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The vanishing hours: Future temporal focus and the passage of time in the digital era☆

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ABSTRACT

In this study, we utilized two newly developed and psychometrically validated instruments—the Immersion in Digital Life Scale (IDLS) and the Quality of Digital Experience Scale (QDES)—to investigate the relationships among Immersion in Digital Life (IDL), the Quality of Digital Experiences (QDE), individual Temporal Focus (TF), and the subjective Passage of Time (PoT). The study sample comprised 7536 participants across six European countries. Our findings indicate that a higher IDLS score and a higher QDES score are associated with an accelerated PoT. Our results revealed that a higher Future Temporal Focus (TF-Future) is related to an accelerated PoT. Moreover, there is an indirect effect of TF-Future on PoT via IDLS and the dimension *Time and Efficiency* of QDES. Specifically, individuals with a stronger TF-Future tend to engage in digital life to a greater extent and experience its beneficial effects, which in turn contributes to a faster subjective experience of time. Country-level differences emerged: participants in Poland reported the highest levels of IDL and the fastest PoT, while individuals in the United Kingdom exhibited the strongest Past Temporal Focus (TF-Past) and the slowest PoT. The results shed more light on the consequences of digital usage on time perception.

1. Introduction

The pervasive use of digital media in daily life has attracted considerable academic attention, particularly regarding its psychological impacts (Ancis, 2020; House & Brennan, 2023). The proliferation of digital technology (DT) has profoundly influenced personal identity, leading to the multiplication and fragmentation of selfhood and subjectivity across digital environments (Thomas & Durston, 2025). In order to quantify these psychological effects, we recently developed and validated two new psychometric instruments on the basis of semi-structured interviews in six European countries: the Immersion in Digital Life scale (IDLS) scale and the Quality of Digital Experience scale

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(QDES) scale (Witowska et al., 2025).

Prior qualitative research using semi-structured interviews with participants from the UK, Poland, Germany, Switzerland, the Czech Republic, and Spain has shown that DT use, can alter how individuals perceive, manage, and evaluate time-often leading to a subjective sense of time loss (Černohorská et al., 2025). Building on these findings, our study aimed to quantitatively examine how Immersion in Digital Life (IDL) and Quality of Digital Experience (QDE) relate to the subjective perception of Passage of Time (PoT) in everyday contexts across the six European countries, with particular attention to the trait of an Temporal Focus on the past, present, and future. Drawing on Robert Levine's pioneering account of temporalities in the pre-digital era (1970–1990), this study explores aspects of the geography of European time in the age of the network society.

1.1. Temporal focus and passage of time

Temporal Focus (TF) describes the characteristic extent to which individuals consciously direct their cognitive attention toward the past, present, or future (Shipp et al., 2009). Unlike the affective concept of Time Perspective (TP-Zimbardo & Boyd, 1999), TF represents a purely cognitive engagement with time.

An individual's TF is influenced by a variety of factors, including culture and language. For example, research by de la Fuente et al. (2014) suggests that Moroccans often exhibit a strong past-oriented mindset, valuing tradition, while Spaniards tend to be more future-oriented, focusing on economic and technological progress. However, TF is not a fixed trait; it can evolve with age and significant life experiences (Shipp & Aeon, 2019). This tendency is shaped early in life through socialization, where parents, teachers, and peers establish what constitutes a proper TF (Trommsdorff, 1983). The ability to consciously self-regulate one's TF through metacognitive skills facilitates the use of past experiences, present demands, and future goals for optimal functioning (Witowska et al., 2022). The dominance of one temporal frame can influence a wide range of behaviors and decisions (Shipp et al., 2009). When a particular temporal orientation becomes a consistent and dominant pattern, it aligns more closely with a fixed TP, which is a core aspect of personality (Zimbardo & Boyd, 1999). An excessive focus on any single temporal zone may be related to negative consequences, though some orientations are generally more adaptive than others (Zimbardo & Boyd, 2008). For instance, research on TP indicates that a strong future-oriented perspective, along with a balanced and positive present orientation, is associated with behaviors that support long-term goals (Stolarski et al., 2015; Zimbardo & Boyd, 2008). In contrast, a hedonistic or fatalistic present TP tends to promote choices driven by short-term gratification (Zimbardo & Boyd, 2008). In line with this, recent findings suggest that individuals who spend more time on social media platforms are more likely to make impulsive, present-focused decisions (Pan et al., 2024); however, the studies have not yet provided explicit findings on the relations between the specific cognitive state of TF and IDL.

