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Mental Health Risk and Resilience in Parenthood: Protocol for a Six-Wave Longitudinal Cohort Study of Parents and Parent Dyads

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Mental Health Risk and Resilience in Parenthood:

Protocol for a Six-Wave Longitudinal Cohort Study of Parents and Parent Dyads

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Abstract

Background: Parental mental health is a dynamic multifactorial process shaped by evolving stressors, caregiving demands, interpersonal relationships, and individual emotion regulation strategies. While prior research has identified correlates of depression and anxiety in parents, most studies rely on cross-sectional designs, isolated predictors, or single-parent (predominantly maternal, perinatal) samples. Consequently, little is known about how psychological (e.g., emotion regulation), health and lifestyle (e.g., sleep, physical activity), cognitive (e.g., fatigue, perceived functioning), social (e.g., support), and contextual (e.g., psychological and physical stressors) factors interact and co-evolve within parents and across parent dyads over time. This protocol describes a six-wave longitudinal study of parents and parent dyads examining risk and resilience processes in parental mental health.

Methods: The study is embedded in the Dutch Longitudinal Internet Studies for the Social Sciences (LISS) panel, a probability-based household panel with rigorous sampling and data-protection protocols. Eligible participants are adult LISS members with at least one child younger than 25 years in the household who cohabit with the child's other parent or caregiver. Both partners in eligible households are invited. Participants complete online questionnaires every two months over 12 months. Primary outcomes are symptoms of depression and anxiety. Risk and resilience were assessed, including stress exposure and perceived burden, parental stress, emotion regulation, sleep problems, physical activity, body mass index, fatigue, perceived cognitive functioning, perceived online and offline social support, exposure to online mental health-related content, and demographic and household characteristics. Primary analyses will use longitudinal multilevel models that separate within-person change from between-person differences. Longitudinal actor–partner interdependence models will examine actor and partner associations within parental dyads. Machine-learning analyses will be treated as data driven predictive analyses and evaluated using cross-validation.

Discussion: This study will provide prospective dyadic evidence on how mental health symptoms in parents emerge from the interplay among stress, resilience, psychological processes, health and lifestyle, cognition, and social context. By integrating repeated assessments, probability-based sampling, and dyad-level data, it advances a relational and dynamic understanding of parental mental health. Findings may inform personalized prevention and intervention strategies targeting parents as individuals, partners, and family systems.

Keywords: Parental mental health; Longitudinal dyadic design; Depression; Anxiety; Stress; Resilience; Emotion regulation; Social support; Health and lifestyle factors; Perceived cognitive functioning.

Background

Mental health symptoms fluctuate over time in response to changing demands, resources, and life events (1,2). Developmental psychopathology and contemporary systems perspectives conceptualize psychological functioning as the product of reciprocal relations among affective, cognitive, behavioral, somatic, and social processes operating across multiple timescales (3,4). Longitudinal studies of psychological adaptation further show substantial heterogeneity. Individuals may display stable resilience, recovery, chronic distress, or delayed onset of mental health symptoms following adversity (5,6). Understanding transitions in mental health therefore requires models that consider temporal dynamics, inter-individual heterogeneity, as well as multilevel risk and protective processes operating within individuals and their interpersonal systems.

The transition to parenthood and the childrearing years provides a salient developmental context in which to study these mental health dynamics. Parenting can increase meaning and life satisfaction, while also reorganizing daily routines, identities, relationships, work patterns, and responsibilities. Common demands include sleep disruption, reduced time for leisure and self-care, financial strain, work–family conflict, relationship changes, and concern about children's well-being (7–9). Most parents adapt, but a meaningful subgroup experiences persistent or worsening symptoms of depression, anxiety, stress, or parental burnout (10–12). Understanding why symptoms increase for some parents but not others is a central challenge for mental health research.

Limitations of Prior Research

Prior research identifies several plausible correlates of parental mental health, including emotion regulation difficulties, sleep disturbance, fatigue, physical inactivity, low social support, and relationship strain (13–15). However, current work is constrained by three critical gaps.

