Exploring the Temporal Dynamics of Momentary Mental Resilience in Everyday Life and its Association with Positive Affect Using Experience Sampling Methodology

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Abstract

Background. Mental resilience (MR) is a trending research topic, but little is known about its temporal patterns. Moreover, the construct has been closely interlinked with positive affect, however, only through retrospective measures. As MR was conceptualised as a dynamic process, it was decided to investigate it using the Experience Sampling Method (ESM).

Purpose. This paper investigates the daily and weekly temporal dynamics of momentary mental resilience (MMR) and its relationship with positive affect (PA) utilising ESM. Moreover, it hypothesises that MMR is higher in the morning than the rest of the day on a daily bases and that MMR is higher on the weekend than on the weekdays weekly. Furthermore, MMR is suggested to be associated with PA and with a lower incline of positive affect change (PAC).

Methods. A within-group ESM design was employed, and data was collected from 87 participants ten times a day over seven consecutive days. MMR and PA were measured using self-report items. Linear mixed-effects models were used for data analysis.

Results. The results revealed no predictable temporal patterns of MMR throughout the day or the week. However, higher MMR was associated with elevated levels of PA, and individuals with higher resilience experienced smaller declines in PAC.

Discussion. These findings shed light on the dynamic nature of MMR and its connection with PA. The lack of predictable general daily fluctuation may be caused by the complex and individual nature of resilience, so an investigation into individual MMR patterns may be necessary. Furthermore, the found association between MMR and PA can be used to create and improve interventions that tailor resilience and overall well-being.

Keywords: momentary mental resilience (MMR), experience sampling method (ESM), ecological momentary assessment (EMA), stress, positive affect (PA), daily life

Introduction

It is widely acknowledged that persistent stress, psychological trauma, and physical illness are antecedents of psychopathology (Agid et al., 2000; Yaribeygi et al., 2017). Nevertheless, research has shown that most individuals who experience such challenges do not succumb to psychological disorders, prompting the question of what renders these individuals immune to the potential harm of such events (Bos et al., 2016; Kalisch et al., 2017; Patel & Goodman, 2007). In contemporary literature, this notion of mental immunity is referred to as psychological or mental resilience (MR) and is a topic of intense study (Davydov et al., 2010; Kuranova et al., 2020).

Definition of Mental Resilience

There is a consensus that resilience is a defence mechanism that empowers individuals to confront, and thrive in the face of adversity (Davydov et al., 2010; Joossens et al., 2022; Southwick et al., 2014; Windle, 2011). However, the details of the conceptualisation of MR are quite disputed (Hu et al., 2015). One point of discourse is whether MR should be treated as a stable personality trait (Connor & Davidson, 2003) or a dynamic process (Luthar & Cicchetti, 2000; Southwick et al., 2014).

Ong and Leger (2022) support the latter proposition, asserting that resilience is an active and changing response to environmental adversities and daily hassles rather than a static characteristic. They posit that the essence of resilience lies in the effective recovery from stressors through adaptation (Ong & Leger, 2022). Hence, this paper adopts the conceptualisation of resilience as a multifaceted and dynamic process, referring to it as momentary mental resilience (MMR).

The majority of studies on MR have typically relied on measuring trait resilience with static measurements, such as retrospective questionnaires (Heilemann et al., 2003; Ponce-Garcia et al., 2015). While helpful in providing insight into overall resilience levels, these measurements are restricted in capturing the dynamic aspects of resilience (Kuppens et al.,

2010). One solution would be to investigate an individual's actual moment-to-moment experience of resilience in everyday life.

Experience Sampling Method

The experience sampling method (ESM) is remarkably fitting to investigate resilience as a dynamic process. ESM is a self-report smartphone-based diary technique that necessitates the participants to report their current thoughts, emotions, and experiences multiple times a day for a set period (Myin-Germeys et al., 2018; Myin-Germeys & Kuppens, 2022). ESM, rooted in ecological psychology, appears to have high ecological validity and limits retrospective bias (Myin-Germeys & Kuppens, 2022). This memory bias is primarily connected to the recall of affective states, fundamental for resilience research (Kuranova et al., 2020; Levine & Safer, 2016).