An individual's TF is associated with the perception of the PoT. For instance, a heightened focus on the present moment combined with a diminished focus on the future has been shown to slow the perceived PoT during waiting periods (Jokic et al., 2018). More broadly, individuals with a Present Temporal Focus (PTF) and an impulsive Time Focus tend to report an accelerated sense of time during pleasurable experiences, but a decelerated sense of time during negative or distressing situations, including during digital media use (Turel et al., 2018). Furthermore, a slower perceived PoT during the COVID-19 pandemic was associated with a shift in TF toward the past—a change likely driven by increased uncertainty about the future (Loose et al., 2022). A general principle in research on time perception pertaining to longer time intervals in the range of hours and days is its retrospective character as the time period to be judged has already elapsed. For these retrospective time judgments, it is typical that the greater the number and variability of experiences within the given time interval, the longer that interval is perceived in hindsight (Kosak et al., 2019; Landau et al., 2018; Zakay & Block, 1997). For example, a routine workweek with minimal variation tends to feel brief in retrospect, whereas a week filled with novel, emotionally rich experiences—such as traveling and exploring a new environment with friends—is typically perceived as subjectively longer (Wittmann, 2016). This retrospective memory effect on time perception suggests that emotionally salient and diverse experiences enhance memory encoding, thereby expanding the subjective sense of duration (Flaherty & Meer, 1994; Teghil, 2024). Building on findings from our qualitative study (Černohorská et al., 2025), which revealed that DT use, is often connected to a loss of experienced time—either through its deliberate use to distract from time in waiting situations or as a consequence of prolonged engagement—we aimed to investigate how the IDL and QDE is associated to the subjective PoT. The way we perceive PoT, reflects our subjective wellbeing. Negative emotions are usually linked to a feeling that time drags, making moments seem longer during distress (Droit-Volet, 2013). Conversely, positive emotional states tend to make time feel like it flies by more quickly (Kosak et al., 2022). Specifically, we examined this relationship in the context of individuals' TF.

A past TF shows a small but significant cross-national effect, consistent with research suggesting that cultures shape cognitive temporal orienting (Callizo-Romero et al., 2020). In his extensive field studies with populations from across the globe, Levine (2008) categorized cultures into "fast" and "slow" societies, based on how quickly life was paced. That is, countries like Japan and the U.S. were described as fast-paced, while countries like Brazil and Mexico were described as slower. The studies highlight how the pace of life affects mental health, stress levels, and economic productivity, where fast-paced environments can lead to efficiency but can increase stress and reduce interpersonal exchange.

1.2. The relationship between individual temporal focus (TF) and digital technology (DT) use

Individuals' TF appears to significantly shape both the nature and extent of their DT use. Those with a past-oriented focus tend to engage with digital media for nostalgic purposes, such as revisiting old photographs or maintaining long-standing social ties (Sedikides et al., 2016). In contrast, present-oriented individuals show the highest levels of engagement with platforms designed for immediate gratification—such as TikTok and Instagram Stories—and are more prone to problematic usage patterns marked by impulsivity and diminished self-regulation (Błachnio & Przepiorka, 2016). Future-oriented users, on the other hand, typically adopt a more strategic approach to DT, favouring productivity tools and educational content while demonstrating a greater capacity to avoid digital distractions, as revealed by an early study (Agarwal & Karahanna, 2000). Collectively, these patterns suggest that the TF is an important factor influencing both the quantity and quality of digital media engagement.

1.3. Digital technology (DT) use and passage of time (PoT)

Contemporary digital platforms are engineered to maximize user engagement, capture attention, and sustain interest over extended periods (Barbaro et al., 2020; Carrino et al., 2017). Research indicates that a significant indirect consequence of these attentional capture strategies is an alteration in users' subjective experience of time, often perceived as acceleration or 'time flying' (Černohorská et al., 2025). Interfaces incorporating mechanisms such as infinite scroll and autoplay foster a psychological state of "flow," characterized by deep absorption and a diminished awareness of time (Seligman & Csikszentmihalyi, 2001). As a result, users often report that time seemed to pass rapidly following prolonged digital media use—a perception frequently accompanied by a sense of regret and the feeling that time has been "stolen" by technology

(Černohorská et al., 2025). Empirical evidence from studies on video game playing support this effect as people typically report losing track of time (Tobin & Grondin, 2009; Wood et al., 2007). A recent systematic study with a VR video game conforms to this outcome: participants who reported more flow experiences also reported a reduced awareness of time and a faster subjective PoT (Rutrecht et al., 2021). Notably, flow states were positively associated with performance, suggesting that deeper immersion not only alters time perception but also enhances task engagement.

1.4. Study aims

In the present study we aimed to explore the relationships between Temporal Focus as an individual trait, IDL and QDE, and effects of these dimensions on the subjective PoT. We assume that TF has an effect on subjective PoT and that this relationship is mediated by the use and experience of DT. Since we have data from six different European countries, we also compared the extent to which the assessed traits, behaviors, and experiences differ between those countries.

