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Where does stress happen? Ecological momentary assessment of daily stressors using a mobile phone app

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Abstract

Despite the importance of daily stress to individuals' health and wellbeing, few studies have explored where stress happens in real time, that is, dynamic stress processes in different spaces. As such, stress interventions rarely account for the environment in which stress occurs. We used mobile phone based ecological momentary assessment (EMA) to collect daily stress data. Thirty-three participants utilized a mobile-phone-based EMA app to self-report stressors as they went about their daily lives. Geographic coordinates were automatically collected with each stress report. Data from thematic analysis of stressors by location (home, work, work from home, other) were used to determine whether certain stressors were more prevalent in certain environments. Nine daily stressors significantly differed by location. Work-related stress was reported more often at work. Pets, household chores, sleep, and media-related stressors were reported most at home. Physical illnesses, vehicle issues, and safety/security stressors occurred most often while participants were "working from home." Traffic-related stress was experienced more commonly in "other" environments. Other 18 stressors were generated regardless of location, suggesting that these stressors were persistent and without respect to location. Study findings expand the understanding of environments in which specific stressors occur, providing baseline data for potential targeted "just-in-time" stress interventions tailored to unique stressors in specific environments. We also provide findings related to the "work from home" phenomenon. Further work is needed to better understand the unique stressors among the large number of individuals who transitioned to working from home during and after the COVID-19 pandemic.

KEYWORDS

daily stress, ecological momentary assessment, geospatial analysis, workplace

1 | BACKGROUND AND OBJECTIVE

Daily stressors refer to everyday adversity and the friction that exists in daily life (Wright et al., 2020). A variety of research tools have broadly categorized daily stressors, including a diverse range of everyday hassles. The Daily Hassles Scale provides an extensive list of potential stressors in categories like work, health, family, friends, environment, practical concerns, and random events (Kanner et al., 1981). The Daily Stress Inventory encompasses 58 items that represent self-reported daily stressors, covering experiences from poor performance at tasks to disturbed sleep (Brantley et al., 1987). Additionally, the Daily Inventory of Stressful Events investigates daily stressors across seven categories, including arguments or disagreements, avoided arguments or disagreements, events at work or school, events at home, experiences with discrimination, events that occurred to a relative or close friend, and others (Almeida et al., 2002).

Furthermore, a vast body of literature has linked stress to an increased risk of negative health outcomes such as high blood pressure, heart disease, and cognitive decline (Helgesson et al., 2003; McCaul et al., 2017; Wills et al., 2002). It is thought that daily stressors play an equal or greater role than major stressful events in the myriad negative health outcomes related to stress (Bolger et al., 1989; Segerstrom & O'Connor, 2012).

However, the specific impact of stressors differs between individuals depending on how the situation is subjectively perceived as stressful and the ability of the individual to cope with the stressor (Dewe & Cooper, 2008; Lazarus, 1991; Lazarus & Folkman, 1984). Stress appraisal theories recognize that appraisals are shaped by both situational and individual factors (Fassett-Carman et al., 2019; Gaab et al., 2005; Lebois et al., 2016). Stress is a complex transactional process between individuals and their environment (Lazarus & Folkman, 1984). Therefore, one must consider both the objective characteristics of daily stressors and individuals' subjective appraisal of these stressors (Almeida et al., 2002).

Many studies have explored the specific environmental characteristics that generate daily stress. Research has examined the frequent occurrence of daily stress in the workplace (Colligan & Higgins, 2006), at home (Monazah et al., 2016), while driving (Scott-Parker et al., 2018), in grocery stores (Aylott & Mitchell, 1998), in travel destinations (Jordan et al., 2019) and in city environments (Matheson et al., 2006; Quinn et al., 2010) among other settings. The home and the workplace are the two most common spaces where people encounter daily stress frequently (Almeida & Horn, 2004; Bickford, 2005); more recently, the increase of remote productivity technology (e.g., video conferencing) and the onset of the COVID-19 pandemic have enabled, and to some extent forced, a shift toward working from home. The unconventional use of the home space has introduced new stressors and challenges to maintaining a work-life balance (Galanti et al., 2021; Hayes et al., 2020; Weinert et al., 2015), compelling us to further explore the relationship between locations and daily stress perception. These studies, while examining stress in specific environments, have not collected data about stress as it happens dynamically in free-living conditions.

