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Methodology and Research Practice

On the Temporal Nature of Parental Burnout: Development of an Experience Sampling Methodology (ESM) Tool to Assess Parental Burnout and Its Related Ever-Changing Family Context

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Parental burnout is a growing subject of research, but thus far this research has not examined whether the features of parental burnout fluctuate over time. Moreover, parenting and parental burnout are inextricable from their family context. Therefore, a critical next step involves examining how parental burnout features temporally unfold and interact with the ever-changing family environment. To do so, we developed an 11-item experience sampling methodology (ESM) tool to measure self-reported parental burnout features (specifically emotional exhaustion, emotional distance, and feeling fed up), as well as partner relationship, children's behavior, behavior toward children, social support, and perceived resources. We conducted two two-week periods of ESM data collection (one with French-language ESM items; n = 9; one with English-language ESM items; n=23) and one eight-week data collection with the French-language ESM items (n=50). We collected the ESM data using *formr*, an open-source platform, and we provide open access to all materials (including a *formr* template, allowing free use of the assessment tool), analysis code, and data: https://osf.io/s2yv5/. Participants' responses indicated sufficient within-person variability (assessed via intraclass correlation) and support for convergent and discriminant validity (assessed by correlating aggregated ESM responses with retrospective questionnaire scores on parental burnout, depression, anxiety, and stress). Lastly, we found that the three parental burnout ESM items had high between-subject reliability and moderate within-subject reliability. Participating parents found the ESM survey easy to answer and not burdensome. Finally, we discuss how assessing parental burnout over time can help usher parental burnout research and treatment forward.

Introduction

When parents face challenging parenting demands without sufficient parenting-related resources, they become stressed and exhausted—when this stress reaches an extreme state, this is called parental burnout. Parental burnout involves four main features (Roskam et al., 2018): emotional exhaustion relating to the parental role, emotional distance from the child(ren), feeling fed up with the parental role, and a sense of contrast with the parent they used to be. Following the current theoretical framework, parental burnout arises when parents chronically lack the resources to balance out their parental stressors (Mikolajczak & Roskam, 2018). These resources and stressors are specific to each parent's situation, and many of them vary over time, such as perceived partner support, leisure time, family organization, financial resources, and social support; all of these can change within weeks, days, or even hours (Mikolajczak, Raes, et al., 2018; Mikolajczak & Roskam, 2018).

Parents experiencing burnout within their parental role is a growing societal concern, as parental burnout is linked with suicidal ideation, addictions, child neglect and abuse, and marital conflict (Mikolajczak, Brianda, et al., 2018). Al-

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though research into parental burnout is still in its infancy, there are already initial findings of a temporal link between parental burnout and subsequent parental neglect and violence (Mikolajczak et al., 2019). These findings highlight the pressing need to better understand how parental burnout develops and how it impacts parenting behaviors, including neglect and violence, so as to develop effective prevention and treatment tools. Parental burnout is particularly concerning in the context of the COVID pandemic, which has changed experiences of daily life across the globe and has perturbed the equilibrium of many parents (Griffith, 2022).

The current method to measure parental burnout, the Parental Burnout Assessment (PBA; Roskam et al., 2018), asks parents to estimate the frequency with which they experience 23 specific feelings or behaviors on a scale ranging from "never" or "a few times a year or less" to "a few times a week" or "every day." The PBA has been adapted into and psychometrically validated for many languages, including Arabic (Gannagé et al., 2020), Portuguese (Matias et al., 2020), Chinese (Cheng et al., 2020), Farsi (Mousavi et al., 2020), Japanese (Furutani et al., 2020), Polish (Szczygieł et al., 2020), Romanian (Stănculescu et al., 2020), and Turkish (Arikan et al., 2020). As can be seen from the frequency responses for the PBA items, the PBA assesses the overall level of parental burnout at a specific timepoint but cannot capture day-to-day fluctuations.

Examining temporal fluctuations is an important next step. For one thing, there has been a growing move across psychology domains to consider the temporal dynamics of psychological constructs by repeatedly measuring the construct in everyday life (e.g., experience sampling methodology; ESM; Myin-Germeys et al., 2018; Trull & Ebner-Priemer, 2020). For most psychological constructs that are relatively stable across time, their features still fluctuate. This is for instance the case for depression. Although it is relatively constant across time, its actual symptoms, and particularly their interrelations, fluctuate on (at least) a weekly basis (Bringmann et al., 2015). Examining temporal fluctuations via ESM can grant insight into how a psychological construct develops or persists. For instance, researchers can use intensive longitudinal data to determine if specific variables influence one another in a feedback loop (Borsboom & Cramer, 2013). ESM data can also be used to grant clinical insight into a person's individual trajectory (although the clinical validity of such measures is still under investigation; Wichers et al., 2017). One such method is inspired by research on critical transitions in ecosystems (e.g., Hirota et al., 2011) and can be used to identify when someone is about to tip into a disordered state (e.g., developing or relapsing psychopathology) or return to an ordered one (e.g., recover; Wichers et al., 2016, 2019). And, last but not least, one can also capitalize on ESM data to generate idiographic (i.e., specific to a single person) network models that illustrate how an individual's behaviors and cognitions influence one another over time. Idiographic networks can thus yield information about potential clinical pathways and central variables for a single person (Bastiaansen et al., 2020) and open up radically new vistas for personalized treatment options (Fisher et al., 2017).

Examining the temporal dynamics of parental burnout is therefore a promising and timely endeavor. On the one hand, there is already evidence that emotional exhaustion, at least, fluctuates on a daily basis (Gillis & Roskam, 2020). It is therefore likely that emotional distance and feeling fed up (which were not measured daily in Gillis & Roskam, 2020) also vary from day to day; the fourth feature of parental burnout (i.e., a sense of contrast with the previous parental self) is by definition likely more stable across time. On the other hand, parental burnout does not exist in isolation but always within a specific family context, since parenting is a subjective experience that can fluctuate with shifts in the parents' or children's behavior or with the ever-changing situational demands of the environment (e.g., Aldao, 2013). A critical next step in parental burnout research would thus be to examine how the fluctuations of parental burnout features interact with contextual factors, such as the parent's relationship with their partner, the children's behavior, or the resources available to parents. Examining how these different variables interact over time will shed light on how parental burnout develops and evolves (for further discussion, see Blanchard et al., 2021). In addition, generating intensive time-series data for individuals allows for personalized clinical applications, such as estimating idiographic models that can be used for quantitative individualized case conceptualization (Fisher & Bosley, 2020).

