Exploring Shared and Unique Temporal Dynamics between Mentalisation, Epistemic Trust and Well-Being: A Time-Series Study of Young Adults

BSc. Thesis

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Abstract

Mentalisation and epistemic trust are critical psychological constructs that influence well-being, especially among young adults navigating the transition to adulthood. These constructs were mostly investigated with cross-sectional or longitudinal studies which leaves a gap in intensive longitudinal designs. This study investigated the contemporaneous and lagged effects of momentary levels of mentalisation and epistemic trust on subjective well-being outcomes among young adults.

The study employed an experience sampling method (ESM) to collect data in real-time from 22 participants 6 times per day over 14 days. This intensive longitudinal data resulted in an average of 69 measurement points per person with a compliance rate of 81,9% gathered through the m-Path smartphone application. The participants were predominantly German (72.73%) female (68.18%) students. The data was analysed using the Group Iterative Multiple Model Estimation (GIMME) network analysis approach, which is data-driven and allows for the identification of associative patterns at the group, subgroup and individual levels.

The raw data of mentalisation, epistemic trust and well-being revealed that the three constructs showed variability over time. The results of GIMME demonstrated mostly positive effects both between and within the latent variables derived from the items measuring the constructs. Lagged effects were observed within the same constructs at the group level, suggesting that each construct affected itself over time. Six distinct subgroups were identified among the sample, which highlighted the overall heterogeneity among the participants. Finally, person-specific analysis was found to be important due to the unique patterns between individuals.

In conclusion, this study emphasises the fluctuation of mentalisation and epistemic trust over time. It is important to further investigate the state-like characteristics of the variables, especially in terms of how contextual and situational factors affect these fluctuations. Overall, the findings have significant implications for the design of interventions aimed at enhancing flourishing and psychosocial well-being among young adults, particularly concerning the need for personalised treatment approaches and consideration of individual variability.

Exploring Shared and Unique Temporal Dynamics between Mentalisation, Epistemic Trust and Well-Being: A Time-Series Study of Young Adults

Overall well-being is significantly influenced by the development of certain skills and competencies like emotion regulation, stress management or problem-solving. These abilities empower individuals to overcome challenges and promote well-being to maintain a constructive relationship with themselves and others (Muller et al., 2023). One of the fundamental challenges in psychology is to identify and understand the subtle ground of self-awareness and interpersonal dynamics. Exploring how individuals understand and interpret their own thoughts along with the trust placed in knowledge, can offer valuable insights about the complex relationships influencing daily well-being. These cognitive processes are explored with terms such as social intelligence, theory of mind and emotional intelligence and reflect an ongoing interest in psychology but also lead to a variety of related concepts associated with similar functions (Ballespi et al., 2021).

Central to this understanding of mental awareness is the concept of mentalisation. The role of mentalisation has been studied for some time, but research in that field has been increasing in recent years (Luyten et al., 2024). Mentalisation refers to the ability to understand and interpret the thoughts, beliefs, feelings and emotions of oneself and others. It also includes the capacity to attribute mental states such as desires, attitudes and intentions to oneself and others to make sense of behaviour and social interactions. (Ballespi et al., 2021; Fonagy et al., 2019; Luyten et al., 2020). Research demonstrates that mentalisation is not just a skill but a comprehensive cognitive and emotional competence that develops optimally in a secure attachment relationship (Fonagy & Allison, 2014). Thus, the ability to mentalise is also a major developmental milestone that extends individual cognition.

Furthermore, secure attachment relationships also play a crucial role in trusting knowledge and intentions communicated by others (Fonagy & Allison, 2014). Placing trust in information, known as epistemic trust, is also recognised as a developmental achievement and cannot be explained by mere compliance (Li et al., 2023; Locati et al., 2023). Epistemic trust entails both belief in and reliance on a person, requiring a combination of faith and dependence. This concept goes beyond simply believing in information; it also includes affective attitudes and feelings towards the trusted person. It involves the openness to regard the knowledge or statements of others as reliable and applicable to oneself and to trust that the information provided by another person is correct and well-founded (McCraw, 2015). This trust is particularly important in various areas of life such as education, (professional)

relationships, collaborations and everyday decision-making, where people need to rely on others for information, guidance or expertise (Campbell et al., 2021).

Epistemic trust and mentalisation are not only important concepts on their own, but they also exhibit a reciprocal influence on one another. Research indicates that mentalisation promotes the establishment of epistemic trust (Parolin et al., 2023). This means, that individuals who are better at perceiving and interpreting the thoughts and feelings of others are more likely to trust the information provided by those individuals. Furthermore, studies have shown that mentalisation and epistemic trust contribute to the quality of interpersonal relationships (Allen, 2018; Campbell et al., 2021; Fonagy & Allison, 2014; Li et al., 2023). Mentalisation processes enable individuals to interpret social cues and feedback from others, which in turn affects their judgement of the trustworthiness and reliability of others (Fonagy et al., 2019). Additionally, effective communication depends on both mentalisation and epistemic trust (Locati et al., 2023; Muller et al., 2023). On the one hand, mentalisation skills facilitate understanding the perspectives and intentions of others and foster empathy during communication (Allen, 2018). On the other hand, epistemic trust enables individuals to rely on the information provided by others and integrate it into their own knowledge base (Locati et al., 2023). Therefore, higher levels of mentalisation are associated with greater empathy, perspective-taking, and understanding in relationships, while higher levels of epistemic trust facilitate cooperation and intimacy.

The evidence is mounting that disruptions in epistemic trust and mentalisation are linked to poorer well-being and mental disorders. Studies of clinical populations have identified associations between hampered metallisation, epistemic trust and a range of psychopathologies such as borderline personality disorder, depression and psychosomatic disorders (Campbell et al., 2021; Fonagy & Allison, 2014; Locati et al., 2023; Riedl et al., 2023). Li et al. (2023) highlight a key finding in their review that disruptions in epistemic trust during developmental stages hinder the understanding of self and others. They emphasise the importance of fostering epistemic trust through positive experiences in social interactions to mitigate the risk of a predisposition to psychopathology. Building on this, research has begun to examine these dynamics in non-clinical samples. For example, a recent study by Parolin et al. (2023) examined the complex interplay between mentalisation and epistemic trust and considered its role as a protective instrument against emotional dysregulation in internalizing symptoms in adolescents. Consequently, it is becoming evident that these concepts play a crucial role in understanding and managing mental health issues and ultimately contributing to an individual's overall well-being.

Despite the known protective benefits, existing research on mentalisation and epistemic trust is limited in scope and does not address all relevant aspects. Most of the recent interest in psychology exploring these two concepts has focused on clinical populations and psychopathological research rather than with healthy individuals, which leaves a gap in understanding how these concepts operate in a young and robust population (Allen, 2018; Duschinsky & Foster, 2021; Fonagy et al., 2019; Li et al., 2023; Luyten et al., 2024). Additionally, these studies have predominantly employed cross-sectional or longitudinal designs with only a few measurements. While these designs allow for between-person comparisons, the extent of fluctuation in mentalisation and epistemic trust within individuals over time remains unclear. Examining dynamics and interactions throughout the day could provide valuable insights into their impact on overall well-being. This is particularly relevant because of the increasing prevalence of poor mental well-being among young adults (Hartson et al., 2023), a trend that merits further investigation into the potential role of mentalisation and epistemic trust. The question of whether mentalisation and epistemic trust are trait-like (static) or state-like (fluctuating) characteristics remains open.

To explore this in more detail the experience sampling method (ESM) can be applied. Also known as ecological momentary assessment, ESM is gaining popularity in mental health research and is used to investigate the current state of individuals. Within this study design, participants are asked to report on their thoughts, feelings, behaviours or environment multiple times throughout the day to collect data in real-time or near-real-time (Gabriel et al., 2018; Palmier-Claus et al., 2019). In contemporary applications, participants are repeatedly prompted by their mobile phones to answer questions (Shevchenko & Reips, 2022). ESM designs have gained increased interest because of the advantages of improved data quality, context reconstruction, real-time study monitoring, reduced recall bias, improved ecological validity and assessing within-person variability (van Berkel et al., 2017). The intensive and repeated measurements of multiple individuals that are generated, lead to the creation of detailed and dynamic data which is known as intensive longitudinal data (Bolger & Laurenceau, 2013). While existing research using ESM has delved into well-being in relation to other psychological factors such as mood and behaviour (Palmier-Claus et al., 2019), initial studies have also started exploring mentalisation with ESM (Martin, 2022). However, there are currently no studies examining the intersection of epistemic trust and ESM.