Most daily stress measurement tools provide cross-sectional self-reports via checklists (Wright et al., 2020). When daily stress is measured at a single point in time using scale-based survey instruments, the mental state at the time of recall and the emotional salience of a given memory may be subject to recall bias, leading to overestimation of emotionally salient stressors and underestimation of daily stressors (Larson & Csikszentmihalyi, 2014). Ambulatory assessments have the potential to address the recall bias problem by intensively recording the individual's experience in real life. Common data collection methods of ambulatory assessment include daily diaries, experience sampling, ambulatory psychophysiology, and ecological momentary assessment (EMA) (Fernández-Castro et al., 2021). EMA allows for the collection of cognitive appraisals of daily stress in the moment it occurs and within the context of the real-life environments where they occur (Stone & Shiffman, 1994), reducing recall bias and facilitating for the measurement of phenomena as they are experienced in free-living conditions (Fernández-Castro et al., 2021; Kou et al., 2020). Furthermore, the ubiquity of smartphones and technological advancement of EMA apps have created the opportunity for EMA data to be collected in concert with user locations.

EMA studies have been increasingly utilizing geolocation to map people's feelings, affections, behaviors, and experiences (Kirchner & Shiffman, 2016). For example, some studies have mapped personal moods by asking participants to fill out mood reporting scales on their phones (Morris et al., 2010), while others have investigated the stress of drug misusers in geographical contexts using a scale (Epstein et al., 2014; Vahabzadeh et al., 2004). However, there is still a lack of studies that combine open-ended daily stressor reports with geographic analysis in a broader population using EMA. It therefore remains unknown which types of daily stress occur most often and in which environment (home, work, or other location). Correspondingly, stress interventions rarely account for the environment in which stress occurs.

In this study, we recruited 33 study participants in the US states of Arizona and Indiana and asked them to report their stressors using an EMA app that recorded their geospatial location for each report. We thematically analyzed stressors to determine the most commonly reported types of stressors. We then determined the location where each stressor was reported and classified them as occurring at home, work or in other settings. Our primary aim was to investigate the geospatial distribution of reported daily stressors, with the expectation that understanding these distributions can lead to the development of targeted community-based or individual interventions, tailored to specific locations, to mitigate daily stress and enhance health.

2 | DESIGN AND METHODS

2.1 | Data collection

Data for this study were aggregated from two separate data collection efforts. The first set of data were collected from 25

individuals in the US state of Arizona in 2018. The second set of data were collected from eight individuals in the US state of Indiana in 2020 before the onset of the COVID-19 pandemic. Participants were recruited via paper flyers and posts in community Facebook groups. Participants attended an informational meeting at the outset of data collection. Participants were provided a basic definition of stress ("Stress is…Anything that causes states such as anxiety, sadness, frustration, the sense of being overwhelmed or helpless") and asked to be mindful of stressors they experienced during the study period. Due to resource constraints, participants in Indiana recorded data for 1 week rather than those in Arizona who recorded for 2 weeks. Data collection took place in Fall 2018 for Arizona participants and in Fall 2019 for those in Indiana. Each data collection period concluded with a debriefing information session. Among the 33 participants, there was a predominant female representation at 70.45%. The average age across both states was approximately 55.27 years. Bachelor's and Graduate Degrees were the most prominent educational qualifications. More than half of the participants identified as non-Hispanic Caucasian. Participants from Indiana had a higher female and non-Hispanic Caucasian representation compared to Arizona, along with a greater percentage in higher education levels and income brackets. In contrast, Arizona displayed a more diverse spread in income levels and racial categories. The demographic information of participants is presented in Table 1.

During the data collection periods, study participants were asked to be mindful of their stressful experiences. If participants experienced stress, they were asked to record their experience via the EMA app on their smartphones. Participants who did not wish to use their own smartphone were provided with a phone by the study team. Participants were instructed that if were in a situation that was unsafe to use their phones (e.g., driving a car), that they proceed to the nearest safe location before recording their stressful experience. Participants were asked to specify the stressor's location in the report text if they were not reporting from the stress point location to preserve the integrity of the data. If participants did not experience stress during a day of their study period, they were asked to log an event on their phones before they went to bed for the evening indicating that they had not experienced stress but were still active participants in the study. During the data collection periods, no participants dropped out of the study, nor were any participants considered "inactive," as all either actively logged stressors or actively indicated that they did not experience stress on a given day. Participants were provided with a monetary incentive for their participation in the study. The study was approved (Approval #1910712088) by the Institutional Review Board (Indiana University, Bloomington, IN, USA). Informed consent was obtained before survey completion.

