

“I got all sorts of solitude, but that solitude wasn’t mine”:

A Mixed-Methods Approach to Understanding Aloneness during Becoming A Mother

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Authors' Contributions

Thuy-vy T Nguyen conceptualized, formulated interview questions and study design, synthesized findings, and wrote the manuscript.

Delali Konu moderated expert panels to finalize interview questions, collected data for both Study 1 and Study 2, coded interviews in Study 1, drafted the Methods section, and contributed to the revision of the manuscript.

Deborah Tetteh coded interviews in Study 1, collected data for Study 2, drafted the Discussion section, and contributed to the revision of the manuscript.

Pearl Tshimbalanga moderated expert panels to finalize interview questions, collected data for both Study 1, and contributed to the revision of the manuscript.

Julie Weissova helped with survey design for both Study 1 and Study 2, coded interviews in Study 1, collected data for Study 2, and contributed to the revision of the manuscript.

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Abstract

This research examined the nuanced experiences of "aloneness" among British first-time mothers, highlighting the impact of motherhood on new mothers' solitude. Utilizing a mixed-method approach, for Study 1 we conducted qualitative interviews to explore mothers' perceptions and experiences of solitude and loneliness after becoming a mother. Study 2 tracked daily activities and emotional states through ecological momentary assessments to identify activity predictors of mothers' daily emotional and psychological well-being. The findings indicate that motherhood significantly reduces opportunities for personal time due to constant childcare demands; however, Study 2 showed that personal time contributed positively to mothers' daily mood. Interestingly, personal time does not require separation from the baby; such time overlaps with time for rest and relaxation, time for media-related activities, and quality time with the baby. As such, the study underscores the importance of supporting first-time mothers in finding quality personal time to mitigate the challenges of new parenthood.

The journey into motherhood is a profound transformation that merits attention due to its extensive impact on a woman's well-being. The transition does not solely consist of the well-documented physiological changes and the acute physical challenges of childbirth but extends into a complex postpartum experience that encompasses both tangible losses and personal gains (Emmanuel & St John, 2010). Even with antenatal support and preparation, many first-time mothers report feeling unprepared for the shifts in lifestyle and identity that follow the arrival of a new-born (Nelson, 2003).

At the heart of this adjustment period is the overwhelming sense of aloneness (Levesque et al., 2020; Rogan et al., 1997). As new mothers struggle with the exhaustive demands of childcare, they often find themselves spending more time alone at home (De Goede & Greeff, 2016; Levesque et al., 2020; Rogan et al., 1997), separated from their social circles and previous activities. This solitude, extensively documented in the literature (Ball, 1987; Barclay et al., 1997; Rogan et al., 1997), is a critical facet of the identity transition into motherhood.

Despite reports of social isolation and increased amount of time spent alone, at the same time the literature also suggests that new mothers struggle to find me-time, including time for exercise and self-care (Levesque et al., 2020). Until parents establish certain routines that correspond with the baby's needs and circadian rhythms (i.e., eating, sleep-wake patterns), lack of time becomes the norm and parents' schedules can be unpredictable and chaotic. Qualitative interviews with parents revealed that they have less freedom to pursue activities that they previously enjoyed and have less energy to do so (Levesque et al., 2020). As such, this frustration of not having time for oneself is often associated with both stress and boredom.

However, it is crucial to consider aloneness in motherhood not just as a challenge, but as an opportunity for personal growth. The literature on maternal transition suggests that resolving the challenges of new motherhood, and the feeling of aloneness that comes with it, gives way to an identity transformation, a "letting go" of previous identities to fully embrace a new

identity as a mother (Rogan et al., 1997). Previous research showed that time spent alone can foster a sense of calm and relaxation (Nguyen et al., 2018; Pfeifer et al., 2019; Rodriguez et al., 2023), promote deeper self-reflection (Long & Averill, 2003), and serves as a productive time for identity exploration (Larson, 1995). Moreover, seeing time alone as valuable and constructive can mitigate feelings of loneliness and isolation (Rodriguez et al., 2020).

Facets of aloneness during maternal transition

The multifaceted concept of "aloneness" during the transition to motherhood encompasses a spectrum of psychological experiences that extend beyond mere physical aloneness. Clarifying the distinctions between aloneness as physical or subjective solitude, from aloneness as loneliness is essential to appreciate the full breadth of a mother's postpartum experience. Solitude, for example, is conceptualized as the state of being detached from immediate demands of social contacts (Long & Averill, 2003) and can encompass both physical experiences of being by oneself and subjective experiences of being in a state of "non-communication" with surrounding others (Weinstein et al., 2022).

On the other hand, loneliness represents emotional response to unmet social needs, a gap between desired and actual social interactions (Russell et al., 1980; Russell et al., 2012). Thus, loneliness can be experienced even during interactions with other people when interactions fail to satisfy the individual's social needs as expected. Social isolation, distinct from loneliness, relies on more objective evaluations of one's social network, and refers to the lack of social contact and social support, often due to external constraints that limit opportunities to engage with a larger network (Valtorta et al., 2016).

These concepts are prominently reflected in the maternal literature, even though they are discussed interchangeably. The literature suggested an increase in physical solitude for new mothers, which is intensified by the fact that male partners often return to work sooner (Feldman et al., 2004). However, even when a mother is alone at home, the baby's constant

needs can intrude upon her subjective solitude – time alone when she can be free from the demands of childcare. In that sense, aloneliness – the feeling of not having enough time for oneself (Coplan et al., 2019) – can be a source of stress for both parents (Levesque et al., 2020). The frustration stemming from this lack of personal space and time can be compounded by feelings of loneliness when existing social ties (e.g., friends, colleagues) become strained or neglected (De Goede & Greeff, 2016; Nowland et al., 2021). New parents often feel unable to maintain relationships and social activities they used to have prior to the arrival of the baby; this may be due time-constraints and inconveniences around bringing babies to child-unfriendly social events (Wilkins, 2006). In some cases, these challenges can progress to social isolation, where new parents find themselves confined to the home, distanced from their usual social circles, and navigating the new demands of parenthood entirely on their own (Emmanuel & St John, 2010; Wilkins, 2006).

Understanding mothers' barriers to taking time for themselves

The experience of “aloneness” during maternal transition is multifaceted. It embodies the paradox of having too much time alone with the baby yet affording very little time for personal activities. This paradox is further complicated by a sense of loneliness and disconnection from pre-existing social circles. Acknowledging the potential of time alone for positive outcomes, it is important to delve deeper into understanding why this aloneness can be particularly challenging for mothers. Research has consistently shown the importance of social support for the well-being of new mothers (see meta-analysis from Lin-Lewry et al., 2024), yet the nuances of aloneness in motherhood remain less explored. As such, we want to differentiate between the constructive and destructive facets of solitude, drawing on the literature that shows the benefits of it for rest and relaxation (Hammond, 2016; Long & Averill, 2003; Nguyen et al., 2018), autonomy (Weinstein et al., 2021), and identity development (Larson, 1990; Long & Averill, 2003; Thomas et al., 2021). By studying solitude in this light, we wanted to understand

the journey of first-time mothers in tackling aloneness to find fulfilment and growth in their new role.

In this research, we conducted a qualitative study to first understand mothers' struggles with solitude, predominantly solitude experienced at home during their transition to motherhood. Then, we followed up with a quantitative study to investigate how time alone at home, personal time, and social time, related to daily emotional and psychological well-being. The focus of both studies is to shed light on the duality of solitude as both a source of stress and a potential space for rest and well-being. The insights gained from this research can lead to more holistic support systems that resonate with the complex experiences of new mothers.

Data Sharing

Aggregated data and analysis codes of both studies were shared on Open Science Framework repository: https://osf.io/7jk9h/?view_only=7980fba9d0824d3b920a78660ad09a2b

Study 1 Methods

Procedure

Interview Questions

Interview questions were developed by the research team with feedback from researchers with expertise in the topic of solitude across two expert focus group panels. The questions went through two rounds of revisions to ensure they captured our research aims to understand mothers' solitude and explore transition to motherhood in a broader sense. The research team also completed four training sessions with a qualitative expert to go over the finalized interview questions, best practices in conducting interviews, and how to engage in reflexivity exercises.