First, these factors are usually examined in separate studies even though they are likely to be mutually reinforcing. For example, sleep disruption and fatigue are strongly associated with emotional dysregulation, negative emotions, and depressive symptoms (16). Health behaviors (e.g., physical activity) that play a critical role in mental wellbeing are often constrained by caregiving responsibilities and time pressure (17). Additionally, the availability and quality of emotional and practical support shape parents' capacity to cope with parenting stressors (18,19). An integrated design is needed to estimate the unique and combined prospective associations of these domains while avoiding the assumption that one pathway applies equally to all parents.

A second limitation is the predominant focus on one parent, especially mothers in the perinatal period. This focus provides limited insight into the dyadic nature of parenthood. Cohabiting parents share household conditions, caregiving responsibilities, routines, and many stressors. Changes in relationship dynamics, mutual support, and emotional co-regulation can influence mental health outcomes within dyads (20,21). Longitudinal dyadic data can distinguish actor associations (e.g., whether a parent's characteristics predict their own later symptoms) from partner associations (e.g., whether those characteristics predict the other parent's later symptoms). Such analyses are relevant to family-oriented prevention strategies.

A third limitation is methodological. Many studies rely on cross-sectional or short-term designs that cannot distinguish stable between-person differences from within-person change. As a result, it remains unclear whether parents report increases in mental health symptoms during periods when they experience more stress, poorer sleep, greater fatigue, poorer cognitive functioning, or lower levels of support than usual over time, or whether people with more mental health symptoms simply differ from those with fewer symptoms in experienced stress level, sleep quality, fatigue, cognitive functioning, and support. Repeated assessments permit within vs. between sources of variance to be separated. They also allow cautious tests of

temporal ordering, although observational longitudinal associations remain vulnerable to measurement error, omitted time-varying causes, and mismatch between the timing of the process and the assessment interval.

Toward An Integrated and Dyadic Perspective

A dyadic perspective is therefore important for developing a better understanding of parental mental health. Partners who co-parent often share routines, caregiving tasks, stressors, and responsibilities, rendering their psychological functioning inherently interconnected. Dyadic research suggests that partners' emotions, stress responses, and health behaviors may influence each other through processes such as emotional contagion and coregulation (22,23). These dynamics are clinically relevant because parental mental health influences not only wellbeing of parental dyads but also child distress (24). Parental depression and anxiety are consistently associated with increased risk for child emotional, behavioral, and developmental difficulties (25,26). Therefore, investigating mental health within parent dyads, enables a more comprehensive understanding of mental health and resilience as both an individual and relational phenomenon and aligns with developmental systems perspectives on family risk and resilience (27).

Several specific factors may drive changes in parental mental health. Emotion regulation strategies, such as rumination or worry, avoidance, and self-blame have been shown to intensify and prolong negative emotional states and increase vulnerability to anxiety and depression symptoms (28,29). Lifestyle behaviors including sleep quality, physical activity, and sedentary behavior are frequently disrupted during early parenthood and are also strongly linked to mental health (15–17). Social relationships also play a significant role. That is, emotional and instrumental support can enhance resilience and reduce stress reactivity (19), whereas exposure to intensive parenting norms, social comparison, and information overload (particularly in online environments) may increase anxiety, feelings of guilt, and perceived parenting

inadequacy (30,31). These psychological, behavioral, and social dimensions are likely shaped by contextual stressors such as work demands, financial pressure, and physical health complications.

To date, studies have typically examined these factors in isolation or in one parent, disregarding contextual and interpersonal dynamics within parent dyads over time. Parental mental health is unlikely to be explained by one factor alone. Equivalent symptom levels may arise from different stressors, changes in emotion regulation, sleep problems, fatigue, social support, or cognitive symptoms. Conversely, some parents may exhibit resilience despite high stress due to strong support or adaptive emotion regulation. This underscores the need for integrative and longitudinal dyadic models of parental mental health (Prime, Wade, & Browne, 2020).

The Present Study

To address these gaps, the present study adopts a six-wave longitudinal design to examine dynamic risk and resilience in parents and parental dyads. This project focuses on symptoms of depression and anxiety as well as parental stress because they are among the most prevalent mental health phenomena during the parenting years and impose substantial burdens on parents, parental dyads, and families (26,32,33).