The interest in capturing dynamic processes has increased over the past years and has called for idiographic statistical methods to develop personalised models of individual processes, a departure from the previous main reliance on cross-sectional studies. This shift

started a movement towards personalising diagnosis and intervention which also extended to psychology because traditional psychopathology models based on between-person data may not adequately capture within-person processes (Molenaar, 2004; Voelkle et al., 2014). The incorporation of ESM is a fundamental aspect of the development and further investigation of the idiographic dimension. Group Iterative Multiple Model Estimation (GIMME), a statistical network approach developed by Gates and Molenaar (2012), addresses the need by bridging the gap between idiographic and nomothetic levels of analysis. This means that the method allows researchers to analyse time-series data from multiple individuals to identify general patterns within the group, while simultaneously examining variations within each individual over time. This represents a significant shift in psychological methodology, with a focus on the time-dependent variations of individual psychological processes. Adopting a person-specific paradigm is crucial for capturing the unique dynamics of each individual's psychological functioning and for optimising clinical interventions.

The present study aimed to fill a significant research gap by examining the temporal relationships between mentalisation, epistemic trust and well-being in young adults, using GIMME and ESM data. The objective was to explore how these constructs interact over time to shed light on their potential impact on overall well-being. This novel exploration seeked to clarify how mentalisation, epistemic trust and well-being dynamically affect each other, including both lagged effects, where the influence of one construct at an earlier point in time affects another at a later point in time, and contemporaneous effects, where the constructs influence each other simultaneously. Given that young adulthood is a crucial developmental period characterised by multiple challenges and profound social implications and to promote healthy resilience and flourishing without specific mental health diagnoses, this demographic group was chosen as the study population. Thus, the two central research questions guiding this investigation were:

1. *"What are the contemporaneous and lagged effects of mentalisation and epistemic trust on overall well-being outcomes among young adults?"*
2. *"Can subgroups of participants with similar patterns between mentalisation, epistemic trust and well-being be identified?"*

Methods

Study design

In this study, the relationship between mentalisation, epistemic trust and subjective well-being of young adults was investigated over 14 days using ESM. This explorative study was part of a larger project that involved three researchers who focused on psychological

research as part of the bachelor thesis. Importantly, not all of the collected data in the overarching study, such as personality or contextual data, was relevant to the aims of the current study and was therefore left out. Ethical approval for the study was obtained from the Ethics Committee of the Faculty of Behavioural, Management & Social Sciences at the University of Twente on February 26th, 2024 (Study request number 240111). The participants signed the informed consent form (see Appendix A) during the intake meeting before collecting any data. The data was collected between April and May 2024. The adapted STROBE checklist for reporting EMA studies (CREMAS) was utilised to ensure comprehensive reporting standards (Liao et al., 2016).

Participants

A total of 24 participants were recruited for this study using a sampling strategy that included a mix of convenience, snowball and volunteer sampling methods. Recruitment was facilitated through SONA, a platform for students from the University of Twente in the Netherlands. Students who participated in this study received 3.25 SONA research credit points (a currency for students at the University of Twente for taking part in research, used as extra credits). The inclusion criteria were: they had to be between 18 and 35 years old, own a device with an IOS or Android system, be willing to download an app on their device and have basic English language skills. To ensure an accurate estimation, one participant was excluded because of a low response rate (<50%). Additionally, one participant was excluded due to constant data. In time series modelling, such as GIMME, it is often not possible to estimate models when variables are constant, because they do not provide any variability or information for the model to work with. The data of this specific participant showed almost no variance over time and GIMME could not estimate the network. Consequently, the final sample for the analysis consisted of 22 participants.

Measures

The study consisted of multiple questionnaires, including the intake survey and the daily questionnaires. The intake survey compromised several demographic questions, such as age, gender, nationality, current occupation and marital status. The m-Path app facilitated the administration of both the intake survey and the daily questionnaires (see Appendix B). M-Path (www.m-Path.io) is an online platform designed to facilitate smartphone-based experience sampling methods in both clinical and research settings. With a focus on real-time monitoring and intervention, m-Path offers a customisable framework and researchers can set up adaptable ESM designs (Mestdagh et al., 2023).

The daily questionnaires for this study were administered six times per day over a two-week period, fired semi-randomly within a 2-hour time frame. This is in line with the recommendation for optimal compliance (van Berkel et al., 2017) and to ensure enough data for GIMME estimations (Beltz & Gates, 2017). The participants received notifications on their devices, prompting them to respond to the questions. The participants needed to respond to each question and they were only allowed to answer once. They had the option to revise their last response while doing the survey. If the participants did not take action, they received a reminder after 10 minutes, and the specific questionnaire would expire after 30 minutes. These settings facilitated timely data collection and ecological validity.

The daily momentary questionnaire was composed of items extracted from established scales, including the Certainty About Mental States Questionnaire (CAMSQ, Muller et al., 2023) and the Warwick–Edinburgh Mental Well-being Scale (WEMBS, Tennant et al., 2007). The questionnaires were adapted for ESM to ensure appropriateness and capture momentary impressions by adding reference periods like “right now” or “currently” (See Table 1). The decision to develop a shortened questionnaire was influenced by practical considerations of participant burden. Completing a comprehensive 30-40-item questionnaire 6 times a day would be inconvenient for participants and decrease participants’ compliance. Therefore, each prompt consisted of 11 questions, with three items assessing each construct: mentalisation, subjective well-being, and epistemic trust. Additionally, participants were asked about their current activity and current company during each prompt to provide context for their responses. Each of the construct items was rated on a 7-point Likert scale from 1 ("not at all") to 7 ("very much"). This approach has been shown to be both sustainable and effective in capturing affective states in ESM studies, as evidenced by a recent comparison of Likert and Visual Analogue Scales (Haslbeck et al., 2024).

The CAMSQ was used to assess mentalisation, with three items specifically selected as they were considered particularly relevant to the construct and the aims of the study (Muller et al., 2023). Items 4, 9 and 16 were the chosen original items because they demonstrated high factor loadings in the samples of the original study. Additionally, they only measure self-certainty in comparison to other-certainty, aiming to limit the number of items while maintaining a comprehensive assessment.

Well-being was measured using a subset of three items from the WEMBS (Tennant et al., 2007). Despite not having the highest factor loadings, items 3, 7, and 9 were selected for the current study because they were still above 0.7 and because while translating them into the ESM context, the interpretation remained consistent with the original intention and

understanding (Marmara et al., 2022; Tennant et al., 2007). The selected items reflected the participants' current level of relaxation, clarity of thought, and feelings of closeness to others.

The questionnaire to assess epistemic trust was created for this study and involved the collaboration of the three researchers of the overarching study. Existing questionnaires measuring epistemic trust could not comprehensively capture the momentary aspect that is essential for ESM data collection. For example, the Epistemic Trust, Mistrust, and Credulity Questionnaire developed by Campbell et al. (2021) provides insights into individuals' epistemic stance but are based on retrospective self-reports rather than real-time assessments (e.g., In the past, I have misjudged who to believe and been taken advantage of). Therefore, the process of developing the items began with brainstorming to identify relevant questions, followed by consolidation of similar items and integration of feedback to complete the final questionnaire. Through this iterative process, insights were gained from various existing questionnaires on epistemic trust, allowing for a comprehensive examination of the construct. In addition, one item was reversely worded to control for response bias and enhance validity.

Table 1

Description of ESM Items

Construct of Interest	Item	Response option
Mentalisation	I understand why certain things make me happy right now. / I understand my feelings right now. / I currently know the reason for my behaviour.	1 "not at all" to 7 "very much"
Well-being	I am feeling relaxed right now. / I am thinking clearly right now. / I am feeling close to other people right now.	1 "not at all" to 7 "very much"
Epistemic Trust	I currently feel open to absorbing new information. / I don't feel like learning new things from others right now. (R) / I currently feel I can rely on my knowledge to make decisions.	1 "not at all" to 7 "very much"

Note. The "(R)" indicates the reversed item.

Procedure

Participants were given the option to choose between an online session or a face-to-face meeting with one of the researchers for an intake interview. After registering for the study, they received an email with precise location details or a Zoom link for the online meeting. During the intake session, participants obtained a comprehensive explanation of the study, which included objectives, procedures, potential risks and benefits, measures to maintain confidentiality and their right to withdraw from the study at any time. The importance of answering as many questions as possible during the study period was emphasised. In addition, participants were informed that those who answered 80% or more of the daily questions had the opportunity to win a 50€ Amazon voucher. These two approaches were chosen to mitigate potential low response rates. Participants had the opportunity to ask questions about the procedure and filled in their informed consent form during the interview.