Despite the aforementioned promising perspective, there is currently no available tool to measure the features of parental burnout and related situational variables on a repeated and frequent basis. Developing ESM items markedly differs from creating a traditional (single timepoint) questionnaire. When developing ESM items, it is crucial that the phrasing and content of items mirror how people actually think about and describe their own moment-to-moment experiences (Myin-Germeys et al., 2018; Varese et al., 2019; Vasconcelos e Sa et al., 2019). Concretely, this means using terminology the targeted population would themselves use and employing unambiguous language (Myin-Germeys et al., 2018; Varese et al., 2019). Since participants will be answering items frequently, the items should thus focus on experiences common to daily life and avoid extreme states (Myin-Germeys et al., 2018; Varese et al., 2019). Because statistical analyses of ESM data depend on sufficient variance in participants' responses over time (Vasconcelos e Sa et al., 2019), adequate item development also has statistical importance.

Beyond the items' content per se, all ESM surveys should also be extremely brief, taking a maximum of two to three minutes to complete, since participants will be taking time, over weeks or months, from their daily lives to answer these questions (Myin-Germeys et al., 2018; Varese et al., 2019). The questions should not feature too many repetitive items, since the participants are already answering the same items repeatedly and often find answering similar items on top of that to be frustrating and confusing; some researchers therefore suggest employing single-item mea-

sures for straightforward unidimensional constructs (e.g., Robins et al., 2001; Wanous et al., 1997).

These varied requirements for developing optimal ESM items have rendered the assessment of their validity and reliability remarkably difficult (for an accessible overview of test reliability and validity concepts, see Jhangiani et al., 2019). For example, test-retest reliability assumes that a test is reliable if responses are stable across time, but this goes against the purpose of ESM, which is to measure fluctuations; changes in responses across time are expected (Eisele et al., 2021; Varese et al., 2019). If using single-item measures as is common for ESM studies (Eisele et al., 2021), internal consistency reliability (i.e., whether items measuring the same content yield similar responses) cannot be estimated (Wanous et al., 1997). Traditional measures of validity, such as criterion validity, are also complicated, since ESM items might not strongly correlate with one-time questionnaires measuring the same construct (Varese et al., 2019). One-time questionnaires typically measure a construct from a static perspective, covering long periods of time (and therefore potentially including recall bias; Varese et al., 2019); measuring that same construct from a dynamic perspective and then aggregating the responses does not necessarily yield similar results (e.g., since state measurements could vary depending on the context; Hektner et al., 2007). This is reflected by how uncertainty still abounds regarding the relationship between state and trait measures, which can be divergent (as is the case with state versus trait anxiety; for discussion, see Balsamo et al., 2013; Heeren et al., 2018).

That said, there are still ways to assess an ESM item's reliability and validity. Multilevel reliability (which assesses both between and within-person reliability) can be examined if multiple items form a scale assessing the same overall construct (Cranford et al., 2006; Shrout & Lane, 2012). At a very basic level, researchers can evaluate the content validity of ESM reports by examining whether internal experiences make sense together—that is, similar states should positively correlate, whereas dissimilar states should negatively correlate (Eisele et al., 2021; Hektner et al., 2007). Researchers can also examine convergent and discriminant validity by correlating ESM measures with retrospective measures of the same construct and different constructs (Eisele et al., 2021). Since ESM items aim at capturing daily fluctuations, it is also necessary to ensure that item responses have sufficient within-subject variability. To do so, one can examine the intra-individual standard deviation and intraclass correlation coefficients (ICCs) of each item (Trull & Ebner-Priemer, 2020). Nonetheless, since assessing the reliability and validity of ESM measures is arduous, it is vital that the item-development phase yields items that are self-explanatory and unambiguous (i.e., have high face validity) while covering all aspects of the construct (i.e., have high content validity). The recommended method to develop ESM items with high face and content validity is to pilot potential items with members of the targeted community, collect qualitative feedback from these community members, and review item phrasings and content with experts (Myin-Germeys et al., 2018; Varese et al., 2019; Vasconcelos e Sa et al., 2019).

Following the above guidelines, we accordingly had three major goals. First, we sought to develop a brief set of ESM items (in French and English) to assess parental burnout and relevant contextual variables, adapted to daily measurement with high face and content validity. To meet the first goal, we carried out an intense item development process, which included adapting items from existing one-time questionnaires (which measure their construct over a window of anywhere from the past two weeks to the past few years) into comparable measures of state constructs, as well developing new items from scratch; we developed the items in French and then back-translated them into English. Since we did not find many resources on how to develop ideal ESM items, we also wanted to share all aspects and materials of this item development process. Second, we wanted to ensure that parents were comfortable using this tool (i.e., minimal burden and applicable to their daily experience). To assess this second goal, we asked the parents who participated in the different ESM data collections for qualitative feedback regarding their experience answering the ESM items and any suggestions they had to render future studies easier for participants. Third, we wanted to examine how the ESM items performed when administered to multiple samples over different lengths of time. To assess this third goal, we examined whether items yielded sufficient within-person variance (i.e., low ICCs), whether the parental burnout items had good reliability, and whether the ESM items had good convergent/divergent validity with retrospective questionnaires. If we met these three goals, we wanted to share the resulting ESM items, administration methods, and materials to further stimulate research on the dynamics of parental burnout and the family context and ease direct comparisons between different studies.

Method

We report our rationale for the technical details of this ESM questionnaire (e.g., why we chose single-item measures, a daily interval for ESM assessment, and a continuous response scale) in Section 1 of the appendix.

Item Development

Development Procedure

We first decided on the desired categories for items. We naturally included the features of parental burnout, but we also included relevant contextual family variables that would likely vary daily and interact with the parental burnout variables. Since a previous (cross-sectional) network study has identified that partner conflict and estrangement, as well as child neglect and abuse, interact with parental burnout (Blanchard et al., 2021), we wanted to include variables that broadly represent partner relationships and behaviors toward children. However, in the present study, we sought to investigate how parental burnout variables interacted more generally with the family context. In addition, ESM items should not assess extreme states but

Table 1. Information on the Different Data Collections

Sample	N	Mothers, *n* (%)	Single parents, *n* (%)[a]	Dates collected	Length of ESM	Briefing type	Median ESM survey time	Compliance rate
Initial Pilot	5	3 (60%)	1 (20%)	Oct.-Nov. 2020	7 days	Over text	--	--
French-speaking 2-week	9	8 (89%)	1 (11%)	Dec. 2020	14 days	Over text	1.33 min	95%
English-speaking 2-week	23	22 (96%)	0	May-June 2021	14 days	Recorded video	1.39 min	87%
French-speaking 8-week	50	46 (92%)	4 (8%)	April-June 2021	56 days	Video call	1.32 min	94%

Note. [a] Single parent is defined here as someone parenting their children without a second co-parent (even if they are in a relationship with someone).

instead focus on behaviors common in daily life to yield sufficient temporal variation (Myin-Germeys et al., 2018; Varese et al., 2019; Vasconcelos e Sa et al., 2019). Since the theoretical framework of parental burnout also emphasizes the role of parental resources, we also included a category for daily resources and support from their social circle.