2. Material and methods

2.1. Participants

The participants of the present study were $N = 7536$ adults from six European countries: Czech Republic ($n = 1212$); Germany ($n = 1225$); Poland ($n = 1456$); (n = 1212); Spain (n = 1212) Switzerland ($n = 1227$; French-speaking), UK ($n = 1204$); The overall mean age was 45.73 years (S.D. = 15.69); 48.7% identified as men ($n = 3669$) and 50.8% as women ($n = 3827$); 0.25% ($n = 19$) preferred not to say. These samples were representative of the countries in terms of age and gender.

We employed a quota sampling method to obtain samples that were nationally representative of each country's adult population based on the most recent census data for age, gender, and geographic region. Quotas were set proportionally to the population distributions. To ensure data integrity and prevent duplicate submissions, the survey platform (e.g., Qualtrics) was configured to flag responses originating from identical IP addresses. This technical metadata was processed temporarily for quality control purposes only, was not linked to participant identifiers, and was deleted following data verification. In addition, we have included attention checks questions to identify inattentive respondents. Data from participants who failed these checks were removed.

2.2. Procedure

Participant recruitment and survey assessment were undertaken by the company Pollster in Poland and by *Qualtrics in the five other countries,* and participants received small monetary compensation for their participation. Data collection was undertaken between the 12th of January and the 21st of April 2024. The online survey asked for informed consent from each participant before the data were collected. Three screening questions were asked regarding age (inclusion: at least 18 years), current place of residence and fluency in the respective language. In Switzerland French-speaking individuals were the target group.

Ethical approval was obtained from Liverpool John Moores University Research Ethics Committee (UREC). Minimal risk registration number: 23/PSY/071. The research adhered to the ethical principles outlined in the Declaration of Helsinki.

2.3. Measures

2.3.1. Immersion in digital life scale (IDLS)

IDL was assessed using the 5-item Immersion in Digital Life Scale (IDLS; Witowska et al., 2025), which evaluates the degree of DT use across various life domains. Participants rated to what extent their: 1. Social relationships; 2. Family communication; 3. Free time activities; 4. Communication with friends; and 5. Time management were digital (e.g. "To what extent is your communication with friends digital"?). Responses are collected via a visual analogue scale (VAS) ranging from 0% ("not at all digital") to 100% ("completely digital"), with participants adjusting a slider to respond. Scale scores were computed as the mean across all items, where higher scores reflect greater digital life immersion. Cronbach's alpha for the IDLS in our sample was 0.85.

2.3.2. Quality of digital experience scale (QDES)

The Quality of Digital Experience Scale (QDES; Witowska et al., 2025) is a 26-item instrument which evaluates individuals' experiences of DT use and its impact across fundamental life domains. The scale comprises three distinct subscales: 1. Wellbeing (5 items- "Using digital technologies helps me to take care of my mental wellbeing"); 2. Social Connectedness (12 items- "Using digital technologies helps me to deepen relationships with others"); Time and Efficiency (9 items- "Using digital technologies allows me to achieve more with less effort"); Participants responded to statement-based items using the following 5-point Likert scale: 1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree. Scoring involved computing mean values for all individual items and the subscale averages, with higher scores reflecting more favorable subjective experiences of digital engagement. The measure demonstrated excellent internal consistency in our sample, with Cronbach's α coefficients of 0.88 for Wellbeing, 0.95 for Social Connectedness, and 0.92 for Time and Efficiency. We also used the three dimensions as a whole scale in our study. The Cronbach's α coefficient was 0.96.

2.3.3. Temporal focus scale (TFS)

The Temporal Focus Scale (TFS; Shipp et al., 2009) assesses individuals' cognitive orientation toward three temporal domains: past memories (e.g., "I think back to my earlier days"), present experiences (e.g., "I focus on what is currently happening in my life"), and future expectations (e.g., "I focus on my future"). Each temporal dimension is measured by four items rated on a 7-point Likert scale ranging from 1 ("never thinking about") to 7 ("constantly thinking about"). Subscale scores were computed as the mean of relevant items, yielding three distinct measures: 1. Past Focus (TF-Past); 2. Present Focus (TF-Present); 3. Future Focus (TF-Future). In our sample, the scale demonstrated good to excellent internal consistency: $\alpha = 0.87$ (Past), $\alpha = 0.70$ (Present), and $\alpha = 0.83$ (Future).