The study has three primary aims. First, it examines how psychological, health and lifestyle, and social factors independently and interactively predict symptoms of depression and anxiety over 12 months. Psychological factors include emotion regulation strategies such as rumination, self-blame, and dampening of positive affect. Health and lifestyle factors include sleep problems, physical activity, body mass index, fatigue, and cognitive functioning. Social factors include perceived online and offline (emotional) support, exposure to online mental health-related content, and mental health information seeking behavior.

Second, this study examines bidirectional relations between the occurrence of diverse types of stressors and psychological, health and lifestyle, and social factors as well as mental health symptoms. This aim addresses both stress reactivity and stress generation by examining whether specific stressors predict subsequent symptoms (or risk and resilience), and whether symptoms (or risk and resilience) predict subsequent stress exposure or perceived burden.

Third, the study investigates interdependence within parental dyads. Specifically, it examines whether one partner's stress exposure, emotion regulation, fatigue, cognitive functioning, support, or symptoms predict the other partner's later mental health. It also allows for a direct comparison of mental health processes between both members of the parental dyad. This aim allows risk and resilience to be studied not only as individual characteristics but also as relational processes embedded within the parental dyad and the broader family system.

By integrating repeated assessments across psychological, health and lifestyle, cognitive, social, and contextual domains in both partners, this study aims to refine theoretical models of parental mental health and resilience. The findings may inform prevention and intervention strategies that address parents as individuals, partners, caregivers, and members of dynamic family systems.

Methods and Design

Study Design and Setting

This study is a prospective six-wave longitudinal cohort study with rolling eligibility and a dyadic subsample. Data are collected through additional study modules of the Dutch Longitudinal Internet Studies for the Social Sciences (LISS) panel (34). The LISS panel is a probability-based household panel drawn from the population register and administered by Centerdata. Approximately 5,000 households and 7,500 individuals participate in the panel. Households that would otherwise be unable to participate are provided with internet access and the necessary equipment.

The six study waves are scheduled at approximately two-month intervals. Participants who enter after the first study wave contribute data from their first eligible wave onward and are not considered to have missing data for waves occurring before they became eligible. At the time of submission, participant recruitment is ongoing and recruitment has not been completed (Expected end: July 2027). The dates of recruitment, data collection, database closure, and analysis will be reported in the final study report.

The LISS panel operates under established data-protection procedures, and research datasets are de-identified before release. Participants provide informed consent and receive financial compensation according to the standard LISS reimbursement scheme of €0.25 per minute. The study protocol was reviewed and approved by the Ethics Review Board of the Tilburg School of Social and Behavioral Sciences at Tilburg University under the Trend Monitor People and Society framework (TSB_RP1801; amendment: TSB_RP1245).

Participant Characteristics

Panel members are eligible when they are aged 18 years or older, live with at least one child younger than 25 years, and cohabit with the child's other parent or caregiver. Eligible constellations may include biological parents, adoptive parents, stepparents, same-gender parents, and other cohabiting caregivers who meet the study definition. This broad criterion extends the investigation beyond samples consisting only of mothers or parents in the immediate postpartum period. Both eligible caregivers in a household are invited independently. Participation by one caregiver does not depend on participation by the other. The resulting sample may therefore include complete dyads, incomplete dyads, and individual parents for whom no partner data are available.

Dyads will be identified using the household and relationship identifiers available through the LISS infrastructure. No questionnaire responses will be disclosed to the

participating partner, and linked dyadic data will be made available to researchers only in de-identified form.

At each wave, all panel members who meet the eligibility criteria are invited, including individuals who did not participate in an earlier wave and individuals who have become newly eligible. The study therefore represents cohabiting two-caregiver households but does not include single-parent households or parents and caregivers who do not cohabit.

Sample Size and Power Considerations

Approximately 1,500 LISS panel members were expected to meet the eligibility criteria, with an initial recruitment target of approximately 1,000 participants. The initial target allowed for nonresponse, intermittent missingness, and attrition. Because the design permits entry at later waves, final sample-size reporting will distinguish the number of unique participants from the number of person-waves and will present a wave-by-wave flow diagram.