2.2 | Instruments

In a pretest survey, study participants provided their home and work address. Individuals who provided the same address for home and work were considered to work from home (with six participants in the "work from home" group). These addresses were used in geospatial analysis to determine whether participants were at home (yes/no) or at work (yes/no) when they experienced stressors. The remainder of the data presented here were collected via the EMA app. We used the ArcGIS Survey123 app for data collection in Arizona. In Indiana, we utilized a custom app named STRIVE (Stress Reports in Variable Environments), which has the same features as ArcGIS Survey123 (Jordan et al., 2023). When study participants determined that they experienced a stressor, they opened the app and were asked to "Briefly describe what is causing you stress." An open-ended text box was provided for participants to describe their stressful experiences. The app automatically collected the global positioning system (GPS)

TABLE 1 Characteristics of the study population.

	Arizona 2018 (*n* = 25)	Indiana 2020 (*n* = 8)
Gender		
Male	32.0%	12.5%
Female	68.0%	87.5%
Other		
Age Mean	54.6 years	56.6 years
Age SD	10.8	5.23
Education Level		
Some high school, no diploma	4.0%	0.0%
Some college credit, no degree	8.0%	12.5%
Trade/technical/vocational training	12.0%	0.0%
Associate's degree	20.0%	37.5%
Bachelor's degree	28.0%	25.0%
Graduate degree	28.0%	25.0%
Household income		
Less than $25,000	34.6%	0.0%
$25,000 to $34,999	23.1%	0.0%
$35,000 to $49,999	11.5%	25.0%
$50,000 to $74,999	7.7%	12.5%
$75,000 to $99,999	11.5%	12.5%
$100,000 to $149,999	7.7%	37.5%
$150,000 to $199,000	0.0%	12.5%
Race		
Caucasian, not of Hispanic origin	64.0%	87.5%
Hispanic	8.0%	12.5%
Hawaiian or part Hawaiian	4.0%	0.0%
More than one race	16.0%	0.0%
Prefer not to answer	4.0%	0.0%

coordinates of the participant each time they logged a stressful experience.

2.3 | Analysis

First, we determined where each stressor occurred. Initial analysis revealed that the vast majority of stressors happened either at home or work. Therefore, we classified the stressor data into four location categories: home, work, work from home, and other. We geocoded each stressor location based on the GPS coordinates recorded by the EMA app and compared them to the GPS coordinates of each participant's self-reported home and work addresses. We created a buffer with a 0.1-mile (528 feet, 0.16 km) radius around each participants' home and work addresses using the rgeos package (Bivand & Rundel, 2021) in R version 4.2.1 (R Core Team, 2022). We then identified stressors that occurred within these buffers (home = 1; work = 1) or outside of these buffers (home = 0, work = 0). For stressors that occurred elsewhere (i.e., not within the home or work buffers), we categorized these as "other" stress locations. For individuals who reported the same address for their home and work in the pretest survey, we classified stressors experienced at their home address as "work from home."

Then, participants' description of each reported stress experience was thematically analyzed to allow stressor themes to emerge. All thematic analyses were conducted in Dedoose, a cross-platform analysis tool for qualitative and mixed methods research (Salmona et al., 2020). Thematic analyses were conducted as outlined in Creswell and Poth (2016), where data are organized and prepared, coded into themes, and then recoded. This analysis technique involved several phases. First, a three-person thematic analysis coding team, composed of researchers experienced in qualitative data analysis, discussed participants' records to determine important areas of inquiry for analysis. The potential influences of each coder on objectivity were also discussed to enhance the reflexivity of the thematic coding (Guillemin & Gillam, 2004). Second, the coding team coded the data, categorizing participants' app-based reports relating to daily life stress. Each coder manually developed a codebook of stressor themes experienced by study participants, identifying 25, 25, and 28 themes respectively. The three coders discussed their coding of stressors to reach consensus on themes, resulting in a final listing of 27 unique stressors. Following this thematic analysis, the stressors were tabulated to identify how frequently each stressor theme emerged among participants. A series of χ^2 tests were performed to assess whether stressor themes were mentioned more or less frequently by location. χ^2 analyses were performed in SPSS 28.