Compared to most static measures, ESM also allows an investigation into interindividual and intraindividual differences, ultimately enabling researchers to identify patterns and dynamics within and across participant populations (Myin-Germeys & Kuppens, 2022). For instance, Kuranova et al. (2020) investigated MMR in the context of affective stress recovery using ESM. Moreover, Ader et al. (2022) also used ESM to explore positive affective recovery in daily life.

Positive Affect and Mental Resilience

One psychological variable that has emerged to be connected to resilience is positive affect (PA), which encompasses positive emotions, such as happiness, satisfaction and gratitude (Hu et al., 2015; Schimmack, 2003). Recently, research has illuminated an association between an individual's ability to adapt and cope with adversity and the subjective experience of positive emotions (Tugade & Fredrickson, 2004). Pillay et al. (2022) discovered a correlation between PA and levels of trait resilience, indicating that individuals with greater resilience tend to experience higher levels of positive emotions. Likewise, Sagone and Indiana

(2017) demonstrated a consistent positive relationship between higher MR and the experience of PA using retrospective measures.

In an attempt to explain the association between PA and MR, Tugade and Fredrickson (2004) propose a theory called the broaden-and-build theory of positive emotions. According to this theory, the experience of PA profoundly broadens an individual's thoughts and actions in the present moment (Fredrickson, 2001). In contrast to negative affect (NA), which tends to inhibit cognitive reactions, PA is associated with a more expansive mindset (Fredrickson, 2001; Tugade & Fredrickson, 2004). This expanded cognitive and behavioural repertoire, may enhance an individual's resilience in the face of adversity (Fredrickson, 2001; Tugade & Fredrickson, 2004). Therefore, PA is not understood as a mere by-product but as an active contributor to overcome adversities (Tugade et al., 2004).

Because ESM emphasises the momentary characteristics of resilience and PA, it is more suitable to study the association of resilience and PA as explained by the broaden-and-build theory, than with retrospective methods. Moreover, the association between PA and MR was never investigated before using ESM. Based on the literature showing the relationship between trait resilience and PA, it is plausible an association would also emerge when exploring MMR and momentary PA.

Therefore, individuals with elevated levels of MMR are expected to experience less incline but maintain higher levels of PA throughout the day. Hence, it is expected that demanding situations lead to less negative impact compared with people with lower resilience levels. While this argumentation is accepted in theory, it has not yet been investigated.

Temporal Dynamics of Momentary Mental Resilience

The perspective that mental resilience is a dynamic process (Ong & Leger, 2022; Southwick et al., 2014), calls for an inquiry into its dynamics (Boker et al., 2016). Thus, an investigation into the temporal manifestations of MMR may be of interest. Discovering

resilience fluctuations may offer valuable insights into the concept (Southwick et al., 2014). Additionally, identifying patterns in resilience, particularly in reduced resilience, allows for the development of interventions to enhance resilience (Masten, 2001). However, to date, no studies have examined the temporal fluctuations of MR.

Research has established that various psychological processes exhibit fluctuations with patterns. Notably, mood, and especially PA, is among the variables that exhibit such temporal dynamics, displaying both diurnal variations and weekly cyclicity (Ryan et al., 2010). Especially, there is evidence that PA seems to be higher during the morning hours compared to the remainder of the day. Wood and Magnello (1992) have reported significantly higher levels of PA in the morning between 10.00 and 12.00, indicating a peak in that time period. However, these diurnal variations were only observed for PA and not for negative affect. Similarly, PA was found to rise pronouncedly from the early morning till the noon hours, followed by a sharp decline by Clark and colleagues (1989).

Additionally, contemporary research also posits the presence of a weekly cyclicity of PA, commonly referred to as the weekend effect. This pattern is characterised by heightened positive mood and reduced negative mood on the weekend compared to the weekdays (Cranford et al., 2006). However, there are differences regarding the beginning of the weekend effect, as some studies also report higher PA on Friday and others do not. For instance, Rossi and Rossi (1977) found that women's moods were higher on Friday through Sunday. Comparably, McFarlane et al. (1988) also validated the existence of a weekend effect on mood, encompassing Friday, with daily measures of valence. Likewise, Ryan et al. (2010) found higher PA, higher vitality and decreased physical symptoms at the weekend. However, the weekend effect commenced on Friday night.