We then sought (French-language or translations of) questionnaires that assessed these categories (Beck et al., 1998; Brianda et al., 2019; Fombonne et al., 1988; Mikolajczak, Brianda, et al., 2018; Mikolajczak & Roskam, 2018; Roskam et al., 2018; Spitzer et al., 2006; Zacchilli et al., 2009) and adapted relevant items (typically with high factor loadings) for daily use. We included both negatively and positively worded items, following the recommendation of Vasconcelos e Sa and colleagues (Vasconcelos e Sa et al., 2019), to ensure sufficient variability. We also aimed for items that were broadly applicable to all parents and children at least some days (e.g., not questions that were only relevant for parents of infants). In total, we adapted and created 70 items. The first, second, and last author of this paper intensively workshopped the phrasing and content of these items so that these accurately assessed the relevant categories and suited a daily assessment. We then sought preliminary feedback from parents (n = 7) and adapted the questions based on their suggestions. The complete list of item revisions and permutations can be found in Table S1 on the Open Science Framework (OSF): https://osf.io/46z8x/.

We then conducted a pilot phase of data collection with a small group of parents (n = 5; see Table 1 for more information), so that parents could experience and give feedback on answering items daily. In this way, we could gauge which items yielded insufficient variation in participant responses, and parents reported to what extent they judged items as clear, unambiguous, and easy to answer. Based on participant feedback about how repetitious the items were, as well as the reasoning explained above regarding single-item measures, we chose one item per category based on response variability, parent feedback, and expert opinion. We then had another round of workshopping and discussion regarding item phrasing. We then conducted a back-translation process to arrive at an English-language version of these ESM items. More details on this process are available in Section 2 of the appendix.

Item Testing

Software: formr

A primary barrier to implementing ESM in research and clinical practice with up-to-date technology (e.g., electronic software, time-stamped entries) is the expense of the software (Varese et al., 2019). Indeed, software and applications designed explicitly for ESM purposes are often either expensive or suboptimal (e.g., restricted to android devices and thereby limiting who can participate). Therefore, we opted to use *formr*, a free and open-source software (Arslan et al., 2020); this also means we can share all materials. Since *formr* operates via webpages, it can be used on any device and does not require participants to download any software or application. In addition, many aspects are also customizable using R; we discuss more details of *formr* and how to use it for ESM studies in Section 3 of the appendix. We share *formr* templates for our ESM studies (French-language version: https://osf.io/c492m/, and English-language version: https://osf.io/p95zs/). Templates include all steps of collecting the ESM data: the enrollment survey wherein participants choose their notification time and type of notification (text message or email), the demographic questionnaire, the ESM items, and the figures apprising participants of their progression through the study.

Testing Procedure: Data Collection (English & French versions)

We conducted two preliminary phases of data collection (one for the French version of the items, one for the English version) to examine the variance in participants' responses to ESM items over two weeks, as well as to examine the three parental burnout items as a parental burnout ESM scale. As part of another project, we also conducted a longer data collection (spanning 8 weeks) with 50 parents. Details on the different data collections can be found in Table 1 and demographic information in Table 2, while additional information about the different data collections are reported in Section 4 of the appendix. All responses were collected using *formr* (Arslan et al., 2018). All parents provided written informed consent to share their anonymized data, and the project received the approval of the Biomedical Institutional Review Board of UCLouvain (approval date: 11 May 2020; protocol title: PBNET). We recruited parents that had at least one child living at home; we purposefully did not restrict our sample to parents with only young chil-

Table 2. Demographic Information

Demographic Variable	Mean	SD	Min	Max
Initial Pilot				
Age of parents	42.20	5.64	35	50
Number of children (living under same roof)	1.6	0.55	1	2
French-language Two-week Data Collection				
Age of parents	44.67	5.55	36	52
Number of children (living under same roof)	1.78	0.97	1	4
Parental Burnout Assessment (total score)	15.44	15.03	3	49
English-language Two-week Data Collection				
Age of parents	39.3	7.95	27	60
Number of children (living under same roof)	2.39	1.34	1	5
Age of children in years (living under same roof)	10.50	5.65	0.2[a]	21.8
Parental Burnout Assessment (total score)	22.90	16.20	2	61
DASS (total score)	16.70	12.80	0	48
French-language Eight-week Data Collection				
Age of parents	37.56	5.28	30	50
Number of children (living under same roof)	1.98	2.96	1	4
Age of children in years (living under same roof)	7.94	5.53	0.01[b]	21.70
Parental Burnout Assessment (total score)	37.84	25.81	8	131
Generalized Anxiety Disorder-7 Questionnaire	5.58	5.35	1	20
Beck Depression Inventory	11.20	10.22	0	52

Note. DASS = Depression Anxiety Stress Scales.
[a] This refers to a child that was 3 months old at the start of the data collection
[b] This refers to a child that was a few days old at the start of the data collection

dren (or only older children), since we aimed to assess the questionnaire's suitability for parents with children of varying ages. For the preliminary data collections, we recruited parents from among the authors' acquaintances, and via emails to relevant groups; for the eight-week data collection, we recruited parents using flyers, social media posts and emails to relevant groups. Of critical interest, we also sought in-depth qualitative feedback from the parents about the items and their experience as participants.

