

Review

Measuring parent–adolescent interactions in natural habitats. The potential, status, and challenges of ecological momentary assessment

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Abstract

Few people are as important for an adolescent's development as their parents. However, most research on parent–adolescent relationships describes long-term population-wide effects. Therefore, little is known about everyday interactions between adolescents and parents in individual families. Ecological momentary assessment (EMA) measures families several times a day as they go through daily life. This approach provides ecologically valid insights into which interactions took place and how they were experienced. State-of-the-art EMA studies suggest that within-family fluctuations in parenting may trigger changes in an adolescent's well-being and behaviors. In practice, moreover, EMA may strengthen family support and intervention research. This article reviews recent empirical work, highlights the (un)used theoretical and practical promise of EMA and identifies key-challenges to unlock this full potential.

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Introduction

Even though not all adolescents would express it as such, few people are as important for their development as their parents. Decades of research conclude that parents who provide warmth, structure, and autonomy support foster adolescents' well-being and adaptation

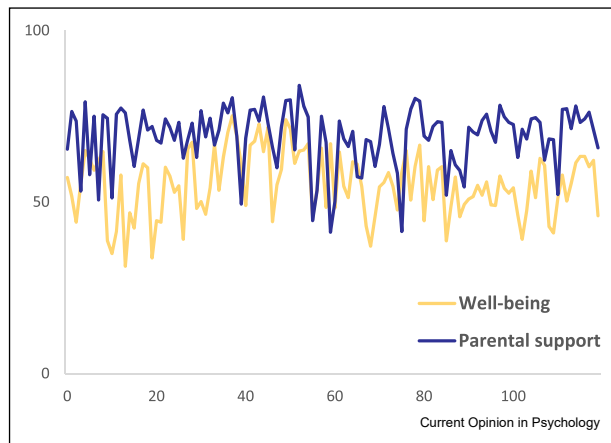
[1,2]. However, the vast majority of empirical studies describe population-wide long-term parenting effects [3]. Therefore, very little is known about how parents and adolescents interact in their everyday lives. This piece of missing information is crucial, however, for supporting families in need.

To monitor the daily lives of families, ecological momentary assessment (EMA, aka experience sampling method — ESM, or ambulatory assessment), asks participants to answer very brief questionnaires several (random) times per day. These may include what they are doing, how they are feeling, and with whom and how they are interacting [4]. Parent–adolescent interactions, as such, are measured in the naturalistic context in which they occur, when they occur (Fig. 1). The appearance of smartphone apps to collect these data has made EMA booming in theoretical and applied research [5]. Complementing recent practical tutorials [6,7], this article reviews recent EMA studies on parenting. It describes the theoretical status and the (un)used theoretical and practical promise of EMA for understanding how parents and adolescents interact in real-world settings. In the end, it identifies key challenges to unlock this full potential in the next decade.

Toward a dynamic theoretical perspective on parenting

Theoretically, parenting can be decomposed, in terms of stable differences between families [8] and dynamic processes within families [9,10]. These processes entail parenting practices, such as setting a rule or giving a compliment, through which parents and other caregivers can have a direct, albeit small, effect upon the future development of their child. State-of-the-art dynamic systems theories of development [11] describe how such dynamic parenting processes accumulate over multiple time scales; from the micro-level of a raised eyebrow within a single interaction to macro-developmental changes spanning multiple years (e.g. relationship transformations during adolescence). One interaction after the other, parents and adolescents gradually shape not only their relationship but also carve out a developmental pathway for the adolescent [12–15].

Fig. 1



Ecological momentary assessment of one adolescent ($n = 1$) reporting on his/her own momentary well-being and experienced parental support ($t = 120$ measurements).

Dynamic system models further argue that each family is a unique system characterized by its own developmental principles and underlying parenting processes [13,14]. An expression of warmth, for instance, may be appreciated by one adolescent and reciprocated with a hug, but it may be frowned upon by another child and trigger a conflict. Stable parenting styles [8] could be a contextual variable that alters (or moderates) the effect of everyday parenting practices upon a child's later behaviors and functioning [9].

Decades of (longitudinal) surveys have provided rich descriptions of how parent–adolescent relationships transform as children mature [16]. Without questioning the empirical validity of such aggregated statistics for understanding how families differ, the estimates convey surprisingly little insight into the way single adolescents interact with his or her own parents in daily life [17]. Micro-mechanisms have a complex and non-linear nature, which is distinct from the often-studied longer-term phenomena. Consider, for instance, the classic example of how parents respond to a tantrum. If caregivers give their child candy, the child will most likely stop crying. This is a positive effect in the short-term. In the longer run, however, the child is trained into more negative behaviors [18]. What works well in the short-term may not only promote but also undermine adaptation in the longer run. Feedback loops such as these might be omnipresent in parent–adolescent relationships but are still hardly understood.