Given the close connection of MR and PA, it is plausible that MMR may also exhibit similar temporal patterns. Hence, it may be of value to investigate if MMR also shows higher

levels in the morning compared to the rest of the day, as well as to investigate if the weekend effect can be recreated.

Aim of this Study

The objective of this paper is to investigate whether MMR exhibits diurnal variations and weekly patterns, and to examine the relationship between MMR and PA. To address this research question, ESM will be utilised to collect real-time data about the participants in their daily life. Specifically, I hypothesise i) higher MMR is associated with higher levels of PA during the day; ii) higher MMR is associated with smaller declines in PA during the day; iii) MMR shows diurnal variations, with higher levels anticipated during the morning to noon (i.e., 8.00 am to 12.00 am) compared to the rest of the day, and that iv) MMR shows variations over the week, demonstrating elevated levels during the weekend (i.e., Saturday and Sunday) in comparison to the weekdays (i.e., Monday to Friday).

Methods

Participants

This study aimed at a sample size of around 100 healthy participants aged 18 to 60. Participants were personally recruited from the acquaintances' circle of the researchers and through the social media platform Instagram. Thus, convenience sampling was applied. The participation condition entailed sufficient command of English to comprehend and adhere to the study, and that partakers had no severe cognitive impairment.

Additionally, participants had to own an Android or IOS device with access to the internet. Participants were not reimbursed for the study, but an overview of the individual result was provided upon request. This overview entailed a distribution of mood over the study connected to various variables like social availability. Participants were informed about the nature and guidelines of the study before participating and gave their written informed consent. Approval by the Ethical Committee of the University of Twente was obtained (No. 220631).

Design and Procedure

A within-group ESM design was employed for this longitudinal study to investigate MMR and PA. The study spanned seven consecutive days, with all participants beginning on the same day. After being personally recruited, participants were asked for their E-Mail addresses. Two weeks later, they received the informed consent, including the description and goals of the study. After partakers agreed to the terms, they were invited to download the App Ethica and create an account.

At first, the participants had to fill out a baseline questionnaire, including demographic information (age, gender, sex, education, nationality, occupation) and other questionnaires that were not utilised in this study. Afterwards, the ESM sampling started. The participants received ten notifications per day at random time points in ten blocks of 1 ½ hours between 8.30 and 22.30 from Monday to Sunday. The principle of time-contingent signal sampling was applied to prevent participants from anticipating the notifications. Each notification was available for 10 minutes. The study concluded with a closing questionnaire in which the request for a personal overview could be indicated.

Experience Sampling Method Measures

Momentary Mental Resilience

MMR was measured with three items derived and adapted from the short version of the Connor-Davidson Resilience Scale (Vaishnavi et al., 2007). Two momentary items were utilised, '*Right now, I feel like I can..' deal with whatever comes*' and '*handle unpleasant situations'*. One retrospective item, *'I could handle the event'*, following the request to think about the most stressful occurrence following the last notification, was also employed. Partakers replied on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Mean scores were calculated for the three items.

Positive Affect

Consistent with previous research (Myin-Germeys et al., 2003; Simons et al., 2020), PA was measured by five items. Two high valence, low arousal items (Right now, *I feel.. 'relaxed',' satisfied'*) and three high valence, high arousal items (Right now, *I feel.. 'enthusiastic',' cheerful',' good about myself')* were utilised. Participants responded on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The average was computed for the five items.

Positive Affect Change. The PAC variable was derived by calculating the change in PA between consecutive measurements. The resulting values represent the increase or decrease in PA between the actual time point (t0) and the subsequent measure (t+1).

Temporal Measures

Time of the Day. The scheduled time of each ESM notification was rounded to the nearest whole hour. The hours were then grouped into the categories of 'morning' (8.00 am to 12.00 am) and 'rest of the day' (13.00 pm to 22 pm).

Day Type. The scheduled day of each ESM notification was categorised into 'weekend' (Saturday and Sunday) and 'weekday*'* (Monday to Friday).