French-language Two-week Sample

First, we administered the French-language versions of the 11 items (see section 5 of the appendix) for 9 French-speaking parents. On the first day, participants filled out a demographic questionnaire and the Parental Burnout Assessment (PBA; Roskam et al., 2018). Based on participant feedback from the pilot (see Section 6 of the appendix), participants could also select in this initial questionnaire whether they received the notifications containing the survey link via text message or email. They were also invited to choose their favored time, between 6 PM to 9 PM, to receive the notification (i.e., they were asked to choose a time after most of their interactions with their children were over). They received one reminder notification two hours later, and the questionnaire expired after five hours. The phrasing of the items was specifically tailored to the participants: if they had one child, the item included the words "my child"; if they had multiple children, the question referred to "my children." As French is a gendered language, the same principle applied for the gender markers of the participant and their partner, as well as if the participant was a single parent (questions referring to "partner" were then not shown). This tailoring of item phrasing was performed automatically through *formr* (for details, see the *formr* template: https://osf.io/c492m/, and specifically the survey entitled 'ESM_PB'). The ESM items were shown in randomized order. Figure 1A illustrates how the ESM questionnaire appears on participants' phone screen. Since this data collection occurred during a semi-lockdown period in Belgium (due to COVID-19), we added a question to assess how much time parents had spent with their children that day. However, this could also be generally useful to assess if children spend a few days away from their parents (e.g., because they are with grandparents or on a fieldtrip, because the parents are away for a business trip).

After completing the daily survey, the participants saw a specialized feedback message (specific to the day of the week and the percentage of time-points completed, to maintain participants' motivation and investment in participating in the study). Next, they saw a feedback graph showing them how many surveys they had filled out so far that week (see Figure 1B). On the fifteenth day, participants answered a follow-up feedback questionnaire, assessing their understanding of the items and soliciting any qualitative feedback about item phrasing, and their overall experience of the study.

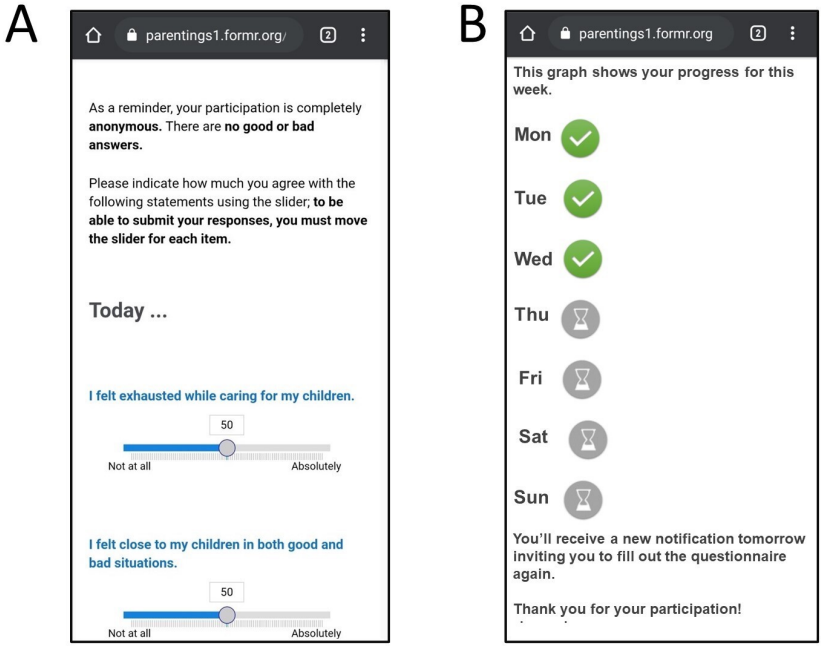

Figure 1. ESM Items and Daily Feedback (Participant View)

Note. A) Participant view of the ESM survey, accessed by a personalized webpage sent to them by an email or text message notification. An example version of this survey can also be viewed here: https://exempleparent.formr.org/. B) Completion feedback screen participant sees about how many ESM surveys they have answered so far during the week and how many they have left.

English-language Two-week Sample

Next, we conducted a two-week data collection period with 23 parents using the English-language ESM items. The procedure was the same as for the French-speaking parents, except parents also filled out the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995). These parents had a high level of English (all but one were either native English speakers or used English regularly at their work) and lived in Belgium.

French-language Eight-week Sample

Since the previous data collections only spanned two weeks, we also included data collection from another project (https://osf.io/pshdn/) which spanned eight weeks. Before parents started this study, a researcher conducted an in-depth introductory briefing session with them to go over each item one-by-one and answer any questions; to this end, we created a *formr* survey with just the ESM questions, to introduce participants during the introductory briefing session to how the software operates, as well as for interested readers to take a look: https://exempleparent.formr.org/. This type of introduction and training meeting is known to enhance participant compliance (Trull & Ebner-Priemer, 2020).

We present preliminary results from this dataset (including ICCs, multilevel reliability for the three parental burnout items, and parent feedback) to examine the long-term use of these ESM items. Compared to the previous data collections, French-speaking parents additionally filled out the Generalized Anxiety Disorder-7 questionnaire (GAD; Spitzer et al., 2006) and the Beck Depression Inventory (BDI; Beck et al., 1998).

Statistical Analyses

In addition to summarizing the qualitative feedback from parents, we also used quantitative methods to assess whether the final items were adequate for ESM use. First, we assessed whether the item responses yielded sufficient within-subject variability. To do so, we computed the ICC for each variable using intercept-only multilevel models, as is common within ESM studies (Gabriel et al., 2019). The ICC represents the proportion of the total variance due to between-person variance (Lüdtke & Trautwein, 2007; Snijders & Bosker, 1999); for example, an ICC of .40 indicates that 40% of the variance is due to between-person variation and 60% to within-person variation. Therefore, low ICC values indicate that an item possesses substantial within-subject variability; ICCs below .5 are usually accepted within ESM research, although some ESM researchers find typical ICC values to be between .2 and .4 (Eisele et al., 2021). We also report the intraindividual means and standard deviations, following the recommendation of Trull and Ebner-Priemer (2020).

Next, for samples in which we collected retrospective questionnaires about both parental burnout and distinct constructs (e.g., anxiety, depression, or stress), we examined the correlation table of all ESM items (aggregated within persons) with the questionnaire scores. Although within-person measures cannot be expected to match perfectly with between-person measures, we can still expect that the three parental burnout ESM responses should be

Table 3. Parental Burnout and Family Context: ESM Items

Category	Item (English version)
Emotional Exhaustion	I felt exhausted while caring for my children.
Emotional Distance	I felt close to my children in both good and bad situations.
Feeling Fed Up	I felt overwhelmed caring for my children.
Partner Support	I received help from my partner with caring for my children.
Partner Conflict	I had some misunderstandings, tension, or arguments with my partner.
Kids' Behavior [a]	My children were difficult to manage.
Behavior towards Kids (+) [a]	I shared positive moments with my children.
Behavior towards Kids (-) [a]	I got angry with my children.
Resources	I lacked the means (for example, time, energy, material resources) to take care of my children.
Social Support	I received help from friends or family (other than my partner) with caring for my children.
Time with Kids	Around how many hours did you spend near your children today (outside of sleeping hours)?