The researcher then assisted participants in downloading and setting up the m-path application on their phones and ensured a smooth installation process. Participants were asked to enter the researcher's code into their m-path app so that the researcher had access to the participants and could monitor their responses. Once the application was successfully set up, the intake survey was sent to the participant's phone to check the notification processes and functionality of the application. After completing the intake survey, which took about 10 minutes, participants had another chance to ask questions. The researchers also recorded the participants' typical wake-up times or daily routines and then the meeting was closed. The entire intake session lasted around 30 minutes.

Following the session, the researchers configured the settings for each participant individually. The timing of the prompts was customised to each participant's daily routine, with the first and last prompts scheduled during waking hours, while the remaining prompts were evenly distributed to ensure uniform recording of time dynamics across participants. Participants were prompted at 6 semi-random time points within a two-hour time slot to ensure variability and minimize predictability (Gabriel et al., 2018). Throughout the 14-day data collection period, the researchers were available to address any technical issues or concerns that participants had.

Data Analysis

To answer the research questions, a comprehensive analytical approach was employed to analyse the collected data from the participants. The analysis examined the dynamic changes of the variables over time and explored their relationships with the GIMME approach. The analyses were carried out using the free statistics program R (version 4.1.1

"Kick Things") and the gimmeSEM function from the gimme R package (Lane & Gates, 2017). After downloading the data sets individually for each participant, the next step was to convert them into formatted tables that could be read, combined and analysed by R.

In the analysis of the descriptive statistics, the files for each participant were combined and sample estimates of the data were established. This included a detailed description of the characteristics of the participants, such as age, gender, nationality, current occupation and marital status (see Table 2). Additionally, the count of measurement responses over the 14-day period was assessed to evaluate participant compliance. The mean of the three-item constructs was calculated to analyse fluctuations of the variables over time and to identify trends and patterns in mentalisation, epistemic trust, and well-being among participants. The negatively phrased epistemic trust item was reverse-scored to maintain data accuracy.

The study employed the GIMME approach to examine patterns of change over time. This data-driven method was first proposed by Gates and Molenaar (2012) and further developed by Lane et al. (2019) and offers a unique approach to bridging the gap between idiographic and nomothetic data. GIMME allows to estimate group, subgroup and individual models from intensive longitudinal data and then searches for common patterns between these models. The idiographic approach focuses on understanding the unique characteristics of individuals, while the nomothetic approach seeks to identify general principles across the group. The process involves an iterative estimation that initially focused on paths existing in the majority of the sample and then incorporates individual-specific characteristics in later runs (Wright & Woods, 2020). The method has shown promise in various research contexts, such as fMRI studies, studies of sleep, affect processes in depression and studies of daily behavioural dynamics in personality pathology (Wright & Woods, 2019).

GIMME operates within a unified structural equation modelling framework (uSEM) that offers estimates for both lagged (where the influence of a variable is observed at a later point in time) and contemporaneous effects (where variables influence each other simultaneously) (Lane & Gates, 2017). By incorporating both types of effects, GIMME connects two popular methods for analysing time series data: vector autoregression (VAR) and structural equation modelling (SEM). As a result, this framework allows for the study of temporal dynamics between constructs, making it particularly suited to study the complex relationships explored in this thesis. Previous research has investigated the validity and reliability of uSEM for generating personalised estimates from intensive longitudinal data sampling (Gates et al., 2017; Wright & Woods, 2020). In the context of the current study, which assessed well-being, epistemic trust, and mentalisation, it is noted that while many

applications of GIMME have typically employed 4 to 10 variables, the software is generally effective with a range of 3 to 20 variables (Beltz & Gates, 2017).

Due to the semi-random data collection of 6 prompts per day within a 2-hour window, which nevertheless led to regular intervals on average, except for the fact that there are no measurements during sleeping times (which is typical in ESM), the data fulfilled the requirement for an evenly distributed time series for the GIMME analysis (Beltz & Gates, 2017). While there are no specific requirements for sample size in GIMME analysis, larger sample sizes, in terms of number of participants, are generally preferred to ensure robust findings. However, Beltz and Gates (2017) demonstrated the applicability of GIMME with a sample size of 10 participants. Many studies using GIMME have typically employed time series of at least 100 measurements, although analyses with fewer measurements have also been conducted (Beltz & Gates, 2017). The current study compromised a maximum of 84 measurements (6 x 14) per participant and is thus acceptable.

To prepare the data for the GIMME analysis, the information on each participant was summarised in a list. This list served as a container holding the data frames, with each person's data stored separately. The list contained data frames for each individual, arranged in rows to represent measurement points and columns to represent the items of well-being, mentalisation, and epistemic trust. Then, the latent variables were computed for each construct, with each construct being represented by the three measured items. The latent variable calculation was performed without confirmatory analysis, as two of the three constructs have already been validated, and this approach aligned with the scope of the thesis, which emphasised exploratory data analysis.

Subsequently, uSEM supported by GIMME was employed to estimate the relationships between mentalisation, epistemic trust and well-being over time. The GIMME analysis started by searching lagged and contemporaneous effects (i.e., regression paths) to enhance uSEM fits for most participants. The default majority threshold of 75% was used. The significance of each hypothesised path was determined using modification indices, which were corrected for multiple comparisons. GIMME selected significant paths for individuals, which were estimated separately for each individual. This approach treated each participant as a unique sample and identified relations that occurred consistently across all samples. Outliers with strong effects in other combination approaches could influence the results, but GIMME ensured that all individuals made the same contribution that described the majority of the group. The paths might have turned in different directions for individuals, but the relationship was significant for the majority (Wright et al., 2019).

The estimation process of the GIMME model comprised three distinct sets of paths that contribute to each model: group-level paths, subgroup-level paths, and individual-level paths. Group-level paths were estimated freely for all individuals in the sample and included lagged paths for each variable, as well as any contemporaneous or lagged associations that were identified during the iterative search. After identifying group-level effects, individuals could be categorised into subgroups based on estimates of group-level pathways and paths shared by a subgroup of the sample. Subgrouping refined the data search algorithms and identified patterns that reoccurred in subgroups. It did not create fixed subtypes but grouped individuals with similar coefficient patterns. Subgrouping created a similarity matrix based on estimates and patterns and grouped individuals with similar estimates and effects. The modularity value represented the division strength of the network in its subgroups. GIMME prioritised group and subgroup-level paths, then searched for person-specific relations until an excellent fit was found that provided unique estimates and path structures for all individuals (Wright et al., 2019).

Results

Participants

The final sample consisted of 22 participants, 15 females and 7 males. Ages varied between 18 and 28 years, with a mean age of 23.14 years and a median of 23 years. The participants were from five different countries with the majority being from Germany and most were students (See table 2).

Table 2

Sociodemographic Characteristics of Participants

Demographics	Sample (n = 22)		Subgroup 1 (n = 7)		Subgroup 2 (n = 11)		Other (n = 4)	
	n	%	n	%	n	%	n	%
Gender								
Female	15	68.18	3	13.64	9	40.9	3	13.64
Male	7	31.82	4	18.18	2	9.09	1	4.55
Nationality								
German	16	72.73	7	31.82	7	31.82	2	9.09
Dutch	2	9.09			1	4.55	1	4.55
Spanish	1	4.55			1	4.55		

Demographics	Sample (n = 22)		Subgroup 1 (n = 7)		Subgroup 2 (n = 11)		Other (n = 4)	
	n	%	n	%	n	%	n	%
Lithuanian	1	4.55			1	4.55		
Polish	2	9.09			1	4.55	1	4.55
Current occupation								
Student	15	68.18	4	18.18	8	36.36	3	13.64
Student & Part-time working	3	13.64	1	4.55	1	4.55	1	4.55
Full-time working	1	4.55	1	4.55				
Other	3	13.64	1	4.55	2	9.09		
Marital status								
Single	10	45.45	2	9.09	6	27.27	2	9.09
In a relationship	12	54.55	5	22.73	5	22.73	2	9.09