Moreover, it has been suggested that long–term relationship transformations during adolescence are driven by the destabilization of short–term interaction patterns. Future phase transitions could, as such, be

recognized by an increase in variability in everyday interactions [19]. To answer such unanswered theoretical questions regarding the dynamics of parenting, there is an urgent need to understand more of the short-term processes within families.

Status and (unused) potential of EMA in parenting research

EMA is one potentially highly suitable method for addressing such new theoretical questions regarding parent–adolescent relationships [20–22]. Specifically, EMA provides (1) unprecedented fine-grained insights into family lives, (2) a more rigorous tests of short-term dynamics of parent–child relationships, and (3) exciting directions to strengthen family support.

In comparison to other popular methods to assess short-term family dynamics to ‘*put families under the microscope*’ [21], such as observations and daily diaries, EMA has specific methodological properties [22,23], see Table 1. Although observations typically yield an outsider's (e.g. researcher) objective perspective in standardized settings (e.g. a lab or home visit), EMA measures adolescents and/or parents' own subjective experiences in different ‘natural habitats’ [24]. Daily diaries, in turn, assess recollections of (patterns of) all behaviors or interactions throughout a day, which may lead to inherent bias, especially when it concerns relatively common events or interactions [25]. In sum, asking “what are you doing right now” in EMA measures parent–adolescent interactions with higher ecological validity than observations and lower recall bias than daily diaries. However, while EMA is booming in adolescent psychology [7], we could only identify twelve recent EMA studies on parent–adolescent interactions (between 2019 and April 2021 [26–37]). In the following, we describe the theoretical insights, they (could) have yielded, as well as their practical potential.

Fine-grained insights into parent-adolescent interactions

Three decades ago, the ground-breaking EMA work of Larson *et al.* [38] already resulted in detailed insights into the daily pleasures and hassles of parenting. EMA studies of the last two years still demonstrate that contemporary parent–adolescent interactions are sometimes characterized not only by hassles (e.g. nosiness, arguments, or stress, 18%) but also by uplifting experience (e.g. fun, happiness, helping; 75%) [29]. Much like the classic work of Larson [38], strong age-trends emerged 14-year-old adolescents who experienced 61% of their most enjoyable moments with parents and 25% with friends. 18-year-old adolescents who reported only 23% of their best moments with parents, and 49% with friends [30]. There were also noticeable differences between families. In a study among 1799 adolescents, parenting style in a given

Table 1

Comparing popular intensive longitudinal research methods.

Method	Measures	Example	Interval between assessments
Observation	<i>Within single interaction (of several minutes):</i> observable behaviors (<i>cf</i> video recall)	Did eye-rolling occur in the last 5 s?	Seconds to minutes
Ecological Momentary Assessment (EMA)	<i>Per interaction (the last or momentary):</i> perceived parenting and/or interaction characteristics	How pleasant was this interaction?	(Several) hours
Daily diary	<i>Over several interactions (across entire day):</i> aggregated perception of parenting and/or relationship characteristics	How supportive was your parent today?	Day

family was related to both the quantity and the quality of interactions with fathers and mothers [28]. Moreover, most adolescents experienced their family context to be equally pleasurable as being with friends in two samples ($n = 241$ and $n = 286$), whereas adolescents at risk for depression experienced more negative affect at home than being with friends [35].

How does parenting dynamically affect adolescents?

Nowadays, state-of-the-art statistical analyses are available to deal with the complexity of these large multi-level datasets and test whether parents' and adolescents' company trigger or facilitate real-time negative or positive emotions or behaviors, as would be predicted by dynamic models of parenting [12,13]. For instance, in an impressive study in which 453819 observations among 4930 parents were collected, parents reported significantly lower levels of happiness when they were taking care of their adolescents than other activities [32]. In the context of parents, university students were significantly more likely to experience homesickness [33], and anxious adolescents were more likely to regulate negative emotions (72% versus peers 39%) [31]. Finally, analyzing the data of 19827 observations, being with parents also affected how much non-core energy food products adolescents eat [37]. These recent microscopic studies provide solid (statistical) evidence that neither adolescents nor their parents are static statures. Adolescents and parents feel and behave differentially when they are amongst each other.

In addition to assessing the presence of parents, the quality of interactions and parenting behaviors may influence adolescent outcomes (and vice versa). In fact, this may be one of the oldest and most studied theoretical questions in parenting research [1], one that has proven difficult to answer with traditional methods. Whereas stable parenting styles in which families differ can be measured with questionnaires, the direct effect of practices upon a child in a given family requires a different approach. Several recent EMA studies have

addressed increasing methodological critiques [39–41] against using surveys and aggregated statistics at the between-family level for understanding processes that take place within individual families.