For the primary multilevel analyses (Study Aims 1–2), simulation-based calculations were conducted with PowerAnalysisIL (35). The calculations indicate statistical power well above .80 to detect small within-person effects ($\beta = .05$) across six repeated measurements. This conclusion remained robust under a conservative scenario incorporating 30% participant attrition, additional wave-specific missingness, autocorrelated residuals, and clustering of repeated observations within individuals and individuals within households.

The machine learning analyses (Study Aim 1) are data driven and are not justified by null-hypothesis significance-test power. Their feasibility will be evaluated using the number of independent households or dyads, outcome prevalence and variance, model stability, predictive performance, and the ratio of predictors to observations. These criteria are consistent with current recommendations for predictive modeling in longitudinal mental health research (36,37).

For longitudinal actor–partner interdependence models (Study Aim 3), 500-replication simulations using PowerLAPIM (38) suggested that 100 distinguishable dyads would provide approximately .82 minimum power to detect standardized actor and partner coefficients of .15 across six waves under the specified autoregressive and dyadic-dependence assumptions. Estimated minimum power across actor and partner effects was .88 with 120 dyads (comfortable safety margin) and .93 with 140 dyads (excellent power), assuming continuous outcomes, autoregressive stability ($\rho = .60$), moderate dyadic dependence, and $\alpha = .05$. These simulations are based on relatively conservative assumptions regarding both the stability of mental health over time and the degree of dyadic dependence.

Description of Materials and Procedure

Invited panel members receive access to the questionnaire through the secure LISS survey platform. The questionnaire is designed to require no more than approximately 16 minutes per wave. The same core constructs are assessed repeatedly. The questionnaire assesses mental health symptoms, stress exposure and burden, parental stress, resilience, emotion regulation, lifestyle behaviors, fatigue and cognitive functioning, social support and mental health information-seeking behaviors, and relevant contextual factors. For several risk and resilience constructs, participants report experiences over the previous two months. This corresponds to the interval between measurement waves. Mental health symptoms are assessed for the previous week, providing an index of current symptom status at each wave. This combination allows the study to examine whether experiences occurring between assessment waves are linked to current symptom levels.

Mental Health Symptoms

Symptoms of depression, anxiety, and stress are assessed using the Dutch version of the Depression Anxiety Stress Scales (DASS-21-NL; de Beurs et al., 2001). The DASS-21-NL consists of three subscales measuring depression, anxiety, and stress symptoms experienced

during the past week. Each subscale contains seven items rated on a four-point Likert scale. Subscale scores will be calculated according to standard scoring procedures. Depression and anxiety are the primary mental health outcomes. The stress subscale may be modeled as an indicator of perceived stress. The DASS-21-NL demonstrates good internal consistency, convergent validity, and factorial validity in community samples.

Stress Exposure and Resilience

Stress exposure is assessed using 14 items covering medical, psychological, financial, and work-related stressors experienced during the past two months. Items were adapted from previous studies (40) to distinguish between stressors affecting the participant directly (e.g., personal health problems) and stressors affecting close relatives (e.g., psychological problems in a family member). For this study, a distinction was made between psychological stressors (e.g., financial problems) and biological stressors (e.g., medical disease), as well as between stressors to oneself or to a close relative. Participants rated how burdensome each stressor was using a 5-point scale ranging from 1 (not burdensome at all) to 5 (very burdensome). A response option of zero indicates that the stressor did not occur in the past 2 months. Both occurrence and perceived burden will be modeled.

Parental stress is assessed using a Dutch version of the Parental Stress Scale (41). This 18-item questionnaire captures both positive and negative aspects of parenting and uses a 5-point Likert scale ranging from 1 (very much disagree) to 5 (very much agree). Previous research supports the scale's reliability and construct validity (41,42). Parental stress is assessed in the past two months.

Resilience is measured using the Brief Resilience Scale (43). This six-item questionnaire measures the perceived ability to recover from stress. Items are adapted to refer to the past two months. The scale demonstrates good psychometric properties (43).

Emotion Regulation

Dampening of positive emotions is assessed using the Dampening subscale of the Dutch version of the Response to Positive Affect Scale (44,45). This 8-item scale assesses cognitive responses that reduce the intensity or duration of positive emotions. Participants report their use of dampening strategies during the previous two months. The scale has demonstrated good reliability and validity (44,45).