2.3.4. Passage of time scale

The Passage of Time (PoT) Scale employs a VAS format with endpoints ranging from 0 ("time passes extremely slowly") to 100 ("time passes extremely fast"). The instrument comprises three items assessing different temporal domains: 1. General time perception (e.g., "How quickly does time normally pass for you?"), adapted from Wittmann and Lehnhoff (2005); 2. Current time perception (e.g., "Thinking about today, how quickly has time felt like it is passing?"), based on Ogden (2020); 3. Time expectation (e.g., "How quickly do you expect the next week to pass for you?"). Although this question refers to the future, it still taps into momentary subjective time perception, which affects the anticipation of the future Passage of Time (Richter & Benzenhöfer, 1985). For the current study, we calculated an average score representing the general feeling of time passage. The three-item scale demonstrated good reliability ($\alpha = 0.82$) in our sample.

We have used the following abbreviations in the results and Appendix sections: Passage of Time (PoT), Future Temporal Focus (TF-Future), Immersion in Digital Life scale (IDLS), Quality of Digital Experience scale (QDES), Quality of Digital Experience subscale: Wellbeing (QDES1), Social Connectedness (QDES2), Time and Efficiency (QDES3).

2.4. Analytical plan

Pearson's r coefficients were employed to assess bivariate correlations between the variables of interest. In a next step we explored potential country differences by applying ANOVA and post-hoc tests. Furthermore, we have performed Structural Equation Modeling (SEM) to test a fully-specified model that includes all constructs and intervening variables concurrently. We applied the bootstrapping (5000) procedure to allow a testing of the total indirect effects.

We have used the z-scores, in order to conduct standardized SEM.

3. Results

3.1. Descriptive and correlation analyses

Table A1 (Appendix) shows the arithmetic means and standard deviations of the study variables. The three QDES subdimensions demonstrate strong inter-correlations (Table 1), with particularly robust associations between social connectedness and wellbeing ($r = 0.721$). The IDLS exhibits moderate associations with the three QDES subdimensions. The IDLS and the QDES dimensions have statistically significant small correlations with both PoT (r's between 0.103 and 0.158) and the TF dimensions, most notably with the TF-Future (r's between 0.197 and 0.240). See Tables A2-A7 in the Appendix for the separate correlation matrices per country which overall have quite similar correlation patterns. Figs. 1–3 present SEM with the three QDE subscales. Table 2 presents the Model Fit Indices for Measurement Invariance Across the Four Scales and Table 3 the Estimates of Structural Equation Modeling.

3.2. Structural equation modeling

All models 1–3 (including each one of the three QDES dimensions and the IDLS as intervening variables show an excellent/good model fit (all IFIs >0.943; all TLIs >0.932; and all CFI >0.943). RMSAE indicates an acceptable fit for Model 1 (QDES1) (RMSEA = 0.061, 90%[0.059, 0.063], *p*close < 0.001) and for Model 2 (QDES2)(RMSEA = 0.055, 90% [0.054, 0.056], *p*close < 0.001). The significance of χ^2 -tests is not informative in the case of large sample size.

In the case of Model 3 (QDES3) RMSAE indicates an acceptable to good fit (RMSEA = 0.050, 90%[0.049, 0.052], *p*close = 0.488). This model shows also the highest model fit in terms of baseline comparative fit indices (IFI = 0.956; TLI = 0.950; CFI = 0.956).

The total indirect effects of TF-Future via QDES and IDLS on PoT were as follows: In the first model (QDES1), $b = 0.050$; 95% CI [0.39, 0.62]; $p < .001$, indicating significance. In the second model (QDES2) there was also a significant total indirect effect, $b = 0.050$; 95% CI [0.39, 0.61]; $p < .001$. In the third model (QDES3) we observed the following significant total indirect effect: $b = 0.059$; 95% CI [0.48, 0.71; $p < .001$.

Finally we tested models 1–3 for each of the six countries separately to investigate any substantial striking differences to the overall sample. For this purposes and for the differences reported in the cross-cultural differences section we tested first all scales of measurement invariance.

No substantial differences were observed regarding the baseline comparison indices for the model-fit: for example the range of IFI, TLI and CFI across all six countries (UK, Switzerland, Spain, Poland, the Czech Republic and Germany) and all three models scored consistently between 0.901 and 0.955.

All estimates reached significance in all three models, besides the one of QDES on PoT, which was insignificant in Model 1 (QDES1) and 2 (QDES2) (all *p*'s >. 124) but reached significance in Model 3 (QDES3) ($p < .001$).