Data Analysis

Statistical analyses were conducted with the program R-Studio (version 2023.03.0). A consistent analysis approach was employed for all four hypotheses, utilising a multilevel linear mixed-effects modelling framework. Age and gender were controlled in all analyses. To account for the nested structure of the data, random intercepts were specified for each participant. Maximum likelihood estimation was applied.

To investigate the first hypothesis, namely that higher MMR is associated with elevated PA, the dependent variable was chosen to be PA, and MMR was treated as the independent variable. To explore the second hypothesis that higher MMR is associated with less declines in PAC**,** PAC served as a dependent variable and MMR as the independent variable. To answer

the third hypothesis stating MMR exhibits higher levels during the morning compared to the rest of the day, MMR was treated as the dependent variable, while time of the day served as the independent variable. Lastly, to test the last hypothesis that higher MMR demonstrates higher levels on the weekend than during the week, MMR was chosen as the dependent variable, and day type operated as the independent variable.

Results

Descriptive Statistics

At the outset, a total of 103 participants enrolled in the study. However, 16 partakers were removed due to non-sufficient completion rates of the ESM questionnaire, failure to complete the baseline questionnaire or lack of consent. This final sample included 87 participants (M_{Age} = 30.1, SD_{Age} = 13,78; 56.3% female, 42.5 % male, 1.2 % prefer not to say). Table 1 presents an overview of descriptive statistics, including mean values, standard deviations, and ranges, for the demographics and measures of MMR, PA and PAC within the examined sample.

Table 1

Overview Demographics and Measures

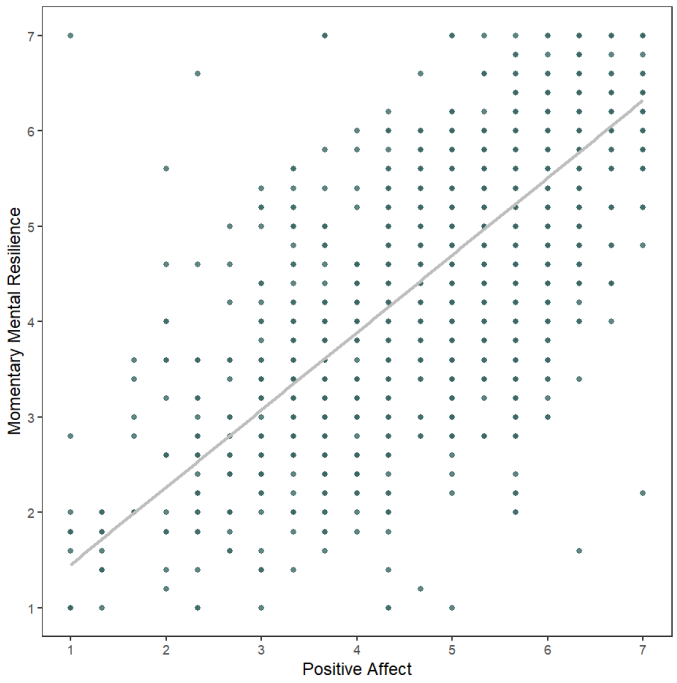
Demographic	Values
Age (years)	
mean (S.D), range	30.1 (13.78), 19-81
Gender, n (%)	
Female	49 (56.3)
Male	37 (42.5)
Prefer not to say	1 (1.2)
Nationality n (%)	
German	27 (31.03)
Dutch	45 (51.73)
Other	15 (17.24)
Education n (%)	
Middle school	16 (18.4)
High school	45 (51.7)
Bachelor	13 (14.9)
Master	7 (8)
PhD	6 (7)
Occupation n (%)	

Working	25 (28.7)
Self-employed	4 (4.6)
Student	29 (33.3)
Studying and working	23 (26.4)
Not working	5 (5.8)
Other	1 (1.2)
Measures	Mean (S.D), Range
MMR	5.1(1.2), 1-7
PA	*4.8(1.3)*, 1-7
PAC	*0.2(1.6)*, -6-7

A strong positive relationship between PA and MMR can be seen in Figure 1. The correlation between the two variables was found to be r = .75.