Note. These ESM items were presented in random order on the same page, with "Today" at the top. ESM = experience sampling methodology.
[a] For these three item labels, we changed the exact label in subsequent publications that used this ESM tool, on the suggestion of a reviewer to make the label closer to the actual item content. As such, in Blanchard et al. (2023) and likely in subsequent publications, these items are labeled as "Difficult to Manage (Kids)" with the shorter version (e.g., for figures) as "DiffKids," "Positive Moments (Kids)" with the shorter version "PosMoKids," and "Angry (Kids)" with the shorter version "AngKids."

more closely correlated with retrospective parental burnout measures than with retrospective measures of depression, anxiety, or stress, in line with expected convergent and discriminant validity (Eisele et al., 2021).

Lastly, although we could not assess the multilevel reliability of all variables, since they were all single-item measures, three items did represent three features of parental burnout. We therefore computed the multilevel reliability of a 'parental burnout scale' which included the Exhaustion, Emotional Distance (reverse-coded), and Fed Up variables, following the method of Cranford et al. (2006) and Shrout & Lane (2012). We used the *mlr* function in the R package psych version 2.0.9 (Revelle, 2020) to partition variance into between-individual (denoted $R_{KR)}$ and within-individual reliability (denoted R_C). Low or moderate within-individual reliability is acceptable, since we expect substantial within-person variability, but high between-individual reliability is required for an ESM scale to be reliable.

We carried out all analyses in R 4.0.3 (R Core Team, 2021) and generated all plots with the *ggplot2* package, version 3.3.2 (Wickham, 2016). All anonymized data and R code can be found at https://osf.io/b35ec/.

Results

Finalized ESM items

The English translation of the finalized ESM items appears in Table 3. The finalized French ESM items, as well as figures showing the mean daily response with standard deviations, can be found in the appendix (specifically sections 5 and 7).

French-language Two-week Data Collection

The median time participants took to complete the ESM survey was 1.33 minutes. Overall, the rate of participant compliance was 95%. Each item appears to have sufficient within-person variation for analyses: there is a substantial intraindividual standard deviation for each item, and the ICCs of almost all items indicate that most item responses exhibit more within-person variation than between-person variation (i.e., ICCs < .50; see Table 4). Partner conflict was the only item with a somewhat larger ICC (.60), but it still contains a large intraindividual standard deviation. Using variance partitioning methods to estimate the multilevel reliability of the parental burnout scale (made up of the three parental burnout features: Exhaustion, Emotional Distance, and Feeling Fed Up), we found that the between-individual reliability was relatively high (R_{KR} = 0.85) while the within-individual reliability was, as expected, moderate (R_C = 0.53).

English-language Two-week Data Collection

The median time participants took to complete the daily ESM survey was 1.39 minutes. The compliance rate was 87% (although *formr* did have server issues during this period of data collection, leading many participants to miss one questionnaire). Although most ICCs were below .50, a few were higher (specifically, emotional exhaustion at .51, emotional distance at .62, partner support at .57; see Table 4). However, when we removed participants who showed no variation in responses (n = 2), and afterward removed participants who showed very little variation (n = 7), these ICCs did decrease (see Section 8 of the appendix)[1]. When examining the multilevel reliability of the three items making up

1 Note that these participants all had high levels of English and were of similar nationalities as the participants with greater response variation (e.g., Belgian, American, Canadian, etc.).

Table 4. Intra-individual Means and Standard Deviations as well as ICCs for Each ESM Item

	French 2-Wk Sample			English 2-Wk Sample			French 8-Wk Sample		
ESM item	**iiMean**	**iiSD**	**ICC**	**iiMean**	**iiSD**	**ICC**	**iiMean**	**iiSD**	**ICC**
Emotional Exhaustion	20.41	21.27	0.26	33.31	19.01	0.51	29.2	24.31	0.23
Emotional Distance	87.57	11.02	0.32	85.02	9.09	0.62	76.11	15.74	0.38
Feeling Fed Up	14.2	17.34	0.15	24.53	17.76	0.40	22.52	21.89	0.16
Partner Support	52.79	24.25	0.40	71.96	18.5	0.57	62.51	25.15	0.42
Partner Conflict	30.49	22.14	0.60	21.78	19.1	0.31	18.97	22.87	0.19
Kids' Behavior	20.19	19.72	0.28	23.01	17.97	0.24	26.18	22.54	0.19
Behavior toward Kids (+)	82.35	14.98	0.37	85.41	11.98	0.36	76.82	16.38	0.38
Behavior toward Kids (-)	22.7	21.79	0.27	24.05	20.22	0.25	22.92	23.37	0.18
Resources	22.62	23.95	0.12	24.93	19.1	0.33	32.44	24.84	0.26
Social Support	27.75	27.91	0.28	13.76	13.72	0.46	25.86	32.02	0.14
Time Spent with Kids	6.09	2.60	0.47	7.43	2.78	0.39	8.01	3.62	0.24

Note. Wk = Week; ICC = intraclass correlations; ESM = experience sampling methodology; iiMean = intraindividual Mean; iiSD = intraindividual standard deviation.

the parental burnout scale, the between-individual reliability was high (R_{KR} = 0.94), while again the within-individual reliability was moderate (R_C = 0.52). Parental burnout ESM items correlated significantly with a retrospective questionnaire on parental burnout but did not do so with retrospective measures of depression, anxiety, or stress (see Figure 2).

French-language Eight-week Data Collection

Participants took a median of 1.32 minutes to answer the ESM items, and the overall compliance rate was 94%. All items showed sufficient intraindividual variability (all ICCs were below 0.5, and except for Partner Support all were below 0.4; see Table 4). Again, the between-individual reliability for the three parental burnout ESM items was high (R_{KR} = 0.96), whereas the within-individual reliability was moderate (R_C = 0.58). Parental burnout ESM items were more strongly correlated with the parallel retrospective subscale (e.g., the Exhaustion subscale with the PBA Emotional Exhaustion subscale) and the total PBA score than with the BDI or GAD (and in fact, only the Emotional Distance ESM item was significantly correlated with the GAD score; see Figure 3).

Participant Feedback

French-language Two-Week Data Collection

The participants overall thought the general interface and slider were easy to use, and parents generally reported appreciating participating in the ESM study (further parent feedback is reported in Section 6 of the appendix). Parents rated whether they would recommend the studies to others on a scale from 1 (*not at all*) to 7 (*absolutely*); their mean response was 6.29.