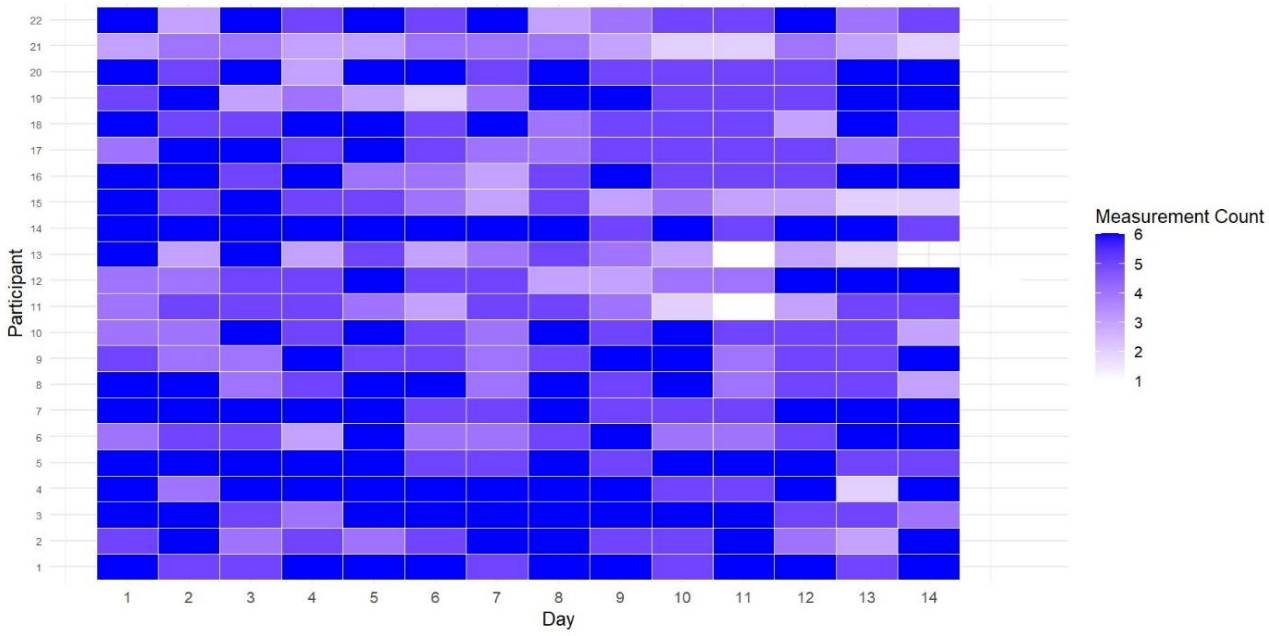
Note. n = 22. Participants were on average 23.14 years old (*SD* = 2.47). Subgroups reflect the subgroups with similar paths identified by GIMME (see below).

ESM Compliance

Figure 1 visualises a heat map of the measured 14 days of each participant. Light colours represent fewer responses on that specific day whereas dark colours show a higher response count. The maximum count is 6. Some participants demonstrated unwavering adherence throughout the entire duration of the study. Their cells on the heatmap remained consistently dark, suggesting a high frequency of responses. In general, the mean response count was 68.78 out of the 84 daily prompts, corresponding to a response rate of 81.9% with no obvious trend of decreasing compliance rates over time.

Figure 1

Heat Map of Participant Compliance over 14 Days

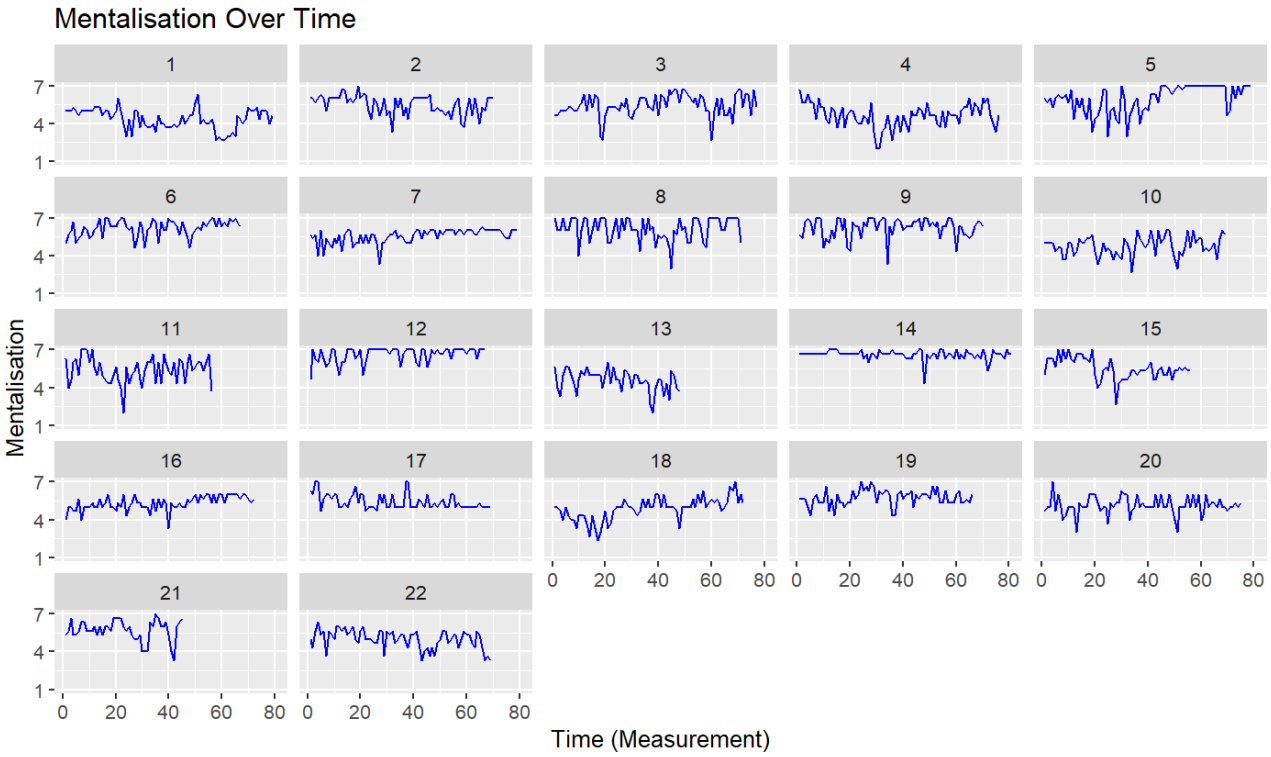


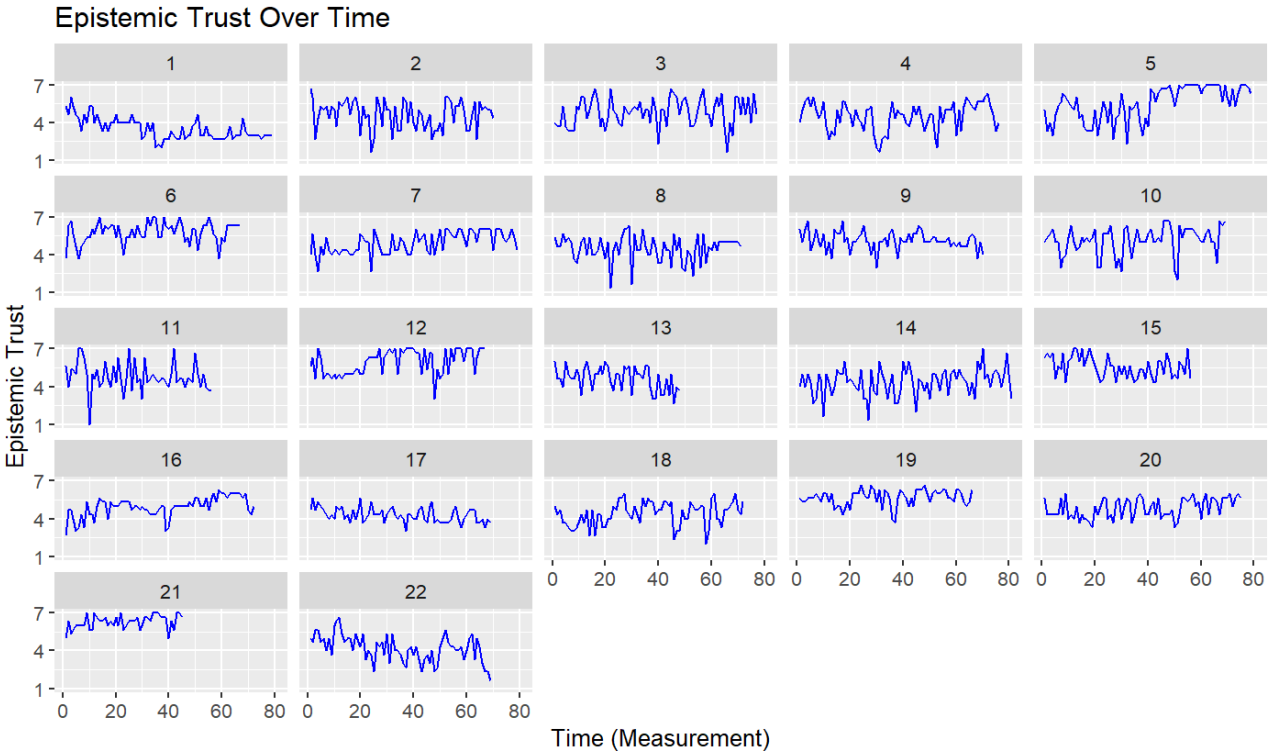
Momentary Fluctuations of the Constructs