Figure 1

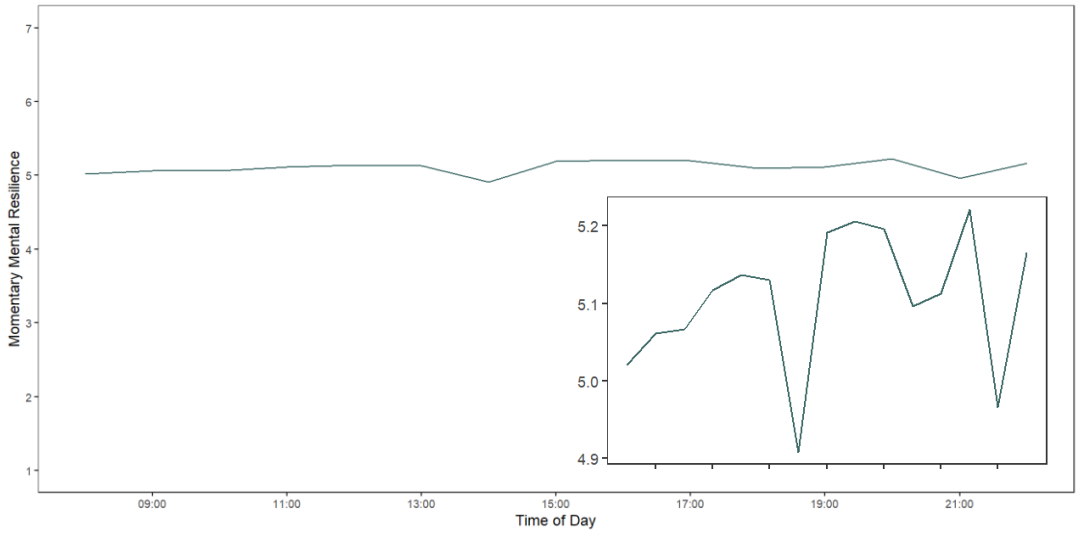
The Relationship between PA and MMR



Depicted in Figure 2 is the relationship between hour of the day and the average MMR of the sample. It can be seen that there is not much variability or visable patterns, and that the average scores are mostly distributed around a MMR of 4.9 to 5.2.

Figure 2

Relationship Between Time of the Day and MMR



To display the withhin variability of MMR, ten randomly chosen variations of participants MMR are displayed in Figure 3.

Figure 3

Ten Examples of Participants' MMR Throughout the Day

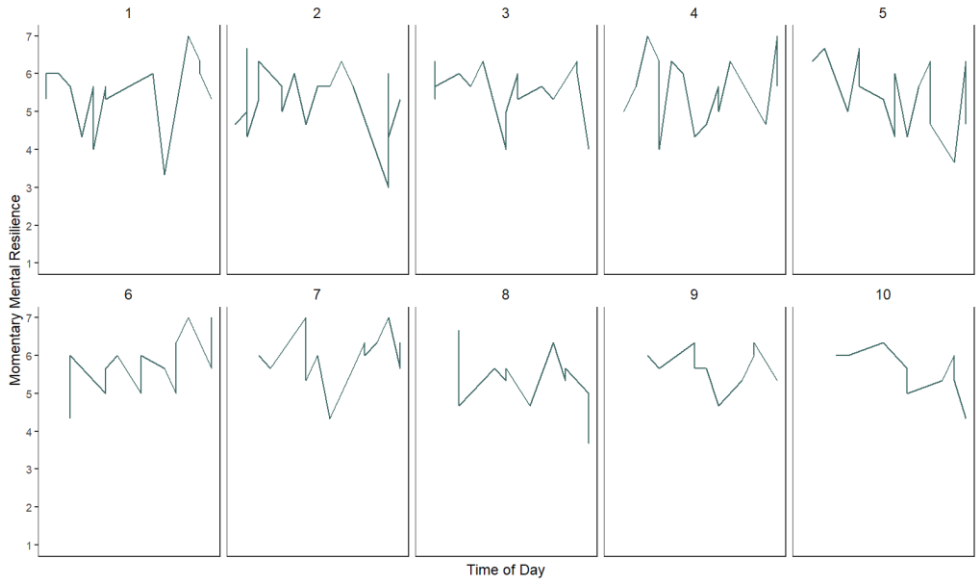
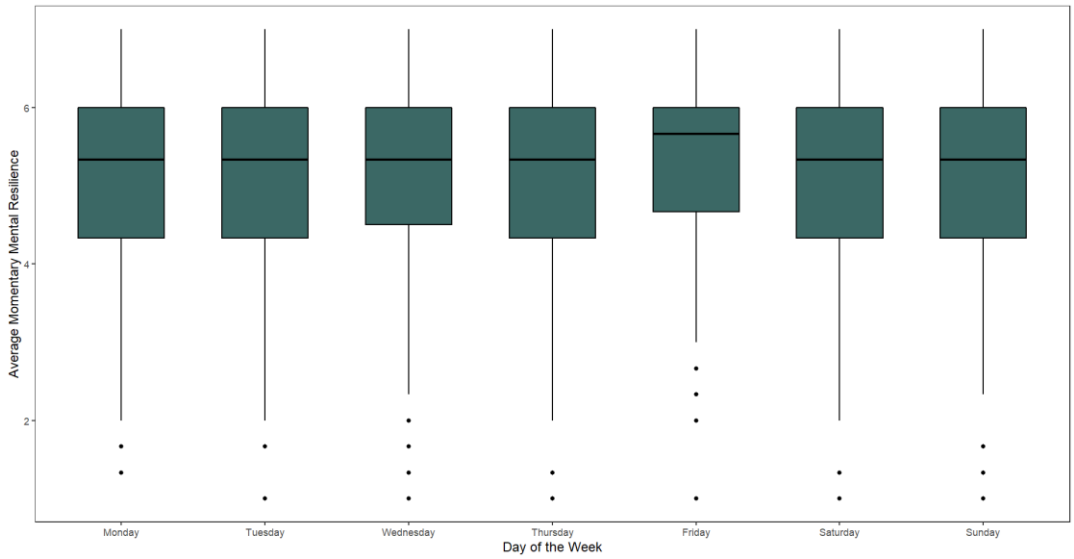