English-language Two-Week Data Collection

After the two weeks of ESM questions, participants rated whether they thought the daily questions were clearly phrased on a scale from 1 (*not at all*) to 5 (*completely*) with a mean response of 4.73 (SD = .45) and whether they found the questions applicable to their daily life with a mean response of 4.36 (SD = 0.85). On whether they found the study to be a burden, participants answered with a mean response of 1.23 (SD = 0.61).

French-language Eight-Week Data Collection

After eight weeks of answering daily ESM questions, parents rated to what extent they found the study to be a burden, from 1 (Not at all) to 5 (Extremely); their mean response was 1.53 (SD = 0.71).

Discussion

Thus far, research on parental burnout has not examined whether parents experience fluctuations in the features of parental burnout. However, the theoretical framework conceptualizing parental burnout emphasizes the crucial role of the parent's time-varying family context—particularly, their parenting resources and stressors (Mikolajczak & Roskam, 2018). Therefore, a critical next step in parental burnout research should involve examining how the specific features of parental burnout fluctuate from day to day in interaction with the ever-changing family context. Investigating daily fluctuations involves ESM methods, with parents answering the same questions repeatedly in their daily lives; one can then use the resulting intensive longitudinal data to address research questions about the onset, maintenance, and interactions of parental burnout features within their family context. However, there is currently no existing tool to measure the features of parental burnout and related family variables on a repeated and frequent basis. This paper therefore had three complementary goals: first, to develop such an ESM tool; second, to ensure parents found it easy to use and not burdensome; and third, to assess the performance of the ESM tool.

For our first goal, we set out to develop ESM items in line with the theoretical framework of parental burnout: items assessing the main features of parental burnout and parenting behavior, but also contextual variables that are likely to change over time, such as partner relationship, child be-

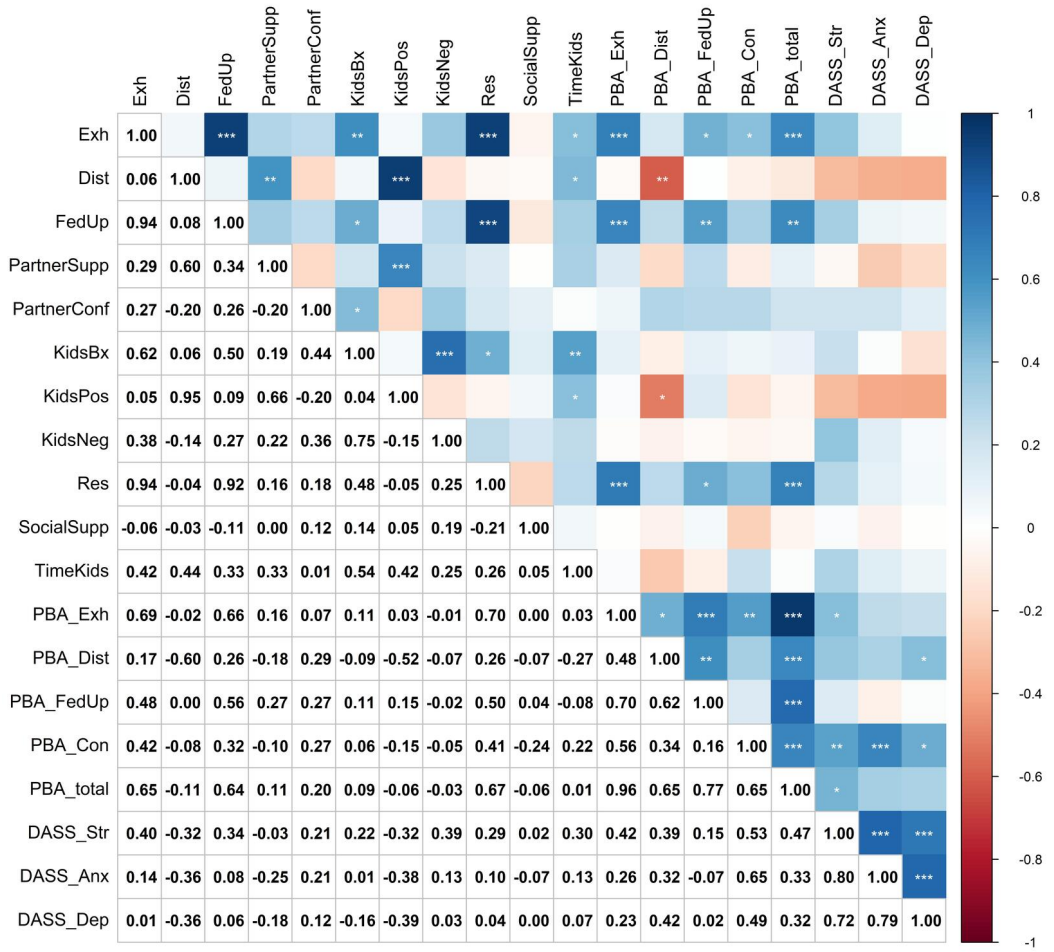

Figure 2. Correlation Plot of All Aggregated ESM Variables from English-language Two-week Data Collection

Note. The correlation table includes data averaged within person instead of all the data because of the temporal dependence between time-points. ESM = experience sampling methodology; Exh = emotional exhaustion; Dist = emotional distance; FedUp = feeling fed up; PartnerSupp = partner support; PartnerConf = partner conflict; KidsBx = children's behavior; KidsPos = positive behavior toward children; KidsNeg = negative behavior toward children; Res = resources; SocialSupp = social support; TimeKids = time spent with kids; PBA = Parental Burnout Assessment; DASS = Depression, Anxiety Stress Scales; Str = stress subscale; Anx = anxiety subscale; Dep = depression subscale.
*p < .05. **p < .01. ***p < .001.

havior, perceived social support, and perceived general resources. We solicited qualitative feedback regarding item content and phrasing from a total of 21 parents, as well as from parental burnout experts. This procedure winnowed an initial pool of 70 items to a final pool of 11 items, each with unambiguous phrasing that assessed the entire contents of its intended construct through a statement applicable to most parents daily.

Our second goal was to ensure this tool was easy to use and not burdensome for parents. Since analyses using ESM data require many time-points (and perform better with no or minimal missing data), and since ESM methods intrude into participants' daily lives by their very nature, this aspect is vital. Further, the target sample for these ESM items are parents, all of whom are busy and some of whom might be extremely exhausted or burned out. Therefore, these ESM items must present a minimal burden so that parents can comfortably answer the items over long periods of time. Across all samples, the ESM items took parents a median time of less than 2 minutes to complete, below the recommended three minutes for ESM questionnaires (Eisele et al., 2021; Varese et al., 2019). All three studies also had high compliance rate, with all parents answering over 85% of ESM prompts—in fact, the only sample with a compliance rate lower than 90%, the English-language sample, experienced issues with the *formr* server that caused most parents to miss at least one ESM prompt. In addition, parents reported in feedback questions that the ESM questionnaire was not a burden, that the questions were clearly phrased and applicable to their daily life, and that they would recommend the study to other potential participants.