Regarding separate analyses for each of the countries we identified the following deviations from the overall sample for **QDES1:** In three countries (Switzerland, Spain and the Czech Republic the path estimate of the TF-Future predicting PoT was insignificant (all *p*'s > 0.186). The corresponding estimate is significant in the overall sample. Furthermore, contrary to the overall sample, the path estimate of IDLS predicting PoT was insignificant in Germany ($p = .572$) and the one of QSES predicting PoT was significant in Spain ($p = .030$). The last deviation was insignificant in all other five countries as well as in the overall sample.

For **QDES2** we observed insignificant path estimates for the TF-Future predicting PoT in Switzerland ($p = .181$), Spain ($p = .315$) and the Czech Republic ($p = .213$). Furthermore, contrary to the overall sample, the path estimate of IDLS predicting PoT in Germany was insignificant, too ($p = 687$) and the one of QDES predicting PoT showed a nonsignificant trend in Poland ($p = .054$).

For **QDES3** we observed the following deviations: The path estimates of TF-Future predicting PoT were insignificant in Spain ($p = .428$) and the Czech Republic ($p = .376$). Furthermore, the one of IDLS predicting PoT was insignificant in Germany ($p = .485$).

3.3. Cross-cultural differences

Cross-cultural studies within European cultures are relatively rare but of substantial importance. For example, Genkova et al. (2022) argue that there are psychological differences between Central and Eastern European countries and that corresponding scales cannot automatically be applied to measure these differences. We therefore intended to conduct the country comparison for the topic of the current study. We argue that cross-cultural differences within Europe are important and we have also carried out a corresponding measurement invariance test.

One-way analyses of variance show statistically significant cross-national differences for all measured variables ($p < .001$), indicating that country-level factors influence TF, IDL, QDE, and the felt PoT (Table 4).

IDLS demonstrated the largest effect ($\eta^2 = 0.0547$), approaching Cohen's (1988) conventional threshold for a medium effect size. This suggests that national context explains a substantively important proportion of variance in individuals' perceived digital immersion. PoT showed a smaller but still notable country effect ($\eta^2 = 0.0296$), remaining below the medium-effect benchmark. The third highest country effect with η^2 larger than 0.01 is the past focus ($\eta^2 = 0.0142$).

Table 1
Intercorrelations (Pearson's r) between variables across all countries.

	1	2	3	4	5	6	7	8
1. IDLS								
2. QDES (total)	0.578***							
2. QDES1	0.511***	0.848***						
3. QDES2	0.554***	0.925***	0.721***					
4. QDES3	0.404***	0.789***	0.587***	0.544***				
5. PoT	0.158***	0.129***	0.103***	0.103***	0.139***			
6. TF-Past	0.190***	0.138***	0.137***	0.150***	0.060***	0.039***		
7. TF-Present	0.033**	0.109***	0.083***	0.088***	0.124 ***	0.163***	−0.097***	
8. TF-Future	0.240***	0.248***	0.197***	0.233***	0.201***	0.105***	0.327***	0.224***

Note. ***p* < .01; ***p < .001 (two-tailed). All correlation coefficients with $p < .001$ are significant after BF = Bonferroni correction for n = 36 calculations ($p = .00138$).