Demographic Questionnaire

Participants responded to an online survey hosted on Qualtrics (Version 2023; www.qualtrics.com), answering demographic questions about their age, gender, ethnicity,

employment status, level of education, marital status, residence, and household status. Participants also completed questions about their physical health (World Health Survey Association, 2017), life satisfaction (World Health Survey Association, 2017), and socioeconomic status (World Health Survey Association, 2017). Additionally, we also asked each participant to estimate their daily number of hours spent in solitude. We provided them with a definition of solitude as time when they are “not interacting with other people, either in person, on the phone, or online”, and asked “on a typical day, approximately what proportion of your waking hours (i.e. excluding time when you are asleep) is spent in solitude?”. After that, they were asked whether they felt that the amount of time they spent alone each week was either “definitely not enough”, “somewhat less than [they] would like”, “just about right”, “somewhat more than [they] would like”, or “definitely too much”.

Interview Protocol

The interviews were semi-structured and consisted of 10 open-ended questions. First, we were interested in the mother’s attitudes toward solitude prior to becoming a mother and after. Second, we asked questions about her perception of norms regarding solitude that are shaped by her close others and/or social circles. Third, we wanted to understand how much control she felt that she had over her solitary time, either when she needed that time or when solitude happened spontaneously. All participants were provided a definition of solitude, which is “times when [you are] not interacting with someone else in person, not talking on the phone or chatting with other people online” (Lay et al., 2019; Pauly et al., 2018), and were asked to consider their solitary experiences in relation to their transition into motherhood.

Interviews were conducted in English; online individual interviews were recorded via Microsoft Teams for up to 1 hour, and in person focus groups were recorded using a Dictaphone for up to 1.5 hours. To ensure privacy, participants could keep their camera on or off for online interviews, and those who participated in focus group only referred to themselves or each other

using their anonymous IDs. At the end of the interview, participants were debriefed, and interviewers completed reflexivity statements to document their thoughts about the participants and the interviews.

Transcriptions

Interviews were transcribed by the research team from scratch or by editing the Microsoft Teams interview transcript. Interviews were transcribed non-verbatim as suggested by McLellan et al. (2003). During this screening process, two transcripts were identified as poor quality due to technological issues with the recordings, and two were identified as potentially inauthentic based on interviewers' reflexivity statements. We checked the themes that were identified in those interviews at the end of data analysis and did not find any inconsistencies compared to the other transcripts, so we included all the transcripts when reporting the results.

Data Analysis

Thematic Analysis (Braun & Clarke, 2006) was used to identify salient themes and codes related to early motherhood and solitude. Four members of the research team conducted the analysis which first included familiarisation with the data by reviewing the interview transcripts and making initial notes (Phase 1). Coders then identified and reviewed initial codes in the data (Phase 2). This was followed by the identification of codes and corresponding themes present in the data (Phase 3). Coders then refined codes and themes (Phase 4). Coders had meetings at each stage of analysis to discuss how themes should be named. At Phase 5, the lead researcher finalised and summarised the code and theme structure. Thematic analysis was conducted using Dedoose (Version 9.2.6; SocioCultural Research Consultants, LLC).

Participants

The study was advertised through multiple channels: mothers and mothers-to-be support groups and internal newsletters at the first author's institution, the local council, the

local National Childbirth Trust, and various social media group pages. Flyers were also posted across local venues. Study advertisements included a QR code to direct the mothers to an online account that we set up (Calendly, 2023) for mothers to pick a time that worked for them; some time slots were set up for individual interviews and some were set up for focus groups. In our study advertisements, we invited first-time mothers with a child aged 3 years or younger who live in North East England (UK). This study was approved by [masked for peer review] Psychology Ethics Committee.

We interviewed 22 mothers between the ages of 23 and 44; Their babies were between 2 and 34 months old ($M = 17.05$). The ethnic makeup of the sample was quite diverse. There were five British participants (i.e., English, Welsh, Scottish, Northern Irish), four identifying as other White backgrounds, three African participants, six identifying as other Black or Caribbean backgrounds, one Asian participant, and three identifying as other mixed or multiple ethnic backgrounds. Fourteen participants obtained undergraduate or bachelor's degrees whereas the rest had postgraduate degrees. Half of the sample were employed full time, four were employed part-time, one was student, and six were unemployed. While most mothers were married ($n = 15$) and four were living with their partners, two participants in our sample were single mothers, and one was divorced. Most mothers were in good physical condition; three reported being in "excellent" health, 11 reported "very good", and eight reported "good". When asked about the amount of time they got to spend alone each week, five mothers said "definitely not enough", eight said "somewhat less than [they] would like", six said "just about right", and only three said "somewhat more than [they] would like".

Results

Meanings of mothers' solitude

Even though we suggested a definition of "solitude", a few mothers expressed that they struggled with what does and does not constitute solitude in the context of new motherhood.

The mothers understood that solitude is not characterised solely by physical aloneness, but the presence of a baby offers an ambivalent type of companionship. The baby represents the presence of another social being, but those moments with the baby are deprived of traditional communication, as babies can only interact in limited ways. Those moments are devoid of shared understanding or verbal communication, leading mothers to feel both alone and not alone simultaneously.

I can communicate with him [the baby] but it's not the same as like, you know, you and I are talking and we can understand exactly what the other person is saying [...] I can't tell him what I'm thinking or how I'm feeling (ID: 10)

So as much as spending time with my child is cute and sweet and all that, I wouldn't say it's part of my solitude time because you know I'll be engaging to make sure I am there for my child like emotionally, play with them, feed them and all that so I wouldn't include that in my solitude time. For me it's just my me-time, you know. (ID: 3)

One mother mentioned that it feels like enforced solitude, because it does not allow for personal reflection or activities. This highlights that mothers' time spent alone with a baby, even when the baby is asleep, does not necessarily equate to "me-time". It is implied that the mother considers a period of solitude as their time when it is characterized by the freedom and autonomy to engage in activities solely for one's own enjoyment or relaxation, separate from the responsibilities of childcare.

So what I think I'd distinguish it into [...] solitude that is just for me has not been natural or regular; [...] so there has not been enough of that, no, but kind of enforced solitude during the day with the baby [...] just grabbing whatever I can when they're asleep. (ID: 7)

Solitude as busyness

The last quote segways nicely into this theme, which captures the reality of mothers during the transition to motherhood, for whom self-care and relaxation are often displaced by an ongoing list of household chores and responsibilities. Even during the brief moments of their child's naptime, mothers find themselves prioritizing housework like cleaning, cooking,

and laundry, since time feels scarce and unpredictable. Activities such as pumping and cleaning baby items add to the sense of a never-ending cycle of tasks.

I was pumping because there was like this requirement of cleaning the bottles in a certain way and doing it non-stop and cleaning the pump parts every single time – an unbelievable amount of teeny tiny fidgety things that have to be cleaned. [...] So there was this I think that was like this constant question, I was taking away from my solitude. (ID: 39)

The opportunity to switch off and engage in rest or hobbies is rare, and the desire to do something for oneself is overshadowed by the pressing need to complete chores. This reflects a common sentiment among new mothers that any potential me-time is consumed by necessary and time-consuming tasks associated with running a household and caring for a baby.

When the baby naps, there is time to obviously do things, but I feel like I'm doing housework and as quickly as possible because they're gonna wake up at any minute. So I haven't had time to relax regularly or do anything that I want to do because I feel like there's so much that I have to do. (ID: 7)

I feel like now there is always a list of like jobs and things to do...so if anyone takes my little one out, I've got to finish up, gotta do washing up. There's just always something I don't even know what I would do to totally switch off now. (ID: 38)

Solitude as “me time”

When mothers do have the liberty of having me-time while at home with their child, many mothers often prioritize basic self-maintenance activities like napping or resting, given the exhaustion associated with caring for a baby. Showers can be a precious opportunity to switch off from the demands of motherhood, even if they are less frequent than desired.