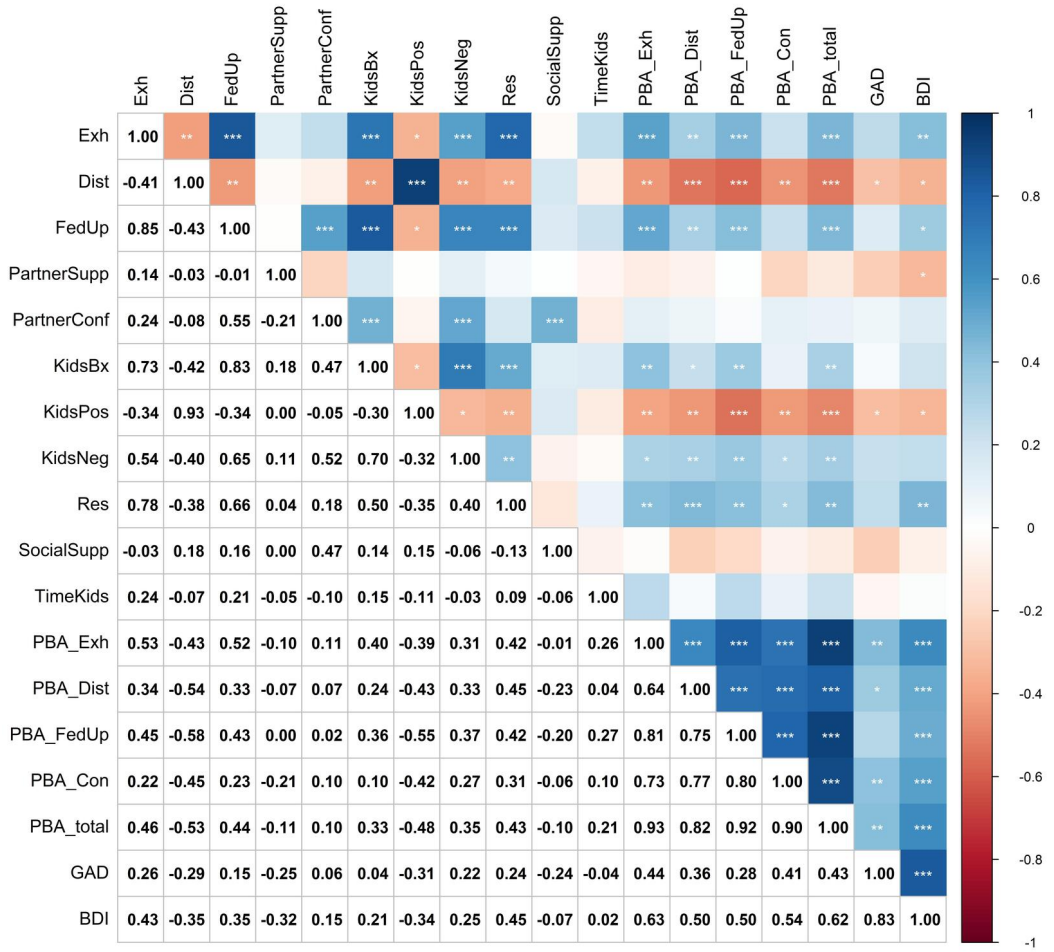

Figure 3. Correlation Plot of All Aggregated ESM Variables from French-language Eight-week Data Collection

Note. The correlation table includes data averaged within person instead of all the data because of the temporal dependence between time-points. ESM = experience sampling methodology; Exh = emotional exhaustion; Dist = emotional distance; FedUp = feeling fed up; PartnerSupp = partner support; PartnerConf = partner conflict; KidsBx = children's behavior; KidsPos = positive behavior toward children; KidsNeg = negative behavior toward children; Res = resources; SocialSupp = social support; TimeKids = time spent with kids; PBA = Parental Burnout Assessment; GAD = Generalized Anxiety Disorder questionnaire; BDI = Beck Depression Inventory.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Our third goal was to assess the performance of these ESM items across three different samples, two languages, and two different lengths of time. Across these different samples, we examined whether the ESM items yielded sufficient within-person variability, which is necessary to investigate how variables fluctuate in time, the purpose of ESM (Varese et al., 2019). In the eight-week data collection, we found that the ESM items do yield sufficient within-person variability, as all ICCs were below 0.5. The French-language two week data collection had one ESM variable with an ICC over 0.5 (e.g., showing slightly more between-subject than within-subject variation), and the English-language two-week data collection had a few more. However, these data collections spanned a shorter amount of time (and so allowed less varied experiences than over eight weeks). In addition, multiple of these items had substantial intra-individual standard deviations, and a few high ICCs seemed related to a few parents in particular answering exactly the same over two weeks. This might have had to do with only the French-language data collection having a face-to-face (video-call) briefing to explain the study to participants, test the items out together, and answer all questions. Therefore, we would recommend for future ESM studies with these items to include a face-to-face briefing (as recommended for ESM studies generally; Trull & Ebner-Priemer, 2020) and to include sufficient time-points to allow parents to experience varied aspects of parenting and family life. We conclude that overall, these items do show sufficient variation for use in ESM studies; this finding in itself has theoretical importance, since it demonstrates that parental burnout features fluctuate over time in an unselected sample of parents. This aligns with previous findings

about emotional exhaustion (Gillis & Roskam, 2020), but is the first to extend these results and find that emotional distance and feeling fed up also fluctuate daily.