Figure 4 shows the average momentary mental resilience levels of each day of the week. No distinctive variations between the weekdays are apparent, except for Friday, displaying a minimally higher mood than the other days.

Figure 4



Momentary Mental Resilience and Positive Affect

In Table 2 the analysis results for the first hypothesis can be seen. A significant positive association was found between the experience of momentary PA and MMR during the day. Age and gender did not influence the association.

Table 2

Fixed Effects Estimates for the Relationship Between MMR and PA

	Estimate	Std. Error	df -value	t-value	p-value
Intercept	1.489	0.240	110.0	6.191	.001***
MMR	0.683	0.021	1724.0	32.246	.001***
Age	-0.004	0.005	82.0	-0.801	.425
Gender	-0.045	0.105	87.3	-0.424	.673

Note. Asterisks indicate statistical significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

Momentary Mental Resilience and Positive Affect Change

Table 3 presents the results of the analysis examining the second hypothesis. The findings reveal a statistically significant positive association between PAC and MMR throughout the day. With an estimate of 0.271, the analysis indicates that a larger increase in

PA is predictive of resilience one moment earlier. Age and gender had no effect on the analysis.

Table 3

Fixed Effects Estimates for the Relationship Between MMR and PAC

	Estimate	Std. Error	df- value	t-value	p-value
Intercept	-0.892	0.185	1811.0	-4.806	.001***
MMR	0.271	0.031	1811.0	8.722	.001***
Age	-0.004	0.003	1811.0	-1.396	.163
Gender	0.281	0.1653	1811.0	-1.688	.092

Note. Asterisks indicate statistical significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

Diurnal Temporal Dynamics of Mental Resilience

Table 4 presents the results of the multilevel regression analysis conducted for the third hypothesis. No statistically significant difference between morning and rest of the day regarding MMR was found ($p > .05$). Age and gender did not influence the relationship.

Table 4

Fixed Effects Estimates for the Relationship Between MMR and Time of Day

	Estimate	Std. Error	df-value	t-value	p-value
(Intercept)	4.150	0.346	89	11.937	.001 ***
Rest of the Day	0.034	0.039	1735	0.865	.387
Age	0.012	0.007	87	1.652	.102
Gender	0.275	0.163	89	1.686	.095

Note. Asterisks indicate statistical significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

Weekly Temporal Dynamics of Mental Resilience

Table 5 presents the results of the multilevel regression analysis conducted for the fourth hypothesis. No statistically significant difference between weekend and weekdays in regards to MMR was found ($p > .05$). Age and gender had no effect on the analysis.