It needs to be done I don't I don't really feel like I switch off. I switch off in the shower [laugh] It's probably my place now. I really appreciate a shower. [...] But I don't get a shower often as I would like. I haven't had one today. (ID: 38).

Mothers also described opting for activities that require minimal effort and provide relaxation, such as listening to soothing music, as a strategy to recharge. These moments of personal activities provide breaks from the continuous responsibilities of parenting and help the mothers restore their energy.

I usually try at least to have at least thirty minutes or so of me-time whereby just maybe take a long shower while listening to music or I just lie down and just appreciate that time for a moment. (ID: 12)

When you get that me-time, I just really wish to get a nap for a few minutes and it's equally important when I'm not doing the things that I love doing, I gets myself to rest and sleep (ID: 69).

Solitude as loneliness

During those solitary moments, loneliness can creep in. This is an often-unspoken aspect of the transition to motherhood because why would a mother feel lonely when they get to spend time with their baby all day? The mothers in our sample discussed the inability to have meaningful conversations with their small child. At the same time, childcare responsibilities make it challenging to connect with friends or enjoy social activities as they once did. Mothers expressed missing the external energy and social interactions outside of the mundanity that comes with childcare and chores.

In that solitudeness, at that moment it come along with some element of loneliness. Well by yes you, you just went through embrace and appreciate that time, but you end up being lonely because you can't talk to this kid. You can't have a conversation with the kid. But again, you can't go out and hang with friends, have coffee, have those long calls (ID: 69)

Those alone moments in the house, especially moments like late-night feedings or when family support is unavailable, also come with maternal demands that accentuate feelings of loneliness. The feeling of “going at it alone” while responsible for another human being was described as lonely and isolating.

I think that there is a loneliness even though you may have some time alone especially you're alone all the time in the middle of the night when you are breastfeeding...I mean you are nursing [but]... it's 3 o'clock in the morning and it's you; but I think that it's incredible the weight of the responsibility no matter if you have a partner, your mom is there, your sister, whoever, like it is on you like everything's happening (ID: 39).

In attempts to overcome this feeling of loneliness, a few mothers developed strategies to engage in productive activities. For them, it is a way to gain a sense of accomplishment and regain energy to combat low moods.

I think for me solitude could be something that you can have too much of. And so for example kind of if my husband would go away for the weekend, the first thing kind of maybe half a day it would be great, you would do all the things that you wanted to do that you know, didn't have time to do when you were as a pair, [...] but then, after a – maybe a day or so I would say I would kind of be a bit lonely and think oh – what have I got to do that I could do to occupy myself with [...] to get that sense of accomplishment or something that you might get [...] when you're doing it with someone (ID: 35).

Challenges of solitude after becoming a mother

Most of our first-time mothers expressed that their “solitude” time significantly reduces as the baby's needs become the central priority. By that, they did not seem to refer to the time in physical isolation, which increased, but instead referred to the subjective sense of being able to be free from the cognitive demands of attending to the needs of their child. This instinct to respond to their child's every sound and movement overrides the possibility of rest, even when the partner is available to take over.

Mothers recognize the value of alone time and the benefits it could bring, yet they struggle to justify taking this time for themselves, as they did before motherhood.

I feel like I do value alone time and I would probably benefit from a bit more than I get now. But I feel like your priorities do adjust to, once you have a baby [...] you don't put yourself first anymore, so I don't prioritise my alone time. It's their needs come first. So, I am not very good at taking the time for myself, where in the past I would've done that and not really thought anything of it if I just need some time out. But now I find it harder to justify for it (ID: 38).

Priorities shift dramatically after one becomes a mother; self-care activities that mothers used to enjoy, like going to the gym or going out, take a backseat to the child's needs. Even during rare moments of being free from childcare, the mother's thoughts are often still with the child; so even when they get to be alone, that solitude is still not entirely their own.

In the first year maybe 9 months 10 months probably the first full year, even if I was alone there was always like this other - I can't read like a whole article and not think about my child [...] Solitude in the first year you might get all sorts of solitude but for me like it wasn't mine and I was constantly thinking about the baby (ID: 39).

Becoming a mother changes both quality and quantity of solitude

Consistent with the above theme about not having time for oneself even in an abundance of physical solitude, several mothers expressed that their transition to motherhood changes their experiences and even the meanings of time alone, both in terms of its duration and quality. Before becoming a mother, a mother could more easily carve time out for herself as a part of the daily routine that allowed for personal pursuits, hobbies, and relaxation. However, after childbirth, the constant needs of the baby take priority, leading to shorter, less frequent, and often more fragmented solitude.

I have shorter solitude time. Before I had like longer periods of my free time because you see now, with the baby and the baby needs a lot of attention and care, I have to like take care of her, like most of the time. Yeah. So the solitude is shorter and also it's less frequent (ID: 87).

This reduced time for “private” solitude can sometimes be further impacted by the baby’s feeding and sleeping patterns. Even when external help is available and appreciated, family members who come to help care for the child can sometimes infringe further on mothers’ ability to find time for themselves.

When I became a mother it was very jarring to go from (long pause) a decent amount of solitude [...] and then all of sudden sort of overnight you're literally never alone and I don't, I never felt like I was alone even though [my] child isn't talking but they have needs, a lot of needs, uhm and then any kind of moment of alone time which I just didn't [have]... I mean my mother came for a month, my mother-in-law came for a month, my dad came for a month [...] But it felt like really frenetic, any moment of so – because I mean I was like I have to do all of these, I mean I have to get all of these things done... (ID: 39).

Becoming a mother takes away choices of how to spend time alone

The biggest change that mothers mentioned about the time alone that they have after becoming a mother is the decreased autonomy for their solitude. Mothers have limited options on how to spend their time alone, even when the baby is asleep. Previously, a mother could engage in leisurely activities like reading, watching movies, or engaging in outdoor activities without many constraints. Now, their alone time is often dictated by the baby's needs and schedules. Any activities that mothers can enjoy alone are squeezed into brief windows of the

baby's sleep or are chosen for their practicality – activities that don't require both hands and can be paused at a moment's notice.

So I'm breastfeeding, so there's a lot of time where I just, there's nothing else I can do except breastfeed and so I thought I'd be able to text friends more, but [...] it's much more involved than I thought it would be. So, the only thing I can do is either watch telly or listen to a podcast, I need something that I don't need my hands for. So it's been nice to catch up on series that I haven't watched, but that is more time sat down than I am used to (ID: 7).

Several mothers mentioned spending more time watching television than before, not out of choice, but because of the need for hands-free activities. They are also limited to more indoor activities, for example, it might not be practical to leave home between constant feedings. As such, the transition to motherhood has shifted the nature of solitude from a state of personal choice to a state largely constrained by caregiving responsibilities.

And when I don't wanna read a book, I go play a guitar because it's in the house. And if the baby wakes up, I'm going to hear. So yeah, I just try to do things that are around the house [...] the ones that are possible because of course I can't go cycling. I can't go for nature walks unless I have the people with me (ID: 86).

Becoming a mother takes away controllability and predictability of solitude

With reduced options on how to spend time alone, a mother also has less control when it happens. Her child's naps might last, for example, 20 minutes or 90 minutes; it is difficult to anticipate how much time she has for herself. This unpredictability around when a mother can have time for herself makes planning difficult.

Initially before I became a mom, I used to create that time and it was somehow easier cause I would just shut down my laptop shut down my device [...] but you know, currently this little human being that you are bringing up, you can't just ignore, maybe shut down like you could shut down the laptop, you just have to be present. [...] what has made it difficult is generally the entire roles of being a mom. You have to feed this child, have to prepare the medicine, have to clean. Sometimes the baby can just decide today we're going to throw tantrums the entire day. And you know you have no control over that or the baby (ID: 12).