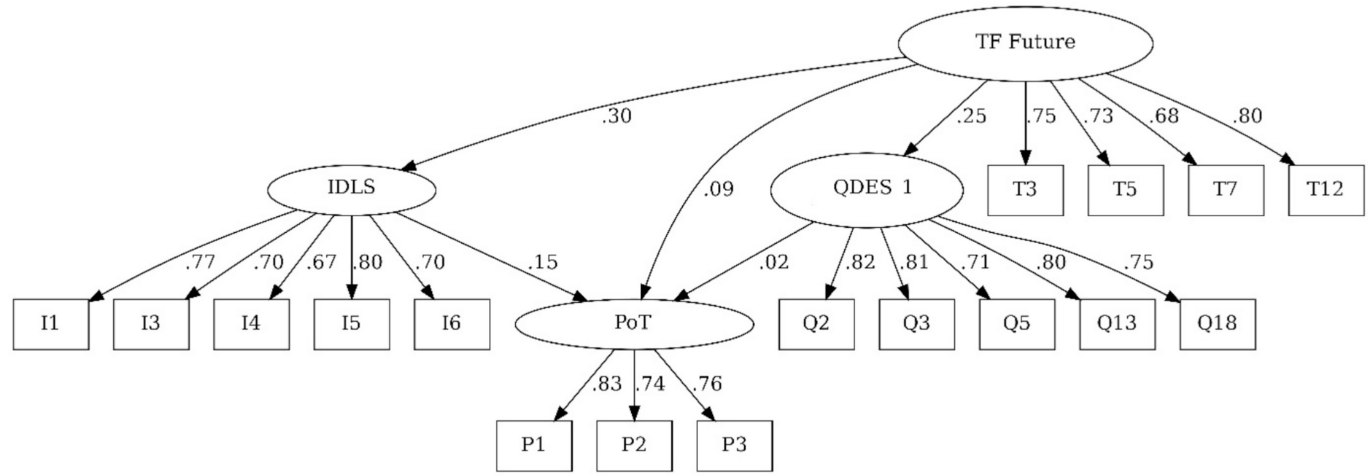

Fig. 1. Structural Equation Modeling with QDES1. *Note.* IDLS = Immersion in Digital Life scale; TF-Future = Temporal Focus Future; QDES 1 = Quality of Digital Experience subscale: Wellbeing; PoT = Passage of Time; $\chi^2(124) = 3305.480$; $p < .001$; RMSEA = 0.061, 90%[0.059, 0.063], *p*close < 0.001; IFI = 0.944; TLI = 0.933; CFI = 0.944; SRMR = 0.121; the path from QDES1 to Passage of Time was not statistically significant.

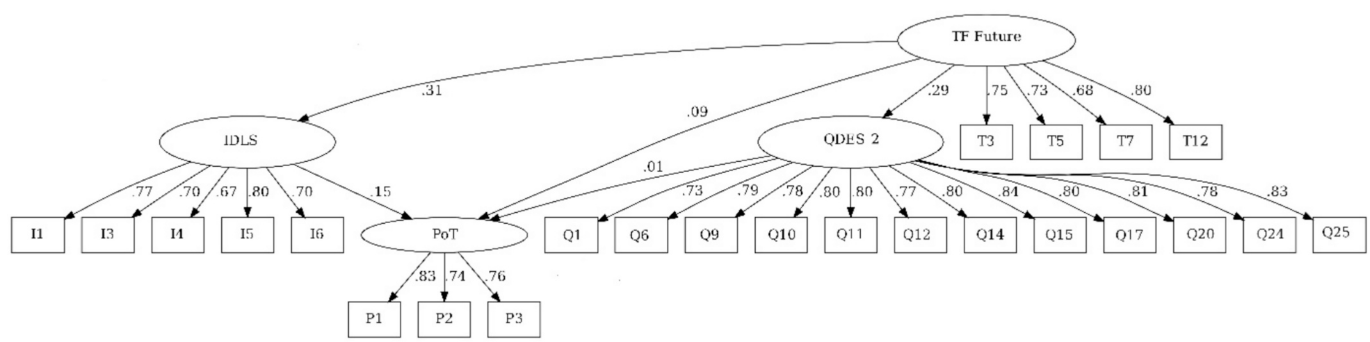

Fig. 2. Structural Equation Modeling with QDES2. Note: IDLS = Immersion in Digital Life scale; TF-Future = Temporal Focus Future; QDES 2 = Quality of Digital Experience subscale: Social Connectedness; PoT = Passage of Time; $\chi^2(247) = 5873.643$; $p < .001$; RMSEA = 0.055, 90%[0.054, 0.056], *p*close < 0.001; IFI = 0.948; TLI = 0.942; CFI = 0.948; SRMR = 0.142; the path from QDES2 (Connectedness) to Passage of Time was not statistically significant.