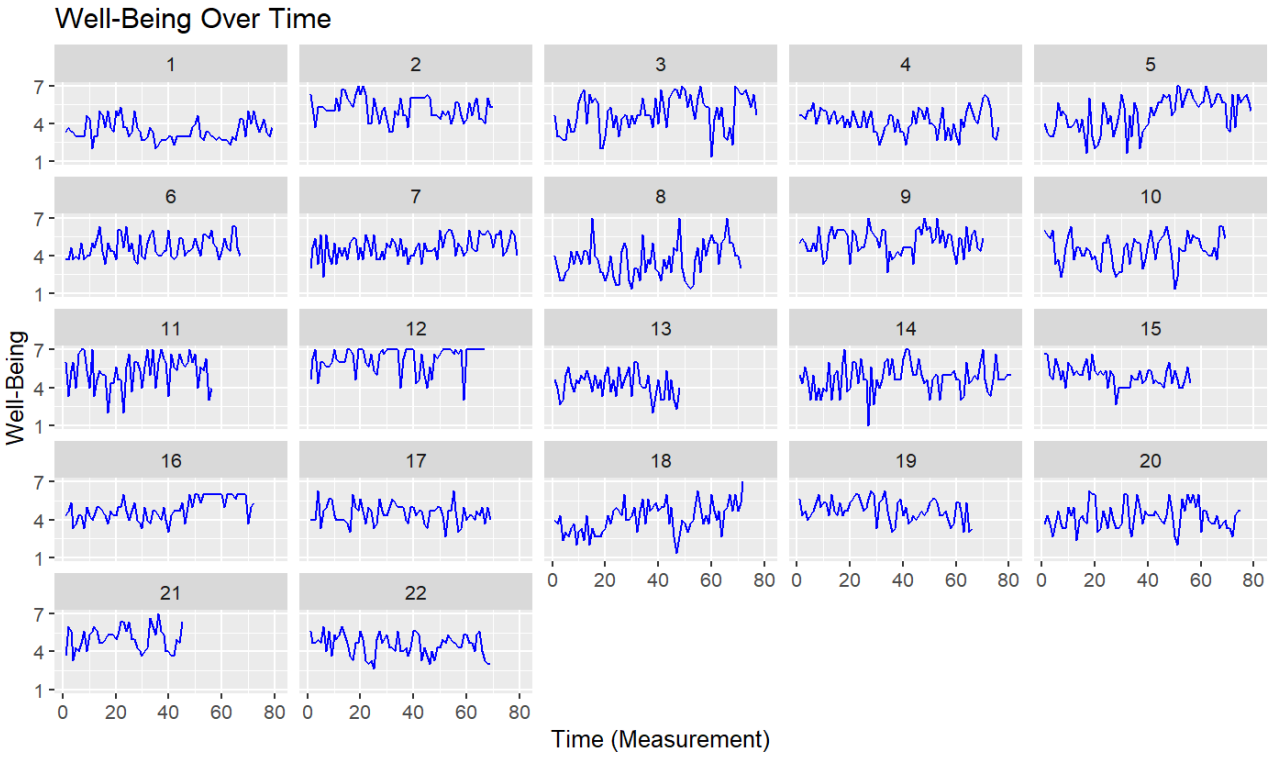
Figure 2 displays the changes in observed mentalisation, well-being and epistemic trust scores across the 14 days for all 22 participants. Each table represents a participant and the y-axis indicates the mean scores of the measured construct, which range from 1 to 7. The x-axis describes the time indicated by the specific measurement. The graphs reveal a high degree of variability both within and between participants. Mentalisation shows the lowest variability (SD = 0.994), followed by epistemic trust (SD = 1.13) and well-being (SD = 1.18). It should be noted that some participants have shorter lines which shows that they have responded to fewer prompts.

Figure 2

Changes in the Mean Scores Over Time of Each Participant


Mentalisation Over Time
Mentalisation
Time (Measurement)


Epistemic Trust Over Time
Epistemic Trust
Time (Measurement)



Note. The scores represent the mean values of the 3 measured items per construct. The numbers 1-22 show the Participant ID.

Level of Analysis

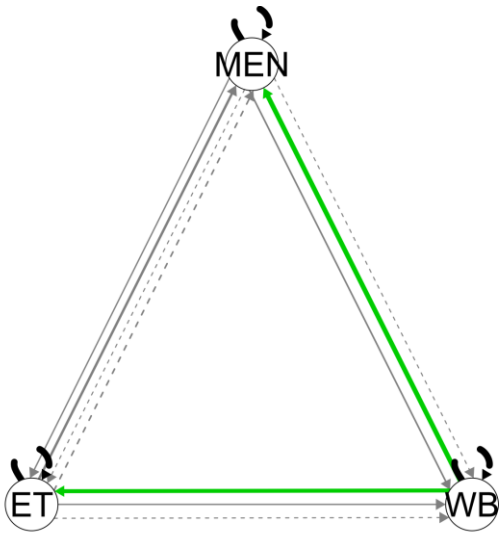
The results of the analysis were presented at three levels: the group level, the subgroup level and the individual level. The analysis revealed a total of 6 subgroups with a modularity of 0.04 within the dataset.

Group Level Analysis

Figure 3 shows a visual representation of all estimated paths, distinguishing between group (in black), subgroup (in green) and individual paths (in grey). It is noteworthy that the plot in Figure 3 indicates whether a path exists or not without providing details on whether it is positive or negative. On the group level (general paths) the analysis revealed lagged effects within the same construct for all three variables, indicating that changes in one variable precede and potentially cause future changes in the same variable. For example, an increase in epistemic trust at a specific time point predicted an increase in epistemic trust at the next time point. This can also be seen in the path count matrix (Table 3). As the sample consisted of 22 participants, a count of 22 represented that this path emerged at the group level and thus the relationship can be observed in every individual's final models.

Figure 3

Diagram of the Summary Paths



Note. The black lines indicate a group-level effect, the green lines indicate subgroup pathways and the grey lines represent individual pathways. The thickness of each line indicates the prevalence of the respective path among individuals. Solid lines represent contemporaneous effects, whereas those indicated by dashed lines are lagged effects. MEN = Mentalisation, WB = Well-being =, ET = Epistemic Trust.

Table 3

Path Count on Group Level and Subgroup Level

Measure	Across the Sample			Subgroup 1			Subgroup 2		
	MEN	WB	ET	MEN	WB	ET	MEN	WB	ET
Lagged Effects									
MEN	22*[3]	1	1	7	0	1	11*[2]	1	0
WB	0	22*[1]	0	0	7	0	0	11*[1]	0
ET	3	1	22*[4]	2	0	7*[4]	1	1	11
Contemporaneous Effects									
MEN	0	3	2	0	1	1	0	1	1
WB	15*[1]	0	12*[1]	2	0	1*[1]	11*[1]	0	11
ET	6*[1]	2	0	1	0	0	4*[1]	0	0

Note. Sample: n=22; Subgroup 1: n=7; Subgroup 2: n=11. MEN = Mentalisation, WB = Well-being =, ET = Epistemic Trust.

* Indicate pathways that include negative relationships.

[n] The number following the asterisk represents the count of negative pathways on the group level. Therefore, each count represents one participant. Numbers without an asterisk indicate exclusively positive pathways.

Subgroup Level Analysis

A total of 6 subgroups were identified. The first subgroup consisted of 7 individuals and the second subgroup consisted of 11 participants. Furthermore, it is notable that subgroups 3 to 6 consisted of only one individual. In other words, these individuals did not fit into any subgroup and thus were clustered separately. They can also be seen as having unique characteristics. Therefore, only subgroup plots of Subgroups 1 and 2 are shown in Figure 4.