As such, after becoming a mother, me-time is no longer guaranteed but becomes random and fragmented throughout the day. Only a few mothers have learned to seize those moments opportunistically, while others might let go entirely of trying to plan for those times.

It's quite fragmented, [...] he'll nap but that would be anything from like 20 minutes and like an hour, 90 minutes, even in rare cases so like for that you are a bit more limited in what you can do. Coz also you don't know how much time you have. Umm like it could be an hour; it could be half an hour and it is like broken up throughout the day (ID: 10).

Challenges of childcare affects the quality of time alone

The negative aspects of mothers' solitude – loneliness and uncontrollability – are intensified when things do not go smoothly, such as on days when the baby is sick or throws tantrums. In those moments, especially for mothers without support to easily call upon, solitary moments can leave the mother stressed and anxious. Having to handle difficult moments with the baby in combination with lacking support makes time alone ever more chaotic and challenging.

Sometimes the baby cries so it can be very challenging for me to have a peaceful environment... let's say that the baby is sick [...] it would be very hard for me to spend my free time like... how I planned about it (ID: 74).

I have a happy baby compared to other babies, which is lovely, [...] but yesterday he cried uncontrollably for an hour and I was really worried that something was really wrong. So when you're on your own, there's no one to, you know, check that that's normal or, you know, bounce ideas off so it can be a worrying experience as well. Whereas the same thing had happened on a weekend and there was somebody else to say what do you think we should do? So, it's just harder on your own (ID: 7).

Discussion

In Study 1, we uncovered the nuances of first-time mothers' aloneness, portraying how moments of solitude for new mothers were transformed by their infants' constant presence. The results showed that time alone with the baby doesn't equate to personal time, as the demands of childcare and household tasks take priority over time for rest and personal enjoyment, limiting mothers' options to basic self-maintenance activities. A shower can become a cherished sanctuary where mothers can momentarily disconnect from the demands of motherhood. Watching television emerges as a common pastime due to its low effort and compatibility with childcare activities like breastfeeding.

Moreover, the study highlights a prevalent sense of loneliness, not only because of the lack of meaningful adult conversations but also due to the difficulty of maintaining pre-existing social connections prior to becoming a mother. Many first-time mothers missed the external energy that social interactions provide, and may experience their loneliness most acutely in the quiet hours of late-night feedings, on days when the baby is unwell, or when support is not available.

The transition to motherhood also brings about significant changes to both the quantity and quality of mothers' solitary time. Time spent alone becomes fragmented and unpredictable. Many of our mothers reported a loss of autonomy over their time alone because they had to constantly be alert to the babies' needs and schedules.

As such, our findings deepened the understanding of mothers' aloneness and revealed different flavors of solitude; solitude experienced as personal time distinctly contrasts with solitude filled with demands and responsibilities and differs further from solitude characterized by a disconnection from social interactions. The key findings in Study 1 suggest that deprivation of time for rest and personal activities, along with the lack of social activities and an abundance of chores and childcare responsibilities, may contribute to new mothers' distress. As such, Study 2 tracked mothers' activities during the transition to motherhood and looked at the associations of those activities with the mothers' emotional and psychological well-being. The aim of Study 2 was to determine which activities were most reliable predictors of first-time mothers' daily well-being and emotional experiences.

Study 2

Recruitment

We recruited participants in the North East region of England through words of mouth, mother groups, and advertisements on local communities' Facebook pages. We were explicitly looking for first-time mothers with a child younger than 3 years old. Again, the advertisements

directed the mothers to an online calendar so they could pick a time that worked for them; we included availabilities over the weekend for full-time working mothers.

Procedure

When a mother signed up for a lab session, she received an email with an anonymous ID and a link to the demographics survey, hosted on Qualtrics (Version 2023; www.qualtrics.com) to report her age, income, ethnicity, countries of birth and residence, employment and marital statuses, and education level. We also assessed whether the mother experienced any depressive symptoms. As the mother arrived at her scheduled session, she was instructed to engage in a 10-minute recorded free play with her baby, and fill out a questionnaire, which she could opt out of if her baby was less than 8 months old. The free play and additional questionnaire were part of other studies and are therefore not included in the analysis of this paper.

We assessed mother's daily activity engagement and psychological experiences. To track this for the next seven days, we asked mothers to download the ExpiWell app (www.expiwell.com), which sent notifications for them to complete ecological momentary assessments (EMA) at five different times: 8am, 11am, 2pm, 5pm, 8pm. The EMAs that went out between 8am and 5pm were available for 1 hour and the one at 8pm was open until midnight. We showed participants examples of the surveys so they could ask questions during the lab session before starting their EMAs the next morning. To encourage response rates, we compensated mothers incrementally depending on the number of surveys they completed, £4 for attending the in-lab session and £3 for every 5 surveys completed afterward. After seven days of data collection, we sent mothers a debriefing form to ask for their feedback and compensate them. All our mothers reported being able to complete the surveys without any problems.

Measurements

Initial Survey

When participants signed up for the study, they were asked about their household's total yearly gross income, ethnicity, employment status, highest level of education, and marital status. Their child's age and gender were also reported. To assess each mother's psychological and physical states, we included measures of mothers' depressive symptoms, physical health, and life satisfaction. For depressive symptoms, we used the Center for Epidemiologic Studies Depression measure (CES-D) (Radloff, 1977), which include items such as "I was bothered by things that usually don't bother me", "I felt depressed", or reverse-coded items such as "I felt hopeful about the future". Participants were asked to rate the items using four response options, "rarely or none of the time (less than 1 day)", "some or a little of the time (1-2 days)", "occasionally or a moderate amount of time (3 to 4 days)", "most or all of the time (5-7 days)". To measure mothers' general physical and psychological health, we used single items, "how do you rate your current physical health?" and "all things considered, how satisfied are you with your life these days?". Finally, like Study 1, we asked mothers about the average number of hours they spent in solitude, and whether they felt that that amount was either not enough or too much.

Ecological Momentary Assessments

Three types of survey were set up on ExpiWell. The start-of-day survey was sent out at 8am; three activity-diary surveys were sent out between 11am and 5pm; finally, the end-of-day survey was sent out at 8pm.

Start of day.

Emotion. At the beginning of each day, mothers reported their current emotions. We included items representing emotions of four different dimensions: high-arousal positive emotions (i.e., cheerful, excited), high-arousal negative emotions (i.e., irritated, tense), low-arousal positive emotions (i.e., calm, relaxed), low-arousal negative emotions (i.e., bored, sad).

These items were adapted from the Pick-A-Mood instrument (Desmet et al., 2016) and each item was accompanied with a picture representing that emotion. Participants rated the items on 11-point scale from 0 (not at all) to 10 (very much). The *multilevel.reliability* command from 'psych' package in R program showed that all four dimensions showed good reliability of average of all ratings across all items and days ($> .70$).

Sleep quality. One item was used to assess participants' quality of sleep the previous night (Snyder et al., 2018). We used a scale ranged from 0 to 10, with 0 labelled "terrible", 2 "poor", 5 "fair", 8 "good", and 10 "excellent".

Stress, Loneliness, and Boredom. Mothers' levels of stress, loneliness, and boredom at the beginning of the day were measured with three single items: "At the moment, I feel stressed/lonely/bored". We asked mothers to respond to those items on scales from 0 (not at all) to 100 (very much).