For the two samples where parents answered retrospective questionnaires about both parental burnout and other constructs (e.g., depression, anxiety, and stress), we also examined the correlations of the aggregated ESM variables with these questionnaires. The three parental burnout ESM items (Emotional Exhaustion, Emotional Distance, and Feeling Fed Up) were more strongly correlated with the parental burnout subscale than with other constructs, providing initial convergent and discriminant validity. In fact, in our English-language data collection, these parental burnout ESM items were significantly correlated with the PBA but not with the DASS subscales (see Figure 2). In the eight-week French-language data collection, meanwhile, there were significant correlations between the parental burnout ESM items and the BDI as well as with the PBA, but the correlations with the corresponding PBA subscale were always stronger (see Figure 3). In addition, the BDI includes items that are not specific to depression (e.g., weight loss, insomnia, irritability), which is not the case for the DASS (Lovibond & Lovibond, 1995). This might have been the reason for this difference between datasets. In addition, when examining the correlation plot of all aggregated ESM variables, the correlations are all in the expected directions based on item content and valence; this is a promising preliminary finding regarding content validity (Hektner et al., 2007). The last part of assessing our ESM items involved examining reliability. Although we developed each item as a single-item measure for its construct (making it difficult to assess reliability overall), the three items measuring different features of parental burnout (Exhaustion, Emotional Distance when reverse-coded, and Feeling Fed Up) could also be summed into an ESM scale measuring overall fluctuations in parental burnout. When combined into one parental burnout scale, these three items had good-to-excellent multilevel between-subjects reliability.

Overall, we therefore provide an ESM tool with good initial estimates of reliability and validity to encourage research into the dynamics of parental burnout and its family context and set the scene for future transfer into ideographical clinical research. We also share the materials we used to collect data (e.g., formr templates), in the hope that they might help other researchers interested in the dynamics of parenting, parental burnout, and the family context. Establishing shared ESM items allows for consistency in the definition and operationalization of items and concepts, as well as response scales, which is necessary to be able to compare ESM results and generalize findings (Mofsen et al., 2019; Myin-Germeys et al., 2018; Trull & Ebner-Priemer, 2020).

Limitations

There is the possibility that participants could show reactivity in response to seeing the ESM questions, based on comments from one parent saying she appreciated participating in the study as it allowed her to evaluate her emotional state when interacting with her children. However, since we value limiting the burden on parents, we do not think it would be feasible to implement potential solutions to reactivity (e.g., variable sampling frequencies; Nehrkorn-Bailey et al., 2018). In addition, since we are especially interested in how these items influence one another (and not necessarily in what specific level each construct is at each day), we do not necessarily view reactivity as a crucial issue. And, in any case, previous research involving parent daily diaries about parental warmth and conflict found that parents showed minimal reactivity over two months, and any small changes were mostly positive, in line with literature on self-monitoring (Reynolds et al., 2015). We are more concerned that the items might induce social pressure for parents or feelings of guilt (Meeussen & Van Laar, 2018). We thus formulated ESM items so that parents would not have to highly endorse sentences that went against social parenting norms (e.g., the item assessing emotional distance assesses its opposite, emotional closeness). A further limitation relates to the generalizability of samples: all samples include mostly mothers and relatively few fathers, and were limited to parents living in Belgium. Although the purpose of this project was to detail the creation of ESM items and initially test them, future research should also confirm that these items are appropriate for more diverse and heterogeneous populations.

Future Directions

Being able to explore the temporal dynamics of parental burnout opens new horizons for parental burnout research. ESM research can clarify the basic understanding of how a psychological construct develops and evolves within its context (Myin-Germeys et al., 2018). This is especially relevant for parental burnout, since its context—the parent's family situation—is a key component within the theoretical framework of parental burnout (Mikolajczak & Roskam, 2018). There might also be differences in the fluctuations of parents with parental burnout and those without, and understanding these differences would provide insight into how parental burnout operates. For example, it is unclear at this stage whether these fluctuations vary depending on the level of burnout; it is possible that when parents are burned out, they experience fewer fluctuations of the parental burnout features. In addition, since previous research has shown associations between parental burnout on the one hand, and marital conflict and neglect and violence toward children on the other (Mikolajczak, Brianda, et al., 2018), investigating how parental burnout features interact with behavior toward the children and the partner can help clarify the exact pathways between parental burnout and family dysfunction. Overall, ESM research encourages dynamic questions investigating change, stability, catalysts of change, and temporal interactions; many analysis types exist to investigate these questions, including multilevel models, temporal networks, and dynamic systems modeling (Jordan et al., 2020; Myin-Germeys et al., 2018; Nehrkorn-Bailey et al., 2018).

Integrating ESM methods within clinical research has also been recommended: adding in-the-moment assessments of a patient's state as an outcome measure for clin-

ical trials can improve measurement precision and lower recall bias (Mofsen et al., 2019). Possibilities also arise to directly integrate ESM methods with clinical work. One example involves generating an idiographic network for a patient, which would allow both the clinician and the parent to visualize how that parent's symptoms interact over time (Epskamp & Fried, 2018; for a discussion, see Blanchard & Heeren, 2020). Another example involves detecting early warning signals heralding a transition into (or out of) a state of parental burnout, using methods from research on critical transitions in ecosystems (Scheffer et al., 2009). For instance, previous research has demonstrated such warning signals for depression (van de Leemput et al., 2014; Wichers et al., 2016) and bipolar disorder (Bayani et al., 2017), and more transdiagnostic approaches have been proposed as well (Wichers et al., 2019). Although these individualized applications are not yet ready for clinical implementation, requiring further methodological and analytic refinements (Bastiaansen et al., 2020; Wichers et al., 2017), they set the scene for radically new ways to inform clinical work and future development in parental burnout research.

Conclusion

Parental burnout is a growing area of research, but this research has not yet considered the possibility of day-to-day fluctuations in its features. Only one study so far has examined the daily fluctuations of a feature of parental burnout: parental exhaustion. We provide initial evidence that not only emotional exhaustion, but also emotional distance and feeling fed up—three of the main features of parental burnout—fluctuate daily. This ushers new possibilities for research examining how parental burnout develops and persists within its specific family system. To allow consistency in future research on the temporal dynamics of parental burnout, we detail our methods in creating an ESM tool with 11 items measuring parental burnout and related family variables (parent behavior, child behavior, partner interactions, social support, and resources).

Contributions

- Conceptualization: MAB, AH, JR.
- Software: MAB, YH, JR.
- Investigation: MAB & JR.
- Formal analysis: MAB & JR.
- Writing – original draft: MAB.
- Writing – review & editing: AH, MM, IR.

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Competing Interests

MM and IR have founded the "Training Institute for Parental Burnout," which delivers training on parental burnout to professionals. MAB participated in developing an English-language version of the training. The institute did not participate in the funding of this study nor did it influence the process or the results in any manner. AH receives honoraria for his editorial work from Elsevier. The other authors have no known conflict of interest to disclose.

Data Accessibility Statement

All materials, R code and anonymized data are shared publicly on the Open Science Framework (https://osf.io/s2yv5/).

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Supplementary Materials

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Appendix

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Table S1

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