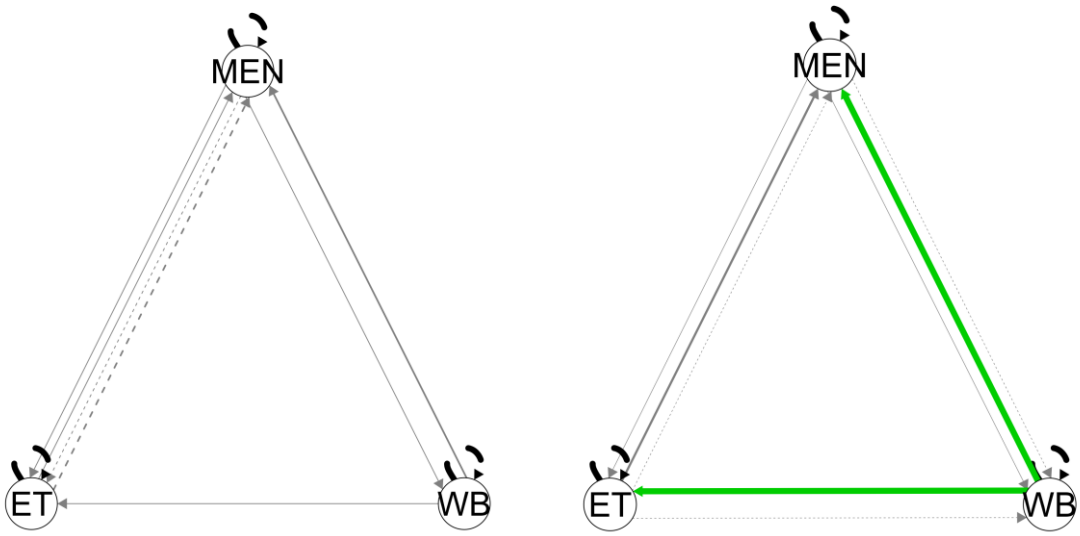
Subgroup 1 represented a group where individuals were clustered together despite having no shared path within the examined model. This can be seen, as there is no green line in the plot. Each individual in this group displayed distinct patterns that were not shared with the subgroup. Thus, the sub-grouping was not only based on the existence of common relations but also on the person-specific estimates of path direction and strength at the group level, as well as the general pattern of the paths. The overall model (Figure 4), the path count matrix (Table 3) and the average SEM coefficients (Table 4) illustrate these findings. They show the presence of lagged and contemporaneous relationships as well as positive and negative effects within that subgroup, with predominating positive associations.

In subgroup 2, two common contemporaneous pathways were identified: one from well-being to mentalisation and one from well-being to epistemic trust (green lines). This indicates that every participant in this subgroup exhibited these relationships. Specifically, the pathway from well-being to epistemic trust was exclusively positive and consistently strong across members, with a coefficient of 0.5 (see Table 4). Overall, this highlights that well-being had an immediate effect on epistemic trust and mentalisation within this subgroup.

Figure 4

Diagrams of Subgroups

1. **2.**



Note. Diagrams of the results from iterative multiple model estimation, organized by subgroup (excluding four individuals not grouped). Solid lines represent contemporaneous effects, whereas dashed lines indicate lagged effects. The width of the line represents the number of individuals for which the path was estimated. Subgroup 1 consisted of 7 participants, and Subgroup 2 consisted of 11 participants. MEN = Mentalisation, WB = Well-being =, ET = Epistemic Trust.

Table 4

Average SEM Coefficients Across Sample and Subgroups

Measure	Across the Sample			Subgroup 1			Subgroup 2		
	MEN	*WB*	*ET*	*MEN*	*WB*	*ET*	*MEN*	*WB*	ET
Lagged Effects									
MEN	.19	.02	.01	.26		.05	.18	.03	
WB		.28			.35			.28	
ET	.04	.01	.17	.07		.09	.04	.02	.21
Contemporaneous Effects									
MEN		.09	.03		.07	.05		.09	.03
WB	.21		.23	.18		-.05	.26		.5
ET	.1	.02		.05			.2		

Note. The values represent standardized Beta coefficients. Source variables are listed in the columns with their coefficient for each target variable in the rows. Empty fields represent coefficients of 0. MEN = Mentalisation, WB = Well-being, ET = Epistemic Trust.

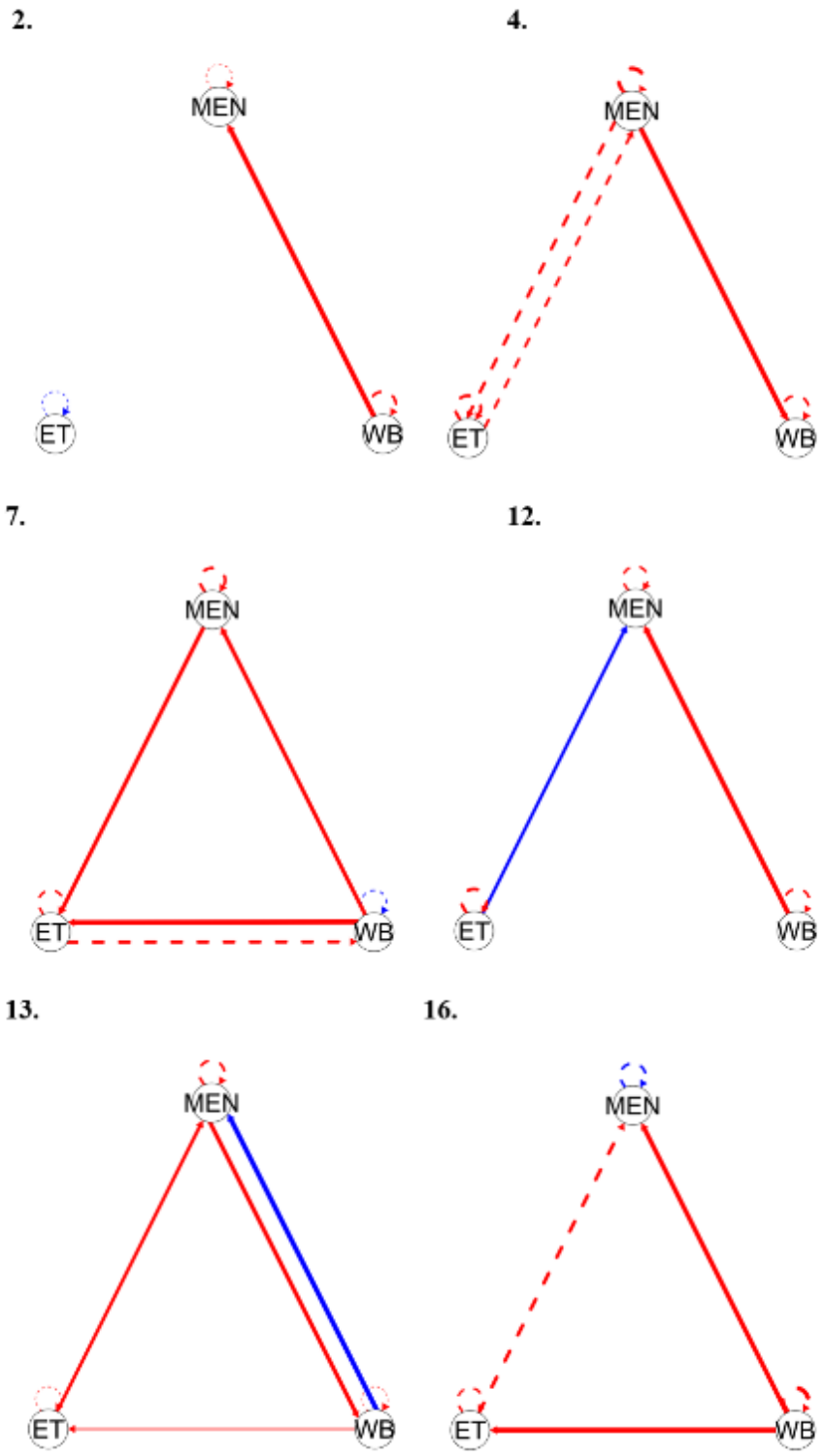
Individual Level Analysis

Person-specific models are available for each participant in the sample. Figure 5 displays examples of estimated paths of 6 arbitrarily picked individuals. These graphs highlight the individual differences in how these constructs interact with each other. When considering general trends, it's important to recognise the variability in model complexity and density across the graphs, which reflects the diverse patterns of relationships observed within the sample. This means that certain individuals exhibit a greater number of significant paths or stronger effects (line thickness) compared to others. For instance, all selected participants show a contemporaneous relationship between mentalisation and well-being but the direction varied (red or blue line). In general, it can be observed that contemporaneous effects are more prevalent than lagged effects between the variables. Additionally, most individuals show positive relations while others also present negative ones (Participants 12 and 13). In some cases, participants do not portray a relationship at all between the two constructs (Participants 2, 4 and 12).