Activity diary

Activities. We asked participants what they were doing during each one-hour interval in the past three hours. For example, the survey sent out at 11am asked mothers to about their activities between 8am-9am, 9am-10am, and 10am-11am. Participants first saw an open-ended question where they could list out the main activities, and then were asked to categorise those activities into any of the following types: 1) personal time (bath, reading, meal, cooking, exercise), 2) personal entertainment (gaming, YouTube, Netflix), 3) relaxation and resting, 4) social activities (family and friends), 5) work-related activities (schoolwork, jobs, productive tasks, emails, etc.), 6) chores and errands, 7) volunteer or extracurricular activities, 8) care responsibilities (childcare, care for a family member, etc.), or none of the above. Those categories were adapted from the activity codes used in Time-Use Surveys (Office For National Statistics, 2023). If a category was chosen for that hour, it got a code of 1; each participant was instructed that they could choose as many categories as apply. For example, if a mother spent

the hour between 9am and 10am having breakfast, taking care of her baby, and socializing, she may categorize this hour into three categories (1, 4, 8 in the list above). The scores for each activity throughout the day were averaged across hours to yield the percentages of time each mother engaged in each category of activity out of all the surveys she responded to on that day.

Aloneness. To assess how frequently the mother spent time alone, we asked her about who she was with: adults living in the same household, child or children up to 3, child or children aged 3+ to 18, relatives, friends or colleagues, strangers, with a crowd. We also asked whether the mother was interacting with anyone during that hour, including interactions that happened on the phone, online, or on social media. Based on the mother's responses, we coded for whether the mother was all alone during that hour, or alone only with her baby (while not interacting with anyone else even remotely). The scores for these two variables throughout the day were also averaged across hours to yield the percentages of time that each mother spent all alone (i.e., 'all alone') or alone with the baby (i.e., 'alone with child') out of all the surveys she responded to on that day.

Location. We also asked the mother where she was during that hour, whether at home, at work or place of education, public space, or whether she was traveling. There was also an open-ended "other" option. We recoded this item into a variable that represents being at home. The scores for this variable throughout the day were then averaged across hours to yield the percentage of time that each mother spent at home (i.e., 'at home') out of all the surveys she responded to on that day.

End of day

The mothers were asked again to report their activities in the past three hours. Additionally, the same emotion items were also included, and we assessed levels of stress, loneliness, and boredom that mothers experienced at the end of the day. To measure stress, we used the short-form 4-item Perceived Stress Scale (Ingram et al., 2016; Vallejo et al., 2018); an

example item was “Today, how much have you felt you were unable to control the important things in your life?”. To measure loneliness, we used the 3-item UCLA Loneliness Scale (Hughes et al., 2004); an example item was “Today, how much do you feel that you lack companionship?”. Finally, to measure boredom, we used the 7-item Multidimensional State Boredom Scale (Hunter et al., 2016); two example items were “Today, I felt bored” and “Today, I was wasting time that would be better spent on something else”. The participants responded to those three scales on 5-point scales from 0 (not at all) to 4 (very much).

Sample

Our sample consisted of 47 new first-time mothers; none of the mothers from Study 1 was in Study 2 sample. We ran a simulated power analysis (1000 simulations) and determined that a sample of 47 with 7 data points per person would allow us to detect an effect size as small as $R^2 = .04$ with more than 80% power. Overall, we obtained 319 daily observations from the mothers in our sample, all of whom were Caucasians and between the ages of 24 and 42 ($M = 31.91$). Most mothers were from households that earned annual incomes more than £52,000 ($n = 32$; 68%), and most had either undergraduate degree or postgraduate qualification ($n = 42$; 89%). There was no single mother in Study 2 sample; 31 mothers reported being married and 16 were living with their partners. Their babies were between 1 and 33 months old ($M = 10.89$); there were relatively equal numbers of baby boys ($n = 23$) and girls ($n = 24$).

This was an affluent sample of first-time mothers and were mostly in good physical condition; most of our mothers reported being in either “good” health ($n = 25$), or “very good” to “excellent” health ($n = 19$), and only three reported “poor” physical health. On a 5-point single item asking about mothers’ life satisfaction, the median was 4. Regarding the phenomenon of interest – mothers’ perceptions of how much solitude they had, 18 of the participants said that their amount of solitude was “just about right” while 25 said it was either “somewhat less than they would like” or “definitely” not enough. Only four said that they had

somewhat more solitude than they would like. We also did not have any mothers that experienced severe depressive symptoms ($M = 1.54$, $SD = .35$; range = [1.00, 2.55]).

Data analysis

We conducted linear mixed effect models using the ‘lmer’ function from the package ‘lme4’ (Bates et al., 2015) in the R software (RStudio Team, 2023). We were interested in which activities that mothers spent more time performing on a given day predicted their emotional experiences, stress, loneliness and boredom reported at the end of that day. We first controlled for mothers’ depressive symptoms, the child’s age, the baseline level of the outcome variable (measured at the beginning of the day), and previous night’s quality of sleep. Then we added the variables ‘at home’, ‘all alone’, and ‘alone with child’, followed by the eight activity categories. With the sample size of 319 data points across 47 mothers, we did not include random effects for all the predictors; instead, we included only the person-level and day-level random intercepts.

Results

Descriptive statistics

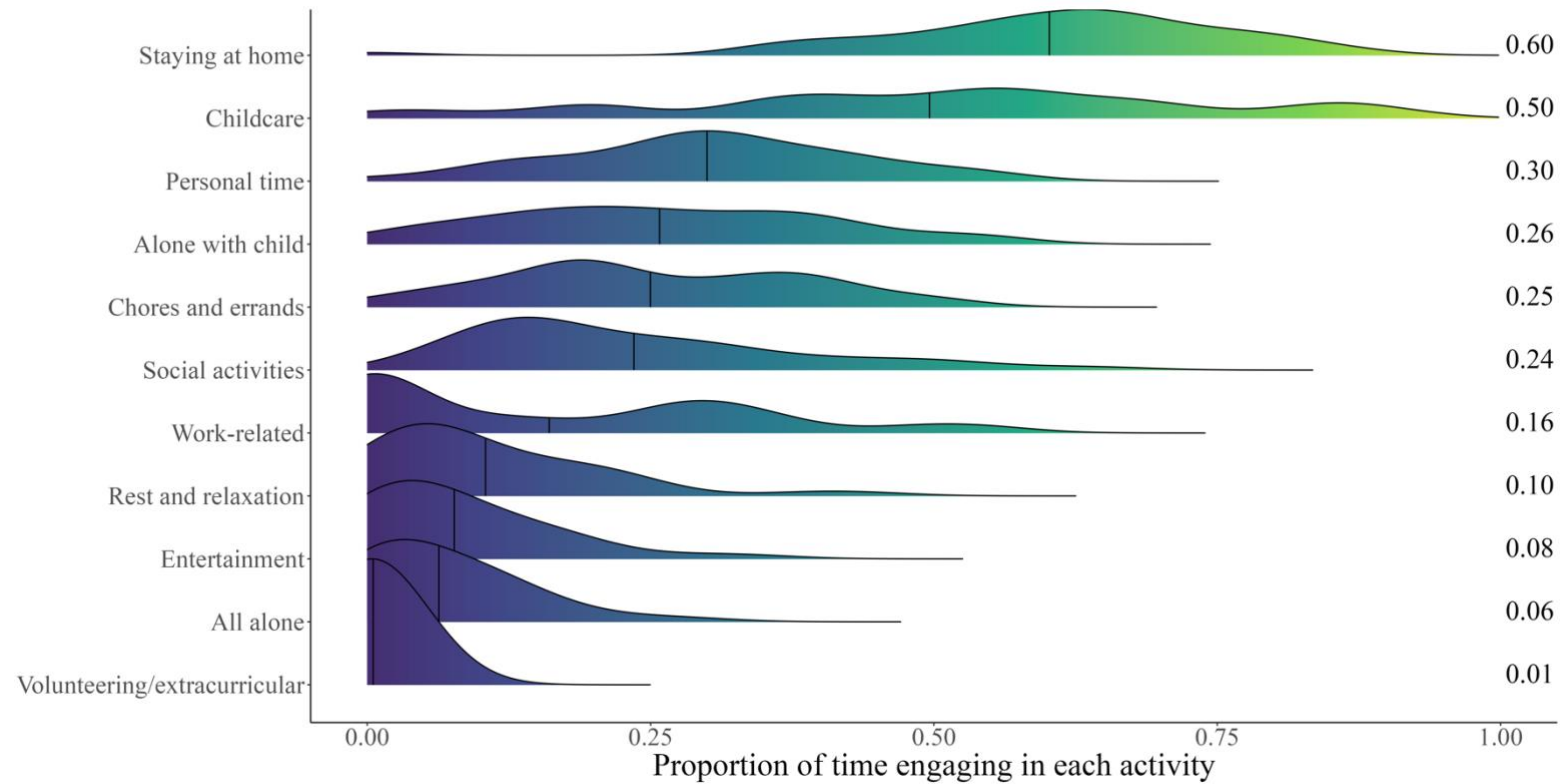
We present the average percentages of time engaged in each activity category in *Figure 1*. On average, our sample of mothers spent most of their day staying at home (60%) and engaging in childcare (50%). Time spent alone with the baby on average took up 26% of the day, but there was very little time that the mother spent all by herself (6%). There were relatively similar proportions of time dedicated for personal time (30%), chores and errands (25%), and social activities (24%). The most popular activities for these mothers’ personal time included quality time with the baby, making or eating meals, watching television, taking a walk, enjoying a cup of tea, or self-maintenance activities like getting dressed or taking a shower. Because most of the mothers also worked (24 full-time and 13 part-time), there was some time dedicated for work-related activities (16%), and even less time for rest and