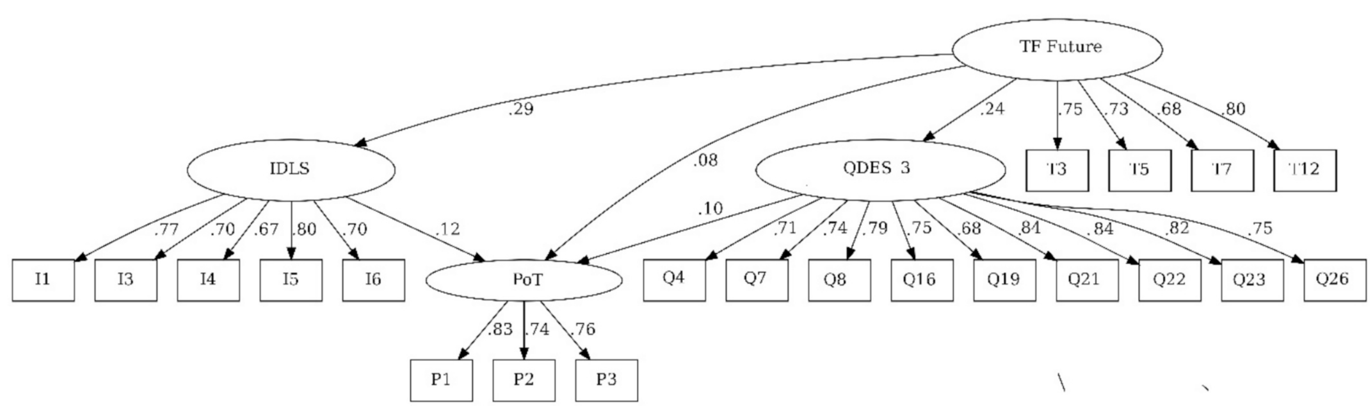

Fig. 3. Structural Equation Modeling with QDES3. *Note:* IDLS = Immersion in Digital Life scale; TF-Future = Temporal Focus Future; QDES 3 = Quality of Digital Experience subscale: Time and Efficiency; PoT = Passage of Time; $\chi^2(148) = 3661.130$; $p < .001$ RMSEA = 0.050, 90%[0.049, 0.052], *p*close = 0.488; IFI = 0.956; TLI = 0.950; CFI = 0.956; SRMR = 0.099.

The other two TF dimensions (Present, Future) and the three QDES measures all exhibited very small effect sizes. While these latter measures reached statistical significance, the very modest magnitude suggests that country differences account for relatively limited practical variation in these psychological constructs.

As presented in Tables 5 and 6, which display the means and standard deviations of the study variables across the six countries, some notable cross-national patterns emerge (for details of all post-hoc differences, see Table A8 in the Appendix. Poland exhibits the highest level of IDL (followed by Switzerland and the UK), coupled with the fastest experience of PoT. The United Kingdom shows the highest mean score for TF-Past among all surveyed nations (at the same time having the smallest score in TF-Future, alongside Germany) while at the same time exhibiting the slowest PoT.

Table 2
Model fit indices for measurement invariance across four scales.

Scale	Model	χ^2	Df	CFI	RMSEA	SRMR	ΔCFI	ΔRMSEA	ΔSRMR
IDLS	Configural	274.751	30	0.982	0.033	0.025	–	–	–
	Metric	433.883	50	0.974	0.032	0.034	0.008	0.001	0.009
	Scalar	1209.869	70	0.922	0.047	0.037	0.052	0.015	0.003
TF-Future	Configural	109.439	84	0.991	0.033	0.014	–	–	–
	Metric	199.643	27	0.985	0.029	0.022	0.006	0.004	0.008
	Scalar	440.42	96	0.964	0.036	0.023	0.021	0.007	0.001
QDES	Configural	10,984.626	1776	0.938	0.026	0.046	–	–	–
	Metric	11,499.739	1891	0.936	0.026	0.048	0.002	0.000	0.002
	Scalar	15,299.689	2006	0.911	0.030	0.048	0.025	0.004	0.000
PoT	Configural	–	–	–	–	–	–	–	–
	Metric	37.222	10	0.997	0.019	0.012	–	–	–
	Scalar	140.850	96	0.985	0.028	0.012	0.012	0.009	0.000

Note. IDLS = Immersion in Digital Life scale; TF-Future = Temporal Focus Future scale; (QDES = Quality of Digital Experience scale (three-dimensional); PoT = Passage of Time scale; Δ values reflect changes compared to the less constrained model (metric vs. configural; scalar vs. metric). For the Passage of Time scale (PoT), which consists of three items, the configural measurement invariance cannot be tested because of the minimum number of four items as requirement for the configural measurement level. The thresholds for evaluating measurement invariance were as follows: CFI ≥ 0.90; RMSEA ≤0.08; and SRMR ≤0.08 for configural invariance. ΔCFI ≤0.010, ΔRMSEA ≤0.015, and ΔSRMR ≤0.030 for metric invariance and ≤ 0.010 for scalar invariance.

Table 3
Estimates of structural equation modeling (standardized estimates in parentheses).

QDES1		
TF-Future	≥ IDLS	0.307 (0.300) $p < .001$
TF-Future	≥ QDES1	0.249 (0.250) $p < .001$
TF-Future	≥ PoT	0.087 (0.086) $p < .001$
TF-Future	≥ PoT	0.146 (0.147) $p < .001$
TF-Future	≥ PoT	0.022 (0.021) $p = .125$
QDES2		
TF-Future	≥ IDLS	0.316 (0.308) $p < .001$
TF-Future	≥ QDES2	0.318 (0.285) $p < .001$
TF-Future	≥ PoT	0.088 (0.087) $p < .001$
IDLS	≥ PoT	0.150 (0.151) $p < .001$
QDES2	≥ PoT	0.008 (0.009) $p = .496$
QDES3		
TF-Future	≥ IDLS	0.300 (0.294) $p < .001$
TF-Future	≥ QDES3	0.237 (0.239) $p < .001$
TF-Future	≥ PoT	0.078 (0.077) $p = .003$
IDLS	≥ PoT	0.121 (0.123) $p < .001$
QDES3	≥ PoT	0.097 (0.095) $p < .001$

Table 4
One-way analyses of variance between countries for all used measures.