Rumination and *self-blame* are measured using subscales of the Cognitive Emotion Regulation Questionnaire (46). Each subscale consists of four items assessing the use of these strategies following negative events. Participants report their use of each strategy over the past two months. The CERQ has demonstrated good psychometric properties in community samples (46,47).

Health and Lifestyle Factors

Sleep problems in the past month are assessed using two items informed by the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989). Items assess total hours of actual sleep using a scale from 0 to 20 and subjective sleep quality using a scale from 0 (“terrible”) to 10 (“excellent”) during the past month.

Physical activity in the past week is measured using the International Physical Activity Questionnaire - Short Form (IPAQ-SF; Lee et al., 2011), assessing frequency and duration of physical activity. This included questions assessing the frequency of engaging in vigorous physical activity, moderate physical activity or walking (three questions), assessed in number of days, as well as the amount of time they spent on each activity and sitting (four questions, assessed in hours and minutes per day).

Body mass index was computed based on height, obtained as part of the LISS panel core questionnaire and current weight.

Fatigue in the past two months is assessed using two items from the Patient-Reported Outcomes Measurement Information System (PROMIS) item bank (50), domain fatigue ("I feel

fatigued or have low energy" (combined items HI7 and AN5) and "I fatigue more quickly from physical exertion" (FATEXP45)). Responses are provided on a 5-point Likert scale ranging from 0 (never) to 4 (very often).

Cognitive functioning in the past two months was assessed using two PROMIS items (50) from the domain cognition, ("My thinking has been slow" (item PC2r); "It seemed like my brain was not working as well as usual" (Item PC35r); 2010-2020 PROMIS Health Organization (PHO). Responses are provided on a 5-point Likert scale ranging from never 0 (never) to 4 (very often).

Social Factors

Perceived *social support in the past two months*, both online and offline, is assessed using six items measuring the frequency of (a) receiving information or advice, (b) receiving support or regaining self-esteem, and (c) being listened to and feeling understood. These domains are assessed separately for online and offline contexts, following prior work (51). Items are rated on a 5-point scale ranging from 0 (never) to 4 (very often).

Exposure to online mental health-related content in the past two months assessed using four items that distinguish informational content from personal experiences shared by others, either online or on social media specifically. Items are rated from 0 (never) to 4 (very often). This measure captures the extent to which parents encounter mental health-related information and narratives online. This approach follows the methodology described in prior work (52).

Mental health information-seeking behavior. In the past week, how often did you spend time seeking and reading mental health related information? Please also consider seeking or reading information about mental health symptoms, treatment options, and tips regarding mental health. Items are rated from 0 (not at all – 0 days) to 5 (every day – 7 days). This item was based prior work (53)

Contextual and Demographic Variables

Relevant demographic and household variables will be obtained from the LISS panel infrastructure where available. These may include parent age, gender, education, employment status, household income, number of children, age of youngest child, relationship duration, household composition, and other relevant contextual indicators. These variables may be used to describe the sample, adjust primary models, examine moderation, and evaluate attrition.

Open Science and Transparency

This study uses the LISS data infrastructure, which supports reproducible research and controlled scientific access to de-identified data (34). De-identified study data will be archived in the LISS data repository and will be available for non-commercial scientific research under the access conditions established by LISS.

Study metadata, questionnaires, codebooks, scoring syntax, data-cleaning rules, power-analysis scripts, preregistrations, and analysis scripts will be deposited in an appropriate research repository where ethical, legal, and licensing conditions permit. A separate analysis plan corresponding to each primary study aim will be preregistered before the relevant outcome analyses are conducted. Deviations from the preregistered plans will be identified and justified in resulting publications.

Statistical Analyses

Analyses will be conducted using R or Python. Statistical significance will be evaluated using an alpha level of .05. Effect sizes and 95% confidence intervals will be reported. Descriptive statistics will be calculated for all study variables at each wave. Distributions will be inspected for skewness, floor or ceiling effects, outliers, and implausible values. Rules for identifying impossible values, survey speeding, inconsistent responses, and extreme physical-activity reports will be defined before outcome analyses are conducted. Observations will be corrected or excluded only according to these prespecified rules.