relaxation (10%), followed by time for personal entertainment (8%) and very little time for extracurricular activities like going to baby or swim lessons (1%).

Time spent on childcare varied across mothers, with 50% of the variance that can be attributed to individual-level differences. Aside from that, time spent on other activities varied less, with variance due to individual differences ranging between 7% to 28%. Analyses of intraclass correlation coefficients suggested moderate to high reliabilities in the differences observed between individuals (ranging between .60 to .87) for most activities (see *Table 1*).

Table 1 showed correlations between proportions of time dedicated to different types of activities. Being alone with the baby correlated negatively with time spent alone by themselves, on social activities, and work-related activities. The more time a new mother spent with the baby, the more time she reported staying at home, doing chores and errands, and performing childcare responsibilities. However, consistent with qualitative responses reported for personal time, some of mothers' personal time also include time spent alone with baby, showing a small positive correlation. Personal time also positively correlated with time for entertainment, rest and relaxation, and negatively correlated with work-related tasks. On the other hand, time that the mothers reported being all by herself correlated positively with time spent on work-related activities, negatively with time spent on childcare duties, but was not related to rest and relaxation.

Figure 1. Numbers of time spent on different activities out of completed surveys (%)



Notes. Numbers on the right represents means for each category of activities

Table 1. Correlations between activity categories

Variable	1	2	3	4	5	6	7	8	9	10	ICC ¹	ICC ²
1. Staying at home	-										.20	.63
2. Alone with child	.25***	-									.20	.63
3. All alone	.15**	-.16**	-								.26	.70
4. Personal time	.14*	.11*	-.10	-							.23	.67
5. Personal entertainment	.25***	.14*	-.07	.23***	-						.28	.73
6. Rest and relaxation	.08	-.03	-.11	.14*	.18**	-					.26	.71
7. Social activities	-.22***	-.19***	-.15**	.10	.06	.26***	-				.22	.60
8. Work-related activities	-.21***	-.32***	.16**	-.25***	-.26***	-.21***	-.41***	-			.25	.69
9. Chores and errands	.17**	.15**	.00	.03	.05	-.10	-.08	-.33***	-		.23	.67
10. Volunteering/extracurricular	.04	.01	-.01	-.01	.11*	.02	-.01	-.04	.02	-	.07	.34
11. Childcare	.32***	.41***	-.33***	.13*	.18***	.00	.04	-.47***	.31***	.06	.50	.87

Notes. * $p < .05$, ** $p < .01$, *** $p < .001$

ICC¹ represents percentage of variance due to individual differences.

ICC² represents reliability of observing the same individual differences with different samples.

Primary analyses

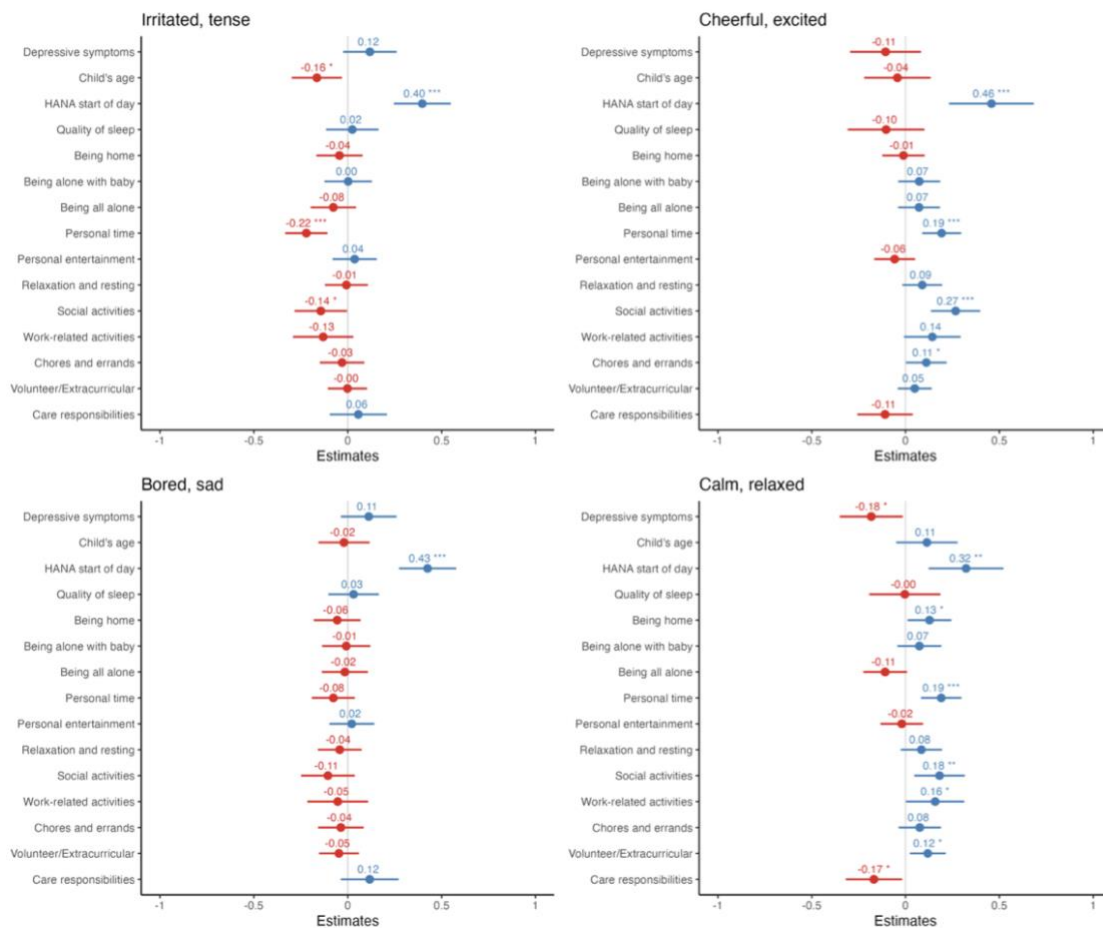
We entered all activities to linear mixed effect models to predict first-time mothers' daily emotions, stress, loneliness, and boredom levels. All outcome variables assessed at the end of the day (after 8pm) were most strongly predicted by the baseline levels measured at the beginning of the day (between 8am and 9am). Examining individual differences between mothers, we found that mothers' baseline depressive symptoms were predictive of several negative outcomes, including lower calmness and relaxation ($B = -1.26$, $SE(B) = .59$, $\beta = -.18$ [-.35, -.01], $p = .033$, $R^2_{\text{partial}} = .04$), more experiences of stress ($B = .64$, $SE(B) = .24$, $\beta = .27$ [.07, .46], $p = .008$, $R^2_{\text{partial}} = .07$), greater loneliness ($B = .49$, $SE(B) = .19$, $\beta = .23$ [.05, .41], $p = .011$, $R^2_{\text{partial}} = .05$), and more boredom ($B = .40$, $SE(B) = .19$, $\beta = .20$ [.01, .39], $p = .039$, $R^2_{\text{partial}} = .04$). Baby's age appears to be a small factor linking to mother's daily emotions; those who have younger babies tend to report more daily feelings of irritation and tenseness ($B = -.05$, $SE(B) = .02$, $\beta = -.16$ [-.30, -.03], $p = .016$, $R^2_{\text{partial}} = .03$).