3 | RESULTS

In the study of Arizona ($n = 25$), a total of 404 daily stressors were recorded for an average of 16.2 (SD = 8.4) stressors per participant, and an average of 1.2 (SD = 0.6) stressors per participant per day. At least one daily stressor was experienced on 85% of study days. Furthermore, the mean subjective severity score of participants reported stressors was 1.9 (SD = 1.1) out of 4. In the Indiana study ($n = 8$): A total of 159 daily stressors were recorded, for an average of 19.9 (SD = 20.6) stressors per participant, or 2.5 (SD = 1.4) stressors per day. At least one daily stressor was experienced on 80% of all days—similar to our first study. Further, the mean subjective severity score of participants reported stressors was 2.8 (SD = 1.5) out of 7.

Results of the thematic analysis of stressors reported by study participants are shown in Table 2. Among all of the stressor themes, the five most frequently mentioned stressors were work, time, psychological issues, physical illness, and pets.

Through chi-square comparison of stressors by location (work, home, work from home, and other), we found 9 of the 27 types of reported daily stressors to differ by location (see Table 3). Work-related stress ($\chi^2 = 60.41$, df = 3, $p < 0.001$) was reported more often at work than at other locations. One respondent said:

> *There are some changes to procedures at work and a pending merger. Stressful times during business hours.*

Stress related to pets ($\chi^2 = 11.18$, df = 3, $p = 0.011$), household chores ($\chi^2 = 11.66$, df = 3, $p = 0.009$), sleep ($\chi^2 = 13.56$, df = 3, $p = 0.004$), and media ($\chi^2 = 9.56$, df = 3, $p = 0.020$) were reported more often when participants were at home than at other locations. Example responses include:

> *Dogs off leash.*

> *Cleaning the stove before the guy comes to pick it up to put in a replacement.*

> *Cannot sleep.*

> *All the political ads suddenly showing up in my Instagram feed! I feel like [sic] an invasion of my privacy!*

The stressor themes physical illness ($\chi^2 = 8.85$, df = 3, $p = 0.031$), vehicle issues ($\chi^2 = 8.73$, df = 3, $p = 0.033$), and safety/security ($\chi^2 = 8.54$, df = 3, $p = 0.036$) were reported more frequently among participants working from home than other locations. For example:

> *I had an intense coughing spell where it felt like I couldn't catch my breath.*

> *Car will not start.*

> *The smoke from the prescribed brush burns. For fire safety reasons.*

Traffic-related stressors were the stressor group perceived most often at non-work or -home locations ($\chi^2 = 8.43$, df = 3, $p = 0.038$). One participant said:

TABLE 2 Description, amount and frequency of stressor themes recorded by participants.

Stressor	Description	*n*	Percentage
Work*	Work-related issues including meetings, conferences, mistakes, work demands, and business trips.	121	16.05
Time	Time related issues including waiting, delays, lateness, lack of time, and hurrying.	70	9.28
Psychological issues	Negative emotions including worry, anxiety, nervousness, feeling edgy, and so forth.	60	7.96
Physical illness*	Physical illnesses including injury, sore throat, headache, and allergies.	47	6.23
Pets*	Pet related incidents including pet related damages, feedings issues, and pets left behind.	38	5.04
Social interaction	Issues with people excluding family member, including friends, unmarried partners, and strangers.	33	4.38
Mistakes	Mistakes made due to lack of ability or forgetfulness.	32	4.24
Technology or device	Device glitches; technology failure; difficulty using tech like phones, internet and so forth.	32	4.24
Finance	Dealing with money, revenue or expenditure, mortgage, paychecks, loans, budgets, and so forth.	30	3.98
Sleep*	Sleep disturbances, not enough sleep, insomnia, early wake ups, or nightmares.	28	3.71
Parental stress	Stressors related to parenting including from raising or caring for children.	25	3.32
Marital stress	Spousal relationships including arguments or differences of opinions and worry about spouses.	22	2.92
Household chores*	Household chores like maintenance, cooking or baking, taking out the trash, and so forth.	22	2.92
Media*	Including information seen on traditional (radio, TV, newspaper) or social media (Facebook, Instagram).	22	2.92
Vehicle issues*	Including vehicle malfunctions or concerns about driving a car.	20	2.65
Safety/security*	Including legal cases, violations of law, personal safety, feeling unsafe, and order (e.g., cutting in line).	19	2.52
Others' health	Concern about others' health conditions, taking care of someone, visiting a hospital, and so forth.	18	2.39
Too much to do	Including being busy or having too much to do.	17	2.25
Traffic*	Traffic congestion or bad road conditions.	17	2.25
Customer service	Unsatisfactory service from businesses or other organizations.	16	2.12
Politics	Elections, voting, thinking about politics, and so forth.	16	2.12
Weather or nature	Bad weather or concerns about the impacts of climate change on nature.	15	1.99
Other family member issues	Interactions with family members other than spouses or children.	11	1.46
Neighborhood	Residential or community living issues.	7	0.93
Tiredness	Feelings of tiredness or exhaustion.	7	0.93
Rare event	Rare events, natural phenomena, or unexpected events.	6	0.80
Crowding	Too many people in one space.	4	0.53
SUM		754	100.00