Participant 4 serves as an illustrative case, demonstrating a relationship where lagged mentalisation predicts mentalisation with a β coefficient of 0.4, as visually represented in Figure 3. This participant belongs to subgroup 1. The fit of the final model for participant 4 is $\chi^2 = 6.7644$, $p < .05$, RMSEA = .0409, SRMR = .050, NNFI = .985, and CFI = .994, indicating an excellent model fit.

Figure 5

Example of Diagrams of Person-specific Models



Note: Solid lines indicate contemporaneous effects, while dashed lines represent lagged effects. Positive effects are depicted in red and negative effects in blue. The thickness of the lines reflects the strength of the effect. MEN = Mentalisation, WB = Well-being =, ET = Epistemic Trust.

Direction, Strength and Stability of the Effects within the Models

To identify the direction of the relationship, the 6 example diagrams that illustrate the unique relationships between mentalissation, epistemic trust, and well-being for each individual can be used. The blue lines indicate a negative association, whereas the red lines indicate a positive one. For instance, mentalisation generally shows a positive lagged association with itself in most of the person-specific models shown, but there are instances where the same path exhibits a negative association (e.g., participant 16). Additionally, participant 2 showed a negative lagged relationship of epistemic trust which means that an increase in epistemic trust predicted a decreased score at the next time point. This variability means that even if all three latent variables were autocorrelated this relationship was not consistently positive. Nevertheless, most of the relationships were positive. A summary of the path counts and the number of negative paths can be found in Table 3.

Moreover, the sign of the relationship does not only indicate the direction but can also characterise the stability of a variable over days (Wright et al., 2019). A positive lagged correlation signifies that the variable tends to remain stable over time. This means that if the variable had a high value at one point, it was likely to have a high value at the next point as well. Similarly, if the variable was low at one time point it was likely to be low at the next time point. Essentially, the values of the variable were the same at successive points in time, indicating stability. A negative lagged correlation, on the other hand, indicates that the variable fluctuates more over time. In this case, if the variable had a high value at one point in time, it was likely to have a lower value at the next point in time, and vice versa. This indicates that the variable tends to vary more from one point in time to the next, showing less stability and more change. To illustrate, a high count of 15 paths was observed, where well-being was associated with contemporaneous changes in mentalisation, with one negative path (15*[1]). This means 14 out of 22 participants showed a positive and relatively stable effect between well-being and mentalisation.

Furthermore, the thickness of the lines in the plots reflects the strength of the effect, where a thinker line indicates a stronger effect and a thinner line indicates a weaker effect.. The exact strength and direction of the relationships are summarised in the average SEM Coefficients (Standardized Beta Coefficients) across the sample and the subgroups (Table 4). They represent the relative impact of the different independent variables on the dependent variable, with higher absolute values indicating a stronger impact. A standardised coefficient typically ranges from -1 to 1, with values close to -1 or 1 indicating a strong negative or positive relationship and values close to 0 indicating a weak or no relationship (Akoglu,

2018). The SEM model revealed predominantly positive relationships between the latent variables which indicated that the measurement of a variable at one point in time generally predicted a positive effect on the measurement of the same or another variable at the same or a later time point. For example, the average lagged β coefficient between mentalisation and itself was found to be 0.19, indicating a weak positive relationship. Similarly, the average contemporaneous coefficient between Well-Being and Epistemic Trust was estimated to be 0.23, suggesting a stronger positive relationship.

Discussion

The study aimed to contribute to a deeper understanding of the idiosyncratic and nomothetic psychological mechanisms underlying well-being in young adults by examining these relationships and providing insights that may inform interventions aimed at promoting resilience and flourishing during this life stage. The central research questions guiding this study were:

1. "*What are the contemporaneous and lagged effects of mentalisation and epistemic trust on overall well-being outcomes among young adults?*"
2. *"Can subgroups of participants with similar patterns between mentalisation, epistemic trust and well-being be identified?"*

The main findings of this study revealed several important insights. First, there was significant variability in the mean scores of mentalisation, epistemic trust and well-being over time between and within the participants. Second, at the group level, only lagged effects of the same latent variable were present, with most identified correlations being positive but not very strong. Third, the GIMME analysis revealed 6 subgroups within the sample. Lastly, person-specific analysis was shown to be important because of the unique patterns in each individual.

The findings of this study highlighted the variability of mentalisation, epistemic trust and well-being within individuals over time. The question was whether mentalisation abilities are an enduring trait that manifests consistently across interactions or if they are state-like and vary over time. On the one hand, much of the existing research focuses on general, average levels of mentalisation rather than on daily fluctuations (Campbell et al., 2021; Fonagy & Allison, 2014; Locati et al., 2023; Parolin et al., 2023; Riedl et al., 2023). On the other hand, mentalisation is a complex construct with multiple dimensions that is significantly influenced by the perceived level of safety within relationships and can vary in its operation across different types of social interactions (Arabadzhiev & Paunova, 2024; Liotti & Gilbert, 2011). The current study suggests that mentalisation exhibited variability throughout the day and

over time, highlighting the dynamic and thus state-like nature of this construct. However, it should be noted that mentalisation involves rich cognitive and emotional processes that may not be adequately covered by the 3 measured items used in this study. While this study focused on the temporal dynamics, it might be also important to consider the contextual factors that could potentially play a significant role in interpreting the results. Additionally, the study focused solely on self-mentalisation, aiming to cover at least part of the construct comprehensively, but this might not have been sufficient to measure the whole dimension.

Furthermore, epistemic trust has also been mostly defined as a trait-like disposition (Knapen et al., 2022), suggesting that it may be relatively stable over time. However, similar to mentalisation the results revealed variability throughout the day and over time. This can be assisted by the finding that psychotherapy offers a context for inducing state-like changes in epistemic trust, with therapy as a mechanism to cause those changes (Fisher et al., 2023). This underscores that epistemic trust can not only be understood as a stable trait and it might imply that not only therapy but also contextual factors within a day can lead to variations. As a result, these psychological constructs should be explored in greater depth to uncover their complexities.

To answer the first research question, at the group level, the results demonstrated that only lagged effects of the same latent variable were present, suggesting that each construct impacted itself in future time points (=autocorrelation). Previous studies have found that most individuals had significant lagged effects of the measured variables, which is consistent with the idea that psychological well-being is characterised by consistent patterns of emotional functioning over time (Heshmati et al., 2022; Houben et al., 2015). To date, however, there is no existing literature that specifically examines how mentalisation, epistemic trust and well-being influence each other over time, making this study a novel contribution to the field.

Most identified correlations were positive, yet the SEM coefficients showed that they were not very strong. This implies that the relationships were somewhat diffuse and not sharply defined. Also, across all analyses, both mentalisation and epistemic trust demonstrated mainly positive relationships with well-being over time with varying strengths and direction. Overall, the literature demonstrates the importance of mentalising skills and epistemic trust for psychosocial well-being and their role in reducing the risk of developing certain mental disorders. Therefore, given the known positive effects of higher mentalisation and epistemic trust on well-being (Fonagy et al., 2019; Parolin et al., 2023), it was anticipated that they would exhibit some form of positive relationship with well-being. However, while some individuals showed contemporaneous and lagged effects, the overall results showed that

this can definitely not be generalised to the whole sample and not even to a single subgroup of people with similar patterns. Contextual factors like daily stressors or social interactions, which this study did not account for, could moderate the immediate effect of mentalisation on well-being (Bliese et al., 2017; Mengelkoch et al., 2024; Sun et al., 2020). In general, these findings underline that the interplay between mentalisation, epistemic trust and well-being is complex and highly individually determined.

To answer the second research question, the presence of many subgroups implies considerable variability and a high level of heterogeneity. In other words, a higher number of distinct subgroups within a larger population indicates a high diversity and differences among these people. This can be further supported by the 4 individuals who could not be placed into one subgroup because of their distinct patterns. They can be seen as having unique characteristics that differentiate them significantly from the sample. Thus, the way the measured variables interact in daily life is highly unique and idiosyncratic, varying greatly from person to person. Conversely, the modularity value, a measure of the strength of the division of subjects into communities, was calculated to be 0.04. Modularity is defined as the degree of interconnectivity between nodes within the same group, with a value of 1 indicating a strong community structure (Gates et al., 2017). The network displays a relatively low value of 0.04, implying it lacks a clear and distinct community structure. This outcome indicates the presence of a more homogeneous network, where relationships are distributed uniformly and differences in the patterns across the group are minimal.