By analytically decomposing two distinct levels of analyses, recent work confirms what leading methodologists have warned for: Between- and within-family associations may not be homologous but different or even opposing [42]. For instance, between-families, Jensen et al. [29] found a positive association across 2104 adolescents. Adolescents who used social media more frequently were more likely to experience family chaos. Within-families, analyzing 14 days of EMA data among 388 families, no drops in the experienced quality of interactions were present at moments when an adolescent used more technology, however. In another much smaller study among 73 emerging adults [34], participants who reported higher levels of self-injury reported weaker attachment to mothers. However, within-person, over-time changes in their own attachment could not predict self-injury. Finally, assessing first-year students 120 times in their everyday lives, they experienced more negative emotions, rumination and interference with their ongoing activities when they had an argument with parents, and this association was similar at the between-family level [36]. Together, these studies illustrate that between-family level estimates and within-family level estimates provide unique pieces of information that are not necessarily linked [43].

Understanding family-specific dynamics

Despite a noticeable theoretical shift from the study of individual differences (e.g. in parenting style literature) toward more dynamic approaches and a focus on shorter time scales in these highlighted examples [16], still many questions remain unanswered. Most remarkably and quite at odds with one of the key principles of dynamic system models arguing that each family is a unique system characterized by its own developmental principles [13,14], all aforementioned studies

aggregated within-family effects into one average effect across families. A daily diary study [44] recently tested this theoretical assumption that ‘one size doesn’t fit all’ [17] among 242 families for 21 days ($t = 168$). This showed that 90% of the adolescents felt better on days with more parental support. However, 10% felt worse [44]. Hence, EMA data can be used to test effect heterogeneity by unraveling dynamics per individual family [45], but it is not yet common practice to describe this.

One promising avenue for the next decade(s) of EMA research is to include the study of effect heterogeneity and answer questions such as in how many and in which families do existing theoretical principles apply? What explains heterogeneity in parenting effects? A unified methodological approach [46] which combines the study of real-time processes at the level of individual families with the study of development over years with large scale surveys may open up possibilities to answer new theoretical questions regarding parenting dynamics.

EMA in practice

Most family interventions are based on the premise that longer-term behavioral change can be promoted by targeting the family’s everyday interactions. EMA could, in potential, strengthen interventions and the research thereof. First, EMA may help families to reflect on their own daily routines [22]. After 2 weeks of self-monitoring, 80% of the participants reported increased awareness of their relationship, behaviors, and communication styles [27]. One child, in this study, realized he was not doing sufficient chores and started to help in unloading the dishwasher. Second, in smartphone applications, EMA could be combined with more precise and timely delivery of interventions [20,22,47]. Indeed, in other domains, EMA is used to identify risk with more sensitive measures, provide tailored feedback, and identify person-specific targets for intervention [48–50]. Third, by providing micro-insights into the underlying working-mechanisms, EMA yields in-depth insights into how interventions work, why they work, and what works for whom [22,51]. Despite the obvious promise of these suggested personalized parenting interventions, their development and evaluation are still in their infancy.

Challenges ahead

Before EMA can live up to its theoretical and practical potential in understanding parenting, we still face numerous methodological challenges. Measuring interactions with parents is difficult because they are unequally scattered over a day. Moreover, some of the most impactful events may be uncommon or brief (e.g. conflicts) and can be easily missed. To address this, sampling schemes can be tailored to the daily routines of individual families, participants can indicate themselves when interactions have taken place (i.e. event-based

sampling), and technological solutions (e.g. Bluetooth proximity triggered sampling) are under development. Moreover, EMA can be applied to assess momentary interaction quality, as well as concrete parenting behaviors [27], but there is a lack of research on the quality of these EMA instruments. To understand parenting within the broader family system, ideally, caregivers and adolescents report on the same interactions and events [51]. This additional technological challenge is yet to be solved. Finally, data-analytical tools for EMA data are rapidly evolving [17,52], but how these state-of-the-art tools perform with dyadic processes and multiple informants is hardly known (but see the study by Janssen *et al.* [53]). The next years of EMA research on parent–adolescent interactions should, therefore, not only push theoretical limits toward more dynamic and idiosyncratic models of parent–adolescent relationships and develop and test practical applications but also prioritize the largely unexplored territory of methodological and technological challenges. The strong open science movement in EMA research, for example, the study by Kirtley *et al.* [54], may facilitate this progress.

Conclusion

EMAs provide ecologically valid insights into how parents and adolescents feel, behave, and interact with each other in real-world habitats. Theoretical progress has lined up several exciting new hypotheses regarding family-specific dynamics, variability, and feedback loops. Thus far, EMA studies have only scratched the surface of these novel theoretical questions. Moreover, implementing EMA in practice, as is now quite successfully carried out in other areas of research, may ignite a new generation of real-time family-tailored interventions. But in the end, to confidently build strong dynamic theories on parenting and develop innovative practical tools, more fundamental methodological and data-analytical challenges need to be tackled first.

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Conflict of interest statement

Nothing declared.

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