Emotions. The results showed that personal time and social activities were the two most reliable predictors of mothers' daily emotions (see *Figure 2*). Having personal time positively predicted positive emotions like cheerful, excited ($B = 2.06$, $SE(B) = .56$, $\beta = .19$ [.09, .30], $p < .001$, $R^2_{\text{partial}} = .06$) as well as calm, and relaxed ($B = 2.15$, $SE(B) = .62$, $\beta = .19$ [.08, .30], $p = .001$, $R^2_{\text{partial}} = .05$). On the other hand, less personal time was associated with being irritated and tense ($B = -2.12$, $SE(B) = .55$, $\beta = -.22$ [-.33, -.11], $p < .001$, $R^2_{\text{partial}} = .06$). Spending more time with friends and family were also associated with more positive emotions (cheerful, excited: $B = 2.59$, $SE(B) = .65$, $\beta = .27$ [.14, .40], $p < .001$, $R^2_{\text{partial}} = .07$; calm, relaxed: $B = 1.86$, $SE(B) = .70$, $\beta = .18$ [.05, .32], $p = .008$, $R^2_{\text{partial}} = .03$) and fewer negative emotions (irritated, tense: $B = -1.25$, $SE(B) = .62$, $\beta = -.14$ [-.28, -.00], $p = .044$, $R^2_{\text{partial}} = .02$).

Calmness and relaxation were also predicted positively by spending time at home ($B = 1.20$, $SE(B) = .55$, $\beta = .13$ [.01, .24], $p = .031$, $R^2_{\text{partial}} = .02$), performing work-related activities

($B = 1.33$, $SE(B) = .66$, $\beta = .16$ [.00, .31], $p = .045$, $R^2_{\text{partial}} = .02$), or engaging in extracurricular activities such as going to gym or baby classes ($B = 10.37$, $SE(B) = 4.24$, $\beta = .12$ [.02, .21], $p = .015$, $R^2_{\text{partial}} = .02$). Performing care responsibilities negatively predicted calmness and relaxation ($B = -1.28$, $SE(B) = .58$, $\beta = -.17$ [-.32, -.02], $p = .028$, $R^2_{\text{partial}} = .02$). Interestingly, doing chores positively predicted feelings of being cheerful and excited ($B = 1.24$, $SE(B) = .61$, $\beta = .11$ [.00, .22], $p = .044$, $R^2_{\text{partial}} = .02$).

Figure 2. Plots of main effects in linear mixed effect models



Notes. * $p < .05$, ** $p < .01$, *** $p < .001$

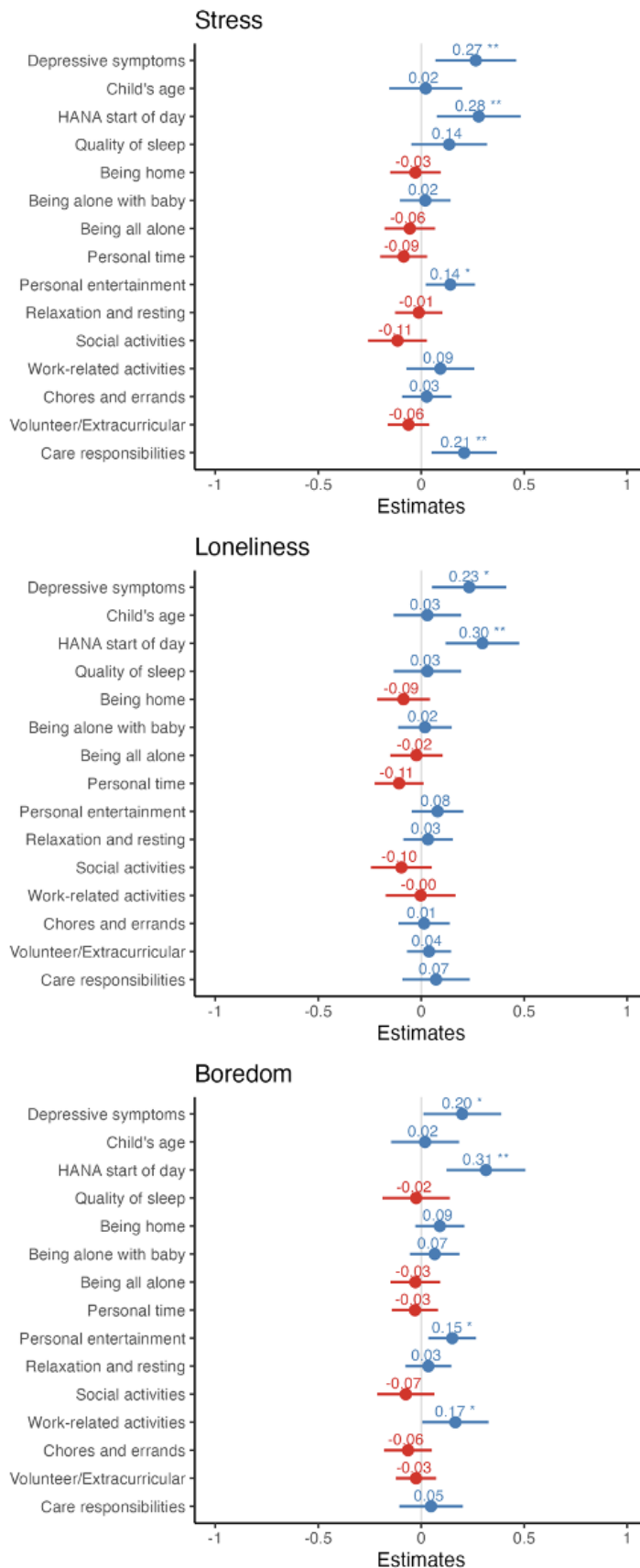


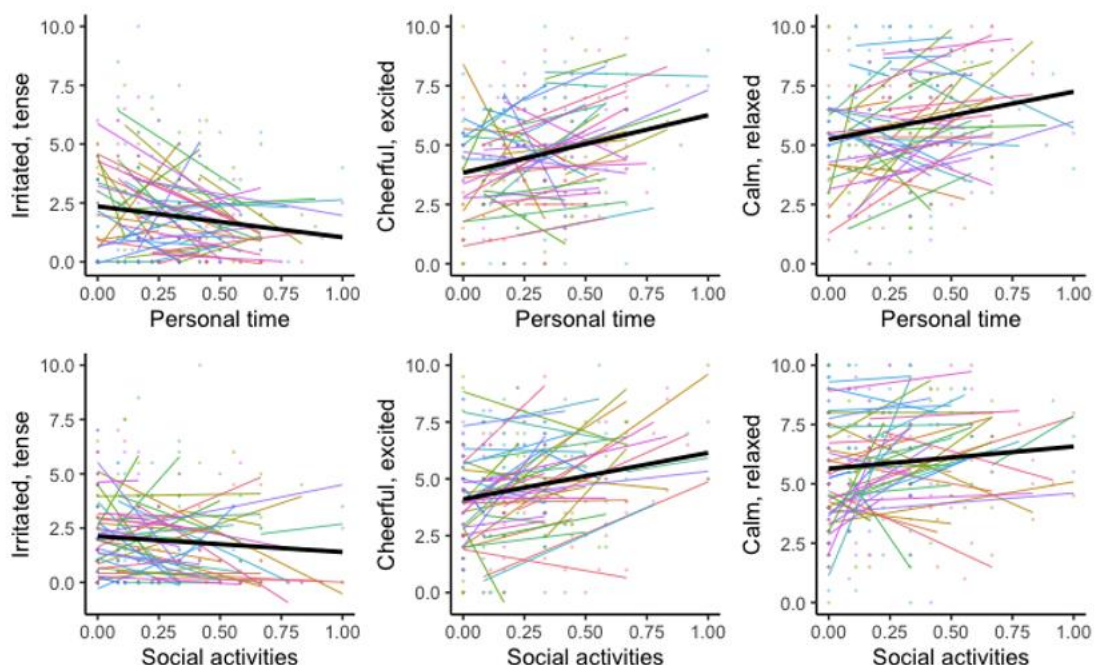
Figure 3. Plots of main effects in linear mixed effect models; * $p < .05$, ** $p < .01$, * $p < .001$**