Internal consistency of multi-item scales will be evaluated using McDonald's omega where appropriate. For repeatedly assessed multi-item constructs, longitudinal measurement invariance will be evaluated when supported by the number of items, model identification, and sample size. When strong invariance is not supported, partial invariance or alternative scoring approaches will be considered and documented.

Missing data patterns will be examined at the item, scale, wave, participant, and parental dyad levels. Attrition analyses will compare baseline characteristics of participants who complete all waves with those who miss one or more waves or discontinue participation. Missing data will be handled using full information maximum likelihood or multiple imputations, depending on the model, measurement level, and missing data structure. Sensitivity analyses will evaluate the robustness of findings to different missing data assumptions.

Multilevel regression models and Structural Equation Models will be used to separate within-person and between-person variance. Dynamic Structural Equation Models (DSEM) or random-intercept cross-lagged panel models (RI-CLPM) will examine temporal ordering between stress exposure, emotion regulation, and mental health outcomes (see Aims 1 and 2). Growth-curve models will examine average trajectories of depression and anxiety symptoms across the six waves. Random intercepts and slopes will be included where supported by the data. Models may test whether baseline stress exposure, resilience, support, sleep problems, fatigue, cognitive functioning, or emotion regulation predict initial symptom levels or changes over time (see Aim 1).

Actor-Partner Interdependence Models (APIM) will be used to examine psychological, health, lifestyle, and social processes over time within parental dyads. Actor effects will test whether a parent's own stress exposure, emotion regulation, fatigue, cognitive functioning, support, or symptoms predict their own later mental health. Partner effects will test

whether one parent's characteristics predict the other parent's later mental health (see Aim 3). Longitudinal dyadic models will account for non-independence within dyads using multilevel or structural equation modeling approaches. Where possible, models will include repeated measures nested within individuals and individuals nested within dyads. Example dyadic research questions include whether one partner's fatigue predicts the other partner's later symptoms, whether one partner's emotion regulation difficulties predict the other partner's perceived stress, and whether perceived support buffers symptom transmission within dyads.

Machine learning methods will be used for predictive modeling and pattern detection. Planned approaches include regularized regression and other supervised learning approaches to predict later depression and anxiety symptoms from prior psychological, health and lifestyle, cognitive, social, and contextual variables. Predictive performance will be evaluated using cross-validation and appropriate error metrics.

Discussion

This study uses a six-wave longitudinal design embedded in a probability-based household panel to investigate dynamic risk and resilience in parental mental health. By integrating psychological, health and lifestyle, cognitive, social, and contextual factors in parents and parental dyads, the study addresses important limitations in existing research on parental depression and anxiety. The comprehensive and multidimensional approach allows for a more nuanced understanding of the complex interconnected processes that shape mental health during the parenting years.

Several features strengthen the methodological rigor of this study. First, the use of the probability-based LISS sampling frame improves population coverage relative to conventional online convenience samples. The provision of internet access and equipment to households without the required digital resources may further reduce socioeconomic barriers to participation (54). Nevertheless, eligibility restrictions, nonresponse, and attrition may still

limit representativeness. Second, the six-wave longitudinal design enables the investigation of temporal associations and within-person change rather than relying exclusively on cross-sectional differences. This is important because stress exposure, emotion regulation, sleep, fatigue, and social support may vary over time. Third, dyadic design enables investigation of interpersonal processes within both parents as parental dyads. Because mental health within families is often interdependent, incorporating both partners allows examination of partner effects that are typically ignored in individual-level research (55,56). Relatedly, the representativeness of family structures in the current sample is enhanced by including all types of constellations of caregiver dyads. Finally, the combination of theory-driven modeling and data-driven approaches allows both hypothesis testing and discovery of novel relationships and patterns, which may improve understanding of complex mental health processes.