Table 5

Fixed Effects Estimates for the Relationship Between MMR and Day Type

	Estimate	Std. Error	df-value	t-value	p-value
(Intercept)	4.179	0.348	88.4	12.021	.001 ***
Weekend	0.002	0.045	1739	0.039	.969
Age	0.012	0.007	87.01	1.656	.101
Gender	0.276	0.163	88.93	1.692	.094

Note. Asterisks indicate statistical significance (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$).

Discussion

The objective of this study was to explore the general temporal patterns of MMR throughout the day and the week, and to examine its relationship with PA. The hypothesis suggesting that MMR is higher during the morning than the rest of the day, was rejected on the base of the findings. Additionally, there was also no support found for the hypothesis that MMR is higher during the weekend than the weekdays. The two hypotheses pertaining to PA yielded significant results. Higher MMR was associated with elevated levels of PA and with smaller declines in PAC.

Daily Temporal Dynamics of Momentary Mental Resilience

The found results are not in line with the daily and weekly temporal dynamics found for PA (Ryan et al., 2010; Stone et al., 1996). This may have multiple reasons. The complex and individual nature of resilience may explain the lack of predictability between daily fluctuations of averaged MMR and time of the day (Kalisch et al., 2017). Different internal and external factors influence resilience, such as coping strategies, personality, and the contextual environment. These factors are highly individual, and the concept may be centred around them (Ungar, 2021; Windle, 2011). Consequently, this heterogeneous and individual-centric nature of resilience could render it less predictable in terms of average temporal patterns. Therefore, it may be challenging to find a general resilience pattern when investigating the overall resilience of the whole sample.

Moreover, it is essential to consider that this study focuses on the temporal dynamics during the day. It may be that mental resilience shows patterns over alternative temporal dynamics. For example, some studies found that mood varies based on the seasons, with higher PA in spring than in autumn and winter (Winthorst et al., 2020). These seasonal mood variations have been linked to very impactful changes in mental well-being. For instance, some

individuals experience seasonal affective disorder (Lam & Levitan, 2000). So it may be insightful to also investigate MMR on a seasonal basis.

Furthermore, the absence of general patterns across the whole sample suggests the necessity to take a more individualist approach and investigate personal patterns in MMR (Ellison et al., 2020). Such stable variations may be utilised to create resilience interventions catered to individuals' specific needs. This could involve identifying optimal times for resilience-building practices based on an individual's unique MMR patterns (Macedo et al., 2014). For example, if someone demonstrates high resilience consistently during the morning, which declines towards the end of the day, they may benefit most from engaging in some exercise during the noon/afternoon to bolster their resilience for the rest of the day. Additionally, individual patterns may reveal the reason for lower resilience levels. For example, if patterns show that resilience always drops in connection with specific variables, such as inadequate sleep quality, certain social interactions, or the environment. These leading causes may be identified and can be directly approached.

Furthermore, it could be that the connection between PA and MMR is not as straightforward as it seems and that there are factors mediating the relationship, that may have to be taken into account when looking at the temporal dynamics of MMR. One point is that the reported variations of higher MR in the morning hour does not apply to everyone. For example, there is a diurnal variation in mood that is typical for depressed individuals, which is characterised by lower mood in the waking hours that slowly improves till the evening (Murray, 2007)**.** Additionally, there is also some evidence that morningness-eveningness plays a role in individuals' moods during the morning hours. So the sleep patterns and overall time preferences of an individual may have to be accounted for (Hasler et al., 2010).

Positive Affect and Resilience

Association of Positive Affect and Momentary Mental Resilience

The findings regarding the association between MMR and PA are consistent with those of Sagone and Indiana (2017) and Pillay et al. (2022), who found the same association between trait resilience and PA. The same results were replicated when investigating resilience from a dynamic perspective using ESM, thus going beyond the trait-level measurement. This finding underlines that the relationship holds in real-time and naturalistic settings. Moreover, using different methods and finding the same association emphasises the relationship's validity and reliability. It suggests that the association is not solely a product of participants' biases when recalling their experiences (Levine & Safer, 2016) but is indeed present in the momentary fluctuations of resilience and affect.