Stress, loneliness, boredom. For these three outcomes, as mentioned above, mothers' depressive symptoms consistently played an important role in explaining daily stress. Above and beyond this individual difference, personal time and social activities did not significantly predict first-time mothers' daily levels of stress, loneliness, nor boredom. Surprisingly, spending more time on personal entertainment such as watching Netflix or YouTube was associated with greater stress ($B = .94$, $SE(B) = .40$, $\beta = .14$ [.02, .26], $p = .020$, $R^2_{\text{partial}} = .03$) and boredom ($B = .83$, $SE(B) = .32$, $\beta = .15$ [.03, .27], $p = .011$, $R^2_{\text{partial}} = .03$). Mothers' daily stress levels on a certain day were also linked to increase in childcare responsibilities on that day ($B = .56$, $SE(B) = .22$, $\beta = .21$ [.05, .37], $p = .010$, $R^2_{\text{partial}} = .03$) (see Figure 3).

Overall, having personal time was the strongest predictor of first-time mothers' daily positive emotions. As

discussed earlier, the sample size for this study allowed us more than 80% power to detect an effect size as small as .04. All the effect sizes we found for personal time linking to emotion outcomes were above .04. Another category of activities that was linked to daily positive emotions was time interacting with friends and family. When we graphed the correlations between personal time and social activities with the emotion outcomes that they predicted individually for each mother (see *Figure 4*), we saw that the effects were consistent across most mothers in our sample, with some mothers showing stronger effects than others.

Figure 4. Scatterplots showing relationships between personal time and social activities with emotion outcomes for each mother



Discussion

Previous research reported “aleness” as a common experience during transition to motherhood. This research explored the multifaceted nature of such phenomenon among two samples of British first-time mothers. Study 1 indicated that aleness includes both the physical time spent alone at home, driven by the demanding challenges of new parenthood, and the loneliness resulting from feeling disconnected from one’s social network. Nonetheless, time for oneself overall decreases in motherhood because time spent alone is often in the

presence of a child. The meanings of solitude thus change dramatically in a way those mothers feel unprepared for (Nelson, 2003).

First-time mothers often feel preoccupied with childcare and household tasks, leaving little time for personal activities. In Study 2, chores and errands took up 25% of the day. Even moments of downtime in between feeds or baby's naptime were filled with the constant need to do something, creating this sense of never-ending busyness in the life of a mother. As a result, time for self-care activities becomes fragmented, scarce, unpredictable, and often limited to more basic-need activities like sleeping, having meals, or showering. While appearing trivial, in Study 2, we found that those activities were connected to improved daily mood for first-time mothers, even above and beyond social time, which was consistently showed to be important for mothers' well-being.

Outside of those activities, entertainment options were restricted to indoors activities such as listening to music or watching television, often chosen since they are hand-free so mothers can do other tasks like breastfeeding. Study 2 revealed that personal entertainment was not linked to mothers' daily mood; instead, it yielded positive associations with daily stress and boredom. It is plausible that spending more time engaging in media-related activities may make mothers more stressed and bored because they did not have other activity options. Or alternatively, daily stress and boredom could lead mothers to engaging more in those activities. Our design did not allow to determine the directions of those associations. Nonetheless, these findings suggest that what mothers considered to be their personal time might be different than the time they spent watching entertainment programs.

Altogether, deprivation of time for rest and personal time, along with the limited opportunities to leave the house and engage in social activities and an abundance of chores and childcare responsibilities, may contribute to new mothers' loneliness. This loneliness becomes even more intense when first-time mothers feel unprepared and unfamiliar with how to care for

their baby. This may be particularly true for mothers who have babies with health problems, mothers who do not get enough family or friend support, or single mothers. Surprisingly, we did not find that social time predicted first-time mothers' daily loneliness, nor boredom and stress; instead, mothers' pre-existing depressive symptoms were the strongest predictor of all three of these outcomes. These findings suggested that everyday distress might be indicative of underlying psychological problems beyond what the mothers were doing everyday.

Study 2 also revealed that mothers mostly stayed at home, with true solitude occurring only 6% of the time, often associated with work-related activities like checking or responding to emails, rather than rest and relaxation. This suggested that the little time that mothers carve out to be completely on their own was spent on work, which contributed significantly to daily boredom. On the other hand, time spent alone with child correlated with a mix between childcare and chores, but also personal time and entertainment. However, among those four types of activities, only personal time was a reliable predictor and could be even more important than social time for first-time mothers' daily positive mood.

Limitations

This research was the first attempt to dissect the complexity of "aloneness" experience often described in the literature on becoming a mother. To achieve the rich data collected from interviews with first-time mothers as well as data of mothers' daily activities, this research relied entirely on convenience sampling from local communities. Therefore, the biggest limitation of our studies was the lack of sample diversity, which might have failed to capture a wide range of experiences of first-time mothers from other health and demographic profiles. For example, mothers' ages and socioeconomic statuses are important risk factors for postpartum depression, and services available to depressed mothers vary depending on their racial backgrounds (Guintivano et al., 2018). Levels of risks associated with mothers' socioeconomic backgrounds also varies between countries, with those in developing countries

suffering from greater risks (Norhayati et al., 2015). Levels of support were the main explanation for elevated risks for these groups, and likely play an important role for first-time mothers in our studies to find time for basic self-maintenance activities with ease. Therefore, the next research direction may be to understand what levels and types of support new mothers need to afford those times.

Another limitation that we recognize in this research is the lack of the partner's perspectives. Previous literature suggested that the non child-bearing partner, commonly the father, who does not face the physical challenges of childbirth, is also significantly impacted by this transition, suffering from negative outcomes like stress, deprivation of both sleep (Saxbe et al., 2018) and me-time (Levesque et al., 2020). What is more important thing is how parenting partners navigate tensions and conflicts in their relationships during this transition to find balance between childcare, personal time, and "us" time (Levesque et al., 2020). As such, we do recognize that accounting for both parents' perspectives is crucial.

Conclusion

In summary, this research sheds light on how the experience of "aloneness" manifests during the transition to becoming a mother. The findings highlight the struggle with constant childcare demands and a scarcity of time for basic self-care, which may intensify feelings of loneliness. With never-ending cycles of chores and constant pressures to attend to the needs of their child, their subjective experiences of time alone and solitude are altered, often feeling burdensome rather than restorative. Notably, personal time, although scarce, unpredictable, and fragmented, emerged as a crucial factor for enhancing mothers' daily mood. The findings from both studies emphasized that quality time for mothers to attend to their own needs can be just as important as social interactions and is more influential in mitigating the emotional challenges of motherhood than previously recognized. These insights call for more nuanced support structures that address these specific needs of first-time mothers, ensuring they have access to

both social support and opportunities for meaningful personal time to ease the demands of becoming a mother.

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