The implementation of this study also involves several practical considerations. A key operational challenge concerns participant retention across multiple waves. Although the LISS panel typically demonstrates relatively high retention rates compared to other longitudinal cohorts, attrition remains a potential threat to statistical power and representativeness. To mitigate this risk, the study uses short questionnaires with limited respondent burden, financial incentives, and integration into the established LISS infrastructure. Eligible LISS panel members are identified and invited to participate at each wave. Moreover, timing of assessments also presents practical trade-offs. The two-month interval was selected to balance participant burden with the need to capture meaningful change in stress exposure and mental health. Shorter intervals may have increased temporal precision but would likely have increased attrition risk. Finally, the dyadic recruitment strategy may introduce logistical challenges because participation of both partners cannot always be guaranteed. Analytical approaches that accommodate partially missing dyadic data will therefore be used where appropriate.

Despite these strengths, several methodological limitations must be considered. First, all primary measures rely on self-report questionnaires. Although validated instruments are used, self-report data may be affected by recall bias, shared method variance, and mood-congruent reporting. Future research could complement this design with behavioral, observational, physiological, or passive sensing measures. Second, the study is observational. Longitudinal data can establish temporal ordering but cannot establish causality. Unmeasured confounding may explain some associations. Results should therefore be interpreted as evidence of temporal association rather than causal effects. Third, the two-month interval between consecutive assessments balances participant burden and longitudinal coverage, but it does not capture shorter-term fluctuations in risk and resilience. Ecological momentary assessment or daily diary designs could complement the present study by capturing fine-grained within-day and day-to-day dynamics. Fourth, some constructs are assessed using shortened scales to reduce participant burden. Although brief measures improve feasibility in panel research, they may reduce measurement precision compared with full instruments. Note that such brief measures do not necessarily compromise the validity of the constructs being assessed (57). Internal consistency and sensitivity analyses will therefore be important. Fifth, dyadic participation may be incomplete. Some households may include only one participating partner at some waves. The analysis plan will accommodate partially missing dyadic data where possible, but incomplete partner participation may reduce power for partner-effect analyses. Finally, the inclusion of parents with co-resident children up to 24 years of age creates substantial heterogeneity in parenting demands. The age and developmental stage of the youngest child will therefore be considered in the analyses, but residual heterogeneity may remain.

Conclusion

This study combines a probability-based longitudinal design, dyadic data, and advanced statistical approaches to investigate dynamic predictors of mental health and resilience in parents and within parental dyads. Despite the limitations inherent to observational longitudinal research, the study design provides a strong framework for examining temporal and interpersonal processes relevant to mental health. The findings are expected to contribute to improved understanding of how stress, resilience, and social processes interact over time. Ultimately, this research may inform the development of prevention strategies aimed at promoting mental health and wellbeing in families.

List of Abbreviations

LISS = Dutch Longitudinal Internet Studies for the Social Sciences

DASS-21-NL = Dutch version of the Depression Anxiety Stress Scales

PSQI = Pittsburgh Sleep Quality Index

IPAQ-SF = International Physical Activity Questionnaire - Short Form

PROMIS = Patient-Reported Outcomes Measurement Information System

DSEM = Dynamic Structural Equation Models

RI-CLPM = Random-intercept cross-lagged panel models

APIM = Actor-Partner Interdependence Models

Declarations

Ethics approval and consent to participate: All participants are recruited through the LISS panel and provide informed consent. Ethical approval has been obtained from the Ethics Review Board of Tilburg University (Trend Monitor People and Society: TSB_RP1801; Amendment for this study protocol: TSB_RP1245).

Consent for publication: Not applicable

Availability of data and materials: This study uses the LISS open data infrastructure, which supports transparency and reproducibility. De-identified data are archived in the LISS data repository and can be accessed for non-commercial scientific research under the conditions set by LISS (https://www.dataarchive.lissdata.nl/). Meta information regarding the study and meta info, R analysis scripts will be shared via data repositories. The specific analysis plan for each project aim will be preregistered before conducting the analysis.

Competing interests: All authors declare no conflict of interest.

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Authors' contributions: JE, NI, MvdS, KL, MdL, GH, and MH were involved in the study conceptualization, investigation, and methodology, with JE adopting a coordinating role. MH and JE wrote the original draft, and NI, MvdS, KL, GH provided critical additions and revisions to the manuscript.

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