*Stressors were strongly associated a specific location.

TABLE 3 Results of χ^2 test for relationships between stressors and locations.

	χ^2 test			Location proportion (%)			
Stressor themes	Value	df	Significance	Home	Work	Work at home	Other
Work	60.41	3	<0.001**	24.8	41.3*	22.3	11.6
Pets	11.18	3	0.011**	57.9*	15.8	7.9	18.4
Household chores	11.66	3	0.009**	68.2*	0.00	22.7	9.1
Physical Illness	8.85	3	0.031**	34.0	4.3	40.4*	21.3
Sleep	13.56	3	0.004**	57.1*	3.6	39.3	0.0
Vehicle issues	8.73	3	0.033**	10.0	15.0	40.0*	35.0
Traffic	8.43	3	0.038**	11.8	17.6	29.4	41.2*
Safety/security	8.54	3	0.036**	26.3	21.1	52.6*	0.00
Media	9.86	3	0.020**	54.5*	4.5	40.9	0.00
Finance	2.99	3	0.393	40.0*	6.7	30.3	23.3
Marital	2.95	3	0.400	45.5*	4.5	31.8	18.2
Parental	4.33	3	0.228	36.0	4.0	40.0*	20.0
Other family member	2.22	3	0.529	45.5*	27.3	9.1	18.2
Neighborhood	3.94	3	0.268	57.1*	0.0	42.9	18.0
Other's health	0.80	3	0.851	27.8	22.2	33.3*	16.7
Psychological issues	3.80	3	0.284	30.0	25.0	31.7*	13.3
Tiredness	4.35	3	0.226	42.9*	0.0	14.3	42.9
Too much to do	5.28	3	0.152	18.8	37.5*	31.3	12.5
Time	5.27	3	0.153	37.8*	17.3	28.4	16.4
Mistakes	6.17	3	0.104	56.3*	9.4	18.8	15.6
Technology or device	2.33	3	0.508	43.8*	9.4	25.0	17.4
Crowding	5.54	3	0.136	0.0	0.0	75.0*	25.0
Social interaction	4.47	3	0.215	21.2	18.2	33.3*	27.3
Customer service	3.70	3	0.296	43.8*	6.3	18.8	17.3
Politics	4.33	3	0.228	56.3*	6.3	31.3	6.3
Weather or nature	1.94	3	0.586	33.3	26.7	33.3*	6.7
Rare event	1.53	3	0.676	16.7	33.3*	33.3*	16.7

*Location where this stressor occurs most frequently among the four locations.

**$p < 0.05$.

The traffic on I-17 causes me to question my ability to navigate the roadways.

4 | CONCLUSIONS

The results imply nine daily stressors are related to specific locations, broadening the understanding of the geospatial distribution of stress. As expected, work-related stress was experienced more commonly at workplace, whereas pets, household chores, sleep, and media-related stressors were most frequently reported at home. Past studies on home-related stress have primarily focused on interpersonal stressors, such as marriage and parenting. Our analysis demonstrates that marital, parental, and neighborhood stressors are not limited to the home setting. Contrastingly, pets, household chores, sleep, and media stressors were more often associated with the home space, signifying that they are less likely to happen elsewhere. Physical illnesses, vehicle issues, and safety/security stressors occurred most often in the "work from home" condition. These three stressors have not often appeared in previous studies on the stress of working from home (Galanti et al., 2021; Hayes et al., 2020; Weinert et al., 2015). In terms of the COVID-19-related shift of many individuals to working from home either full- or part-time, we provide evidence that stressors experienced in the home by those who work there may be

different than for those who work elsewhere. As the work from home phenomenon continues to evolve, these work-from-home stressors will likely evolve with it, but most experts agree that remote work is here to stay—and the stressors that go with it are worthy of further examination (Faulds & Raju, 2021). Traffic-related stress was reported more commonly in "other" environments. Compared with the nine daily stressors, the other 18 daily stressors, for example, time, psychological issues, social interaction, finances, marital stress (see all 18 stressors without asterisk in Table 2), were not strongly associated with a specific location, signifying that they occur in many environments, and might linger longer, as they can permeate different spaces.