The person-specific analysis also revealed great variability in the patterns between mentalisation, epistemic trust and well-being between individuals. Some participants had stronger relations while others had no effect at all between certain constructs. The direction also varied across participants. This highlights the importance of studying each person individually in contrast to looking at a population and group averages. The findings align with recent advancements in psychological research that advocate for understanding individual differences to improve interventions and theories (Lee & Gates, 2023). Molenaar (2004) established the concept of ideographic science, which emphasises the unique characteristics of individuals in psychological research. His approach challenges the traditional nomothetic perspective by advocating personalised assessments that recognise the diversity of human experience. This paradigm shift can be further supported by the findings of the current study and therefore considering the variability in individuals has a high potential for developing effective and personalised treatment plans.

Limitations and Strength

The study had several limitations. Firstly, the small sample size of 22 participants limits the generalisability of the results to daily life experiences. In addition to that, the sample mostly contained German female students. This limitation is likely related to the use of convenience sampling, which is known to be inconsistent across participants, making it difficult to generalise and extend findings (Jager et al., 2017). Larger studies with a more diverse sample are needed to confirm and extend these results.

Secondly, despite high participation rates, each participant was only able to provide a maximum of 84 measurements (e.g. 80% participation = 63 observations). This is below the ideal threshold of over 100 measurements per person recommended for optimal GIMME analysis (Beltz & Gates, 2017). In addition, the study randomly assessed data 6 times a day within a two-hour time frame. While attempting to achieve an even distribution, this inevitably missed observations during participants' sleep periods, a factor not fully accounted for by GIMME (Wright et al., 2019).

Furthermore, the study's reliance on only three items to measure mentalisation, epistemic trust and subjective well-being may have oversimplified these multifaceted constructs. Daily contextual factors such as social interactions, work pressure and personal experiences could influence the relationships. Besides these situational factors, also the ability to self-evaluate and self-report could have impacted the accuracy of the measurement (Finnigan & Vazire, 2018). The variability introduced by these factors was not controlled for, which could affect the results of the study and potentially lead to biased estimates of their relationships.

However, despite these limitations, the study also had several unique strengths. When a study aims to draw conclusions about individuals, ESM with individual analyses is an appropriate consideration (Gabriel et al., 2018; Mestdagh et al., 2023). Moreover, the study was the first to use ESM to measure epistemic trust. It also demonstrated that there are variations throughout the day and that it cannot be considered only a stable trait. The items to measure epistemic trust were created by the researchers, including a reversed item for epistemic trust to reduce response bias and improve reliability. This method can counteract tendencies such as agreeing with all statements, thereby ensuring more accurate results. However, the existing literature on this topic shows mixed results. While some studies have found that reversed items enhance reliability, others have suggested that they can confuse respondents and reduce data quality (Suárez Álvarez et al., 2018). Consequently, it is important to pilot-test and validate all of the items used to measure momentary epistemic trust.

In addition, the present study has initiated the GIMME analysis to uncover personalised dynamics at group and individual levels, providing a comprehensive understanding of the relationships between mentalising, epistemic trust and well-being. GIMME can run with different numbers of measurements per individual (Wright et al., 2019), which was essential for this study. This lays the groundwork for more detailed future studies that can further explore individual variations and dynamics in mentalisation, epistemic trust and well-being.

Moreover, the study achieved a high participation rate, with only one participant excluded for falling below the 50% compliance threshold. This robust participation exceeds the average compliance rate for ESM studies (van Berkel et al., 2017). Thus, it increases the within-sample reliability and generalisability of findings. This high response rate could have been supported by the m-path app and tailored schedules for each participant, aligning data collection with their daily routines and increasing engagement. Moreover, the shortness of the questionnaire with 11 items in total might enhanced participant compliance and reduced respondent burden.

Implications and Future Research

This study has several implications for both research methodology and the understanding of the mechanisms underlying psychosocial well-being. Methodologically, it highlights the importance of data density and measurement comprehensiveness when using statistical techniques such as GIMME within ESM studies. The results of the study suggest that achieving the right balance between participant compliance and measurement count is crucial for obtaining optimal analysis results and underline the need for innovative approaches to increase the number of data points to improve the data collection.

Additionally, the potential state-like character of the constructs suggests that they are susceptible to fluctuations possibly influenced by various contextual factors. This implies that interventions and treatments targeting these constructs may need to take into account the dynamic nature of individuals' experiences and environments and adapt strategies accordingly to effectively address these changes in mental states. However, future research is needed to investigate these contextual influences and develop targeted strategies for addressing them.

Moreover, mentalisation and epistemic trust are important within the therapy itself. Fluctuations in these abilities throughout the day might require a therapist to adjust their approaches within the sessions. Recognising and addressing these fluctuations could inform the treatment planning and session timing thereby optimising the therapeutic outcome. Future

research is needed to examine how fluctuations in mentalisation and epistemic trust affect the effectiveness of therapy.

The variability of the relationships within and between participants highlights the subtle nature of interpersonal dynamics. The absence or divergent direction of a relationship between certain constructs in some participants underscores the importance of personalised assessments. Clinicians should be cautious about assuming the universal applicability of interventions targeting mentalisation and epistemic trust. For some individuals, focusing on other aspects of their psychological and social functioning may be more beneficial. Future research could use advanced methods like Two-Stage Random Effects Meta-Analysis to understand these patterns better across larger groups of people (Lee & Gates, 2023). This would help researchers make more accurate conclusions and develop better ways to help people improve their well-being.

By understanding how these cognitive processes interact and influence each other during the day, targeted interventions can be developed to improve the ability to navigate social relationships, make informed decisions and contribute to their overall psychological well-being. As a result, there is a growing recognition of the need for idiographic or personalised models that are tailored to individual characteristics and experiences. Future research should continue to explore these individual differences to refine and enhance clinical practices in promoting overall well-being.

Conclusion

In summary, this study used an advanced methodological and analytical approach to provide insights into the temporal dynamics of mentalisation, epistemic trust and well-being. Through an experience sampling method, intensive longitudinal data was collected and analysed. The group iterative multiple model estimation revealed various contemporaneous and lagged effects between mentalisation, epistemic trust and well-being across and within individuals. This highlighted common patterns as well as individual differences within the group. The findings provide an opportunity to reflect on the degree of homogeneity and heterogeneity within the sample, which adds an additional layer of complexity to the understanding of these constructs. Nevertheless, the results stress the importance of personalised approaches to psychological assessment and intervention and emphasise that one-size-fits-all solutions may not be effective for everyone.

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Appendices

Appendix A

Informed Consent form

Informed consent form

Dear Participant,

Thank you for participating in this study!

Brief summary of the study:
This research aims to investigate the relationship between subjective well-being, epistemic trust, and mentalization using Experience Sampling Methods (ESM).
The primary purpose of this research is to investigate how individuals' levels of epistemic trust and mentalization fluctuate throughout the day and how the interaction between these factors impacts mental health and well-being.

Procedures:
You will be asked to complete an entry survey providing background information and a personality test based on the Big Five model.
If you agree to participate, you will be required to download the m-path app and answer multiple questions multiple times a day.
Participation involves answering questions related to your epistemic trust, mentalization, and well-being.

Risks and Benefits:
Participation in this study involves minimal risk. Some questions may prompt self-reflection, potentially leading to mild emotional discomfort. However, measures are in place to provide support if needed. The benefit of contributing to psychological research and understanding human behaviour is a potentially positive outcome. Participants who complete 80% of the daily prompts will have the chance to win a 50 Euro Amazon voucher as a token of appreciation.

Confidentiality:
All data collected will be treated confidentially. Your answers will be anonymized and handled with confidentiality. Only the research team will have access to the data.

Voluntary Participation:
Participation in this study is voluntary. You have the right to withdraw at any time without any consequences.

Contact Information:
If you have any questions or concerns, please contact one of the researchers:

To participate in this study, we need to ensure that you understand the nature of the research, as outlined in the summary of the study. Please confirm at the bottom of the page to indicate that you understand and agree to the following conditions:

Consent Form for Understanding the Relationship Between Mentalization, Mental Health, and Epistemic Trust

Please tick the appropriate boxes	**Yes**	**No**
Taking part in the study		
I have read and understood the study information dated [DD/MM/YYYY], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
I understand that taking part in the study involves answering questions multiple times a day on epistemic trust, mentalization and overall well-being.	☐	☐
Use of the information in the study		
I understand that information I provide will be used for research purposes.	☐	☐
I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.	☐	☐
Future use and reuse of the information by others		

Signatures

_____	_____	_____
Name of participant	Signature	Date

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee/domain Humanities & Social Sciences of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by [redacted]

Appendix B

App Interface from the User View