Association Positive Affect Changes and Momentary Mental Resilience

The observed association suggests that individuals with higher mental resilience are less prone to PA drops. This observation is in accordance with the status quo understanding of resilience. Moreover, it also fits well with Ong and Leger's (2022) concept of sustainability, which implies that resilient individuals can also preserve their well-being and health, even before the stress recovery phase.

Utilising Positive Affect to Improve Mental Resilience

The study's results highlight the importance of positive emotions in the context of resilience. This finding aligns with the broaden-and-build theory (Fredrickson, 2001), which hypothesises that positive affect is crucial in enhancing adaptive coping strategies and promoting resilience. This association also has important practical implications. According to supporters of the position that resilience is a dynamic process, not a trait, resilience is highly modifiable and can be improved (Connor & Zhang, 2006; Southwick et al., 2014).

In line with a salutogenic orientation, it means that inventions to increase and improve PA may also indirectly improve an individual's resilience and, thus, overall health. There are already many interventions to improve mental resilience. Multiple systematic reviews

(Helmreich et al., 2017; Macedo et al., 2014) investigated the efficacy of various resilience interventions and concluded that despite the unanimous operationalisation of the construct and great heterogeneity in the studies, they helped improve resilience levels. Because most interventions targeted to enhance resilience originate from positive psychology, they often involve the improvement of PA (Helmreich et al., 2017). However, it may be even more emphasised in these interventions to enhance individuals' resilience and overall psychological well-being.

Strengths and Limitations

This study contributed to resilience research by investigating MMR with ESM as one of the first few studies. Additionally, by employing ESM, resilience was investigated from a more dynamic point and with better representativity and validity. Moreover, the acquired sample of 87 partakers is quite large for an ESM study and provides substantial data points for analysis (Trull & Ebner-Priemer, 2020). Finally, due to the under-researched nature of resiliency patterns, this study may also serve as a starting point for other research.

Several factors warrant caution when looking at this paper. Firstly, this study employed a convenience sampling method, which may negatively impact the generalisability of the findings. Moreover, ESM observations rely on the subjects' compliance, as highlighted by Wichers et al. (2007). Furthermore, as for all self-report measures, there is the risk of potential biases like social desirability (Myin-Germeys & Kuppens, 2022). Moreover, as indicated by the participants, individuals are less inclined to react to the ESM notifications in moments characterised by heightened emotional arousal or involvement in a task. This bias creates a methodological problem in experience-sampling studies (Schimmack, 2003).

Finally, it should be mentioned that even though the participants were supposed to fill out the baseline questionnaire on the initial day of the study, technical issues with the Ethica application caused a delay. Thus, causing some participants to complete the questionnaire later

than intended. This may be problematic, as it caused unnecessary confusion, potentially impacting the participants' motivation to continue with the study.

Future Directions

Based on this paper, multiple issues may be addressed in the future. Because no relationship between hours of the day and resilience was found, it may be interesting to investigate the temporal dynamics over a different period span, for example, a week or over the seasons. Moreover, it should be examined if and how resilience fluctuates around other variables, for example, social support or the environmental context. By examining resilience within these broader temporal contexts, researchers can gain deeper insights into the multifaceted nature of resilience and its relationship with time. Moreover, a more individualist approach, namely investigating people's unique MMR patterns, may be needed.

This study establishes an association between resilience and PA, which have practical implications that can improve well-being and overall health.. From the point of this study, there seems to be a bidirectional relationship, with both variables, MMR and PA, influencing each other. However, research may be needed on the finer details of this relationship, for example, to find out which direction is stronger and which variables may influence the relationship.

Conclusion

The study's findings contribute to understanding resilience and its relationship with PA. No consistent daily or weekly patterns of MMR were found, but it was associated with PA and less decline in PAC. The lack of predictable general daily fluctuation may be due to the complex and individual nature of resilience, influenced by various internal and external factors. Additionally, the association of MMR and PA can be utilised to improve interventions that aim to increase resilience and, thus, overall well-being.

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