Our findings expand daily stress measurement to include the combination of EMA and geospatial analysis. EMA allows participants to record their experience of stress as it happens. By linking GPS-enabled devices to EMA of daily stress, we show that it is possible to determine which stressors happen in which environments. These findings should enhance the ability of those seeking to build time- and location-specific interventions to accurately identify where and when stressors occur most often. For instance, with geospatial data, mobile applications for just-in-time interventions can offer real-time feedback or coping strategies at the exact time and place an individual frequently reports stress. Intervention applications can even anticipate potential stressors based on an individual's location, providing alerts and suggestions beforehand. Furthermore, by mapping stressor hotspots, community-based interventions can be developed for stressors common to specific regions or communities. Above intervention capabilities based on mobile electronic devices can be added to the current EMA- and GPS-based system.

In sum, our findings showed differences in the experiences of daily stressors by location. We provide findings related to the "work from home" phenomenon, which has become increasingly more normalized in recent times. These findings are part of a small, but growing, body of research that should continue to identify elements of the built and natural environment that play a role in stress, allowing for more targeted interventions aimed at reducing stress and promoting health.

5 | LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

As a preliminary study, some limitations exist in this paper. First, we limited the possible spatial categories for analyzing GPS coordinates to four locations: home, work, work at home, and other. Given that "other" encompasses all locations other than the home and workplace, unique patterns in shared public spaces (e.g., school, hospitals) could not be assessed. Future studies should cover a broader range of spaces, as specific environments bring about stressors for their unique populations. For example, existing research has found that in school settings, adolescents face stressors related to school performance, stressful interactions with teachers, and race and gender discrimination (Ringdal et al., 2020; Tavarez, 2022; Wei et al., 2011).

In addition, since the data for this study were gathered before the onset of the COVID-19 pandemic, the findings related to the "work from home" trend reflect the pre-pandemic period. Even though initially implemented to comply with government-imposed stay-at-home orders during the pandemic, many employers decided to allow remote work even after the orders were lifted (Kosteas et al., 2022). Working from home could be a "new normal" (Srivastava et al., 2022). Given the widespread normalization of remote work, research conducted in the post-COVID era may reveal different dynamics. Future research on working from home can be conducted from various angles. For example, one aspect could be social interaction—the presence of other family members at home at the same time and their interaction might influence stress experience.

Finally, the study's participant base was limited in both size and demographic diversity, consisting of 33 predominantly non-Hispanic white participants and should not be generalized to the population at large. To gain a more comprehensive understanding of the relationship between stress, demographic diversity, and location, future research should expand the participant pool and explore a more diverse range of demographics.

Beyond the findings of this paper, we emphasize that this study's methodology provides a template for future stressor studies. Future research should continue to explore the reasons that some stressors are more likely to be encountered in certain spaces. We recommend configuring GPS coordinates for various common places, such as hospitals, grocery stores, banks, parks, roads, schools, and gymnasiums. The resulting findings will provide a comprehensive picture of the relationship between stress and spatio-temporal effects: how stress categories change as spaces shift; which types of stress tend to spill over and persist into other spaces; which spaces tend to stimulate a more complicated stress perception; and in which spaces people tend to perceive minimal stress. Interventions targeted at specific geospatial locations can be created to address common stressors in various environments. In addition, the potential of smartphone-based EMA is enormous, and additional data such as biomarkers (e.g., heart rate), activity type (Xinyu et al., 2020), time, photos of stressors in their contextual environments, and voice or video features could be collected and analyzed to fully assess the relationship between location and stress. Furthermore, the results of our study imply that working at home entails more nuanced categories of stressors (although not necessarily more severe ones) than in a conventional workplace. Thus, it can be hypothesized that the presence of numerous overlapping concerns/responsibilities in the home environment is a stressor in and of itself. Ultimately, the challenge of creating less stressful environments at home warrants further exploration.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data sets generated or analyzed during this study will be available from the corresponding author upon reasonable request.

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PEER REVIEW

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