of both identities in one's self-concept" (Epitropaki et al., 2017, p. 120). In fact, schemas of leadership and followership (i.e., implicit leadership and followership theories; Epitropaki et al., 2013; Lord et al., 2020; Offermann & Coats, 2018; Sy, 2010) share communalities (e.g., being enthusiastic, hard-working, motivated), which may suggest a co-activation of identities. At the same time, they also differ (e.g., domineering vs. easily influenced; educated vs. uneducated), which may suggest that active leader identities inhibit aspects of a momentary follower identity. Future research can apply our approach and LFIG measure to study specific work events (e.g., positive or negative interactions with managers, co-workers, subordinates) that may trigger individuals to switch from a follower to a leader identity and vice versa.

Conclusion

We examine the ebb and flow patterns that characterize intra-personal leader identity dynamics. Integrating perspectives on temporal dynamics in leadership research with event system theory we find that strong daily events drive positive shifts in young adults' leader identities, making leadership more salient than followership. Over time, chains of stronger and weaker events provoke leader identity dynamics in the form of ebb and flows with the potential to result in the emergence of new leader identity equilibria. We hope our study will spark new perspectives and research on events and the dynamic patterns of leader and follower identity formation.

Appendix

Original reference	Items for leader (follower) identity measures
Hiller, (2005)	I am a leader (follower)
Hiller, (2005), Rus et al., (2010)	I see myself as a leader (follower)
Hiller, (2005)	If I had to describe myself to others, I would include the word "leader (follower)"
Hiller, (2005)	I prefer being seen by others as a leader (follower)
Rus et al., (2010)	Being a leader (follower) is important to who I am
Rus et al., (2010)	Being a leader (follower) is a central part of who I am
Rus et al., (2010)	I am a typical leader (follower)
Rus et al., (2010)	I am exemplary of other leaders (followers)
Rus et al., (2010)	I identify with other leaders (followers)
Rus et al., (2010)	I enjoy being a leader (follower)

Items for leader and follower identities were measured in the baseline survey and rated on two separate Likert scales (Instruction: When thinking about yourself, how well does each of the following statements describe you in general?) on seven-point Likert scales, ranging from (1) not descriptive at all to (7) extremely descriptive

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10869-023-09906-7.

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Data Availability Data for this study are not available because they are proprietary based on the data management plan submitted for ethical approval to the University at which data was collected and to the funder of this research. The analysis code has been made available at the Open Science Framework and can be assessed at https://osf.io/wrvye/.

Declarations

Disclaimer The views, opinions, and/or findings contained in this paper are those of the authors and shall not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documents.

Conflict of Interest The authors declare no competing interests.

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