Variables	F (5, 7530)	η2	p
IDLS	87.30***	0.0547	<0.001
QDES total	11.43***	0.0075	<0.001
QDES1	6.42***	0.0042	<0.001
QDES2	13.58***	0.0089	<0.001
QDES3	5.73***	0.0037	<0.001
PoT	46.05***	0.0296	<0.001
TF-Past	21.73***	0.0142	<0.001
TF-Present	13.44***	0.0088	<0.001
TF-Future	12.36***	0.0081	<0.001

Note. η2: According to Cohen (1988), the limits for the size of the effect are 0.01 (small effect), 0.06 (medium effect) and 0.14 (large effect).

4. Discussion

The current study provides evidence that TF-Future as trait-like cognition, the extent of IDL and the QDE, shape subjective PoT. Our findings reveal key insights that advance our understanding of temporal perception in the digital age.

IDL is related to a faster PoT. This is consistent with the notion that "time flies when you are having fun" (Agarwal & Karahanna, 2000) or when one is absorbed in cognitive activities. Our finding solidifies that digital platforms are potent flow-inducing environments that directly manipulate our temporal perception. Platforms are architected to maximize engagement and attention, with time distortion emerging as a robust, yet indirect, psychological consequence.

Table 5
Means (M), Standard Deviations (SD) across countries for the IDLS, QDES total, QDES1 = Wellbeing, QDES2 = Social Connectedness, QDES3 = Time and Efficiency.

Country	*n*	M_{IDLS} (SD)	$M_{QDES\ total}$	M_{QDES1} (SD)	M_{QDES2} (SD)	M_{QDES3} (SD)
CZ	1212	42.36 (20.17)	3.34 (0.64)	3.35 (0.77)	3.05 (0.78)	3.73 (0.71)
DE	1225	44.53 (20.94)	3.32 (0.75)	3.30 (0.84)	3.11 (0.88)	3.72 (0.76)
PL	1456	55.28 (19.60)	3.39 (0.69)	3.38 (0.81)	3.09 (0.85)	3.78 (0.71)
ES	1212	47.26 (19.92)	3.46 0.67	3.29 (0.82)	3.27 (0.80)	3.80 (0.72)
CH	1227	54.12 (22.08)	3.45 (0.75)	3.36 (0.86)	3.22 (0.92)	3.78 (0.75)
UK	1204	52.43 (20.37)	3.49 (0.68)	3.46 (0.81)	3.24 (0.87)	3.85 (0.67)
ALL	7536	49.52 (21.07)	3.41 (0.70)	3.36 (0.82)	3.16 (0.85)	3.77 (0.72)

Note: UK = United Kingdom, CH = Switzerland, ES = Spain, PL = Poland, CZ = Czechia, DE = Germany.

Table 6
Means (M), Standard Deviations (SD) across countries for the PoT = Passage of Time (PoT) and the three Temporal Focus (TF) dimensions.

Country	*n*	M_{PoT} (SD)	$M_{TF\text{-}Past}$ (SD)	$M_{TF\text{-}Present}$ (SD)	$M_{TF\text{-}Future}$ (SD)
CZ	1212	68.55 (18.51)	4.06 (1.23)	4.72 (0.77)	4.39 (1.14)
DE	1225	69.52 (18.33)	4.08 (1.21)	4.78 (1.07)	4.36 (1.16)
PL	1456	74.84 (17.09)	4.16 (1.20)	4.71 (0.82)	4.55 (1.03)
ES	1212	68.14 (18.22)	4.02 (1.21)	4.70 (1.06)	4.41 (1.23)
CH	1227	69.24 (18.21)	4.05 (1.14)	4.79 (0.93)	4.63 (1.11)
UK	1204	64.39 (18.83)	4.46 (1.28)	4.52 (0.94)	4.36 (1.20)
ALL	7536	69.30 (18.44)	4.14 (1.22)	4.70 (0.94)	4.45 (1.15)

Note. UK = United Kingdom, CH = Switzerland, ES = Spain, PL = Poland, CZ = Czechia, DE = Germany.

A stronger TF-Future is associated with both a greater extent and higher QDE which, in turn, is linked to an accelerated subjective PoT. The finding that TF-Future is the primary temporal dimension linked to intervening and outcome variables in the SEM is conceptually coherent. The constructs of IDL and QDE are inherently prospective and forward-looking. They involve planning, goal-setting, and envisioning possible future selves—processes that are the hallmark of a future Temporal Focus, a premise that was supported by our correlation results. Beyond this future-oriented use, the correlation coefficients presented in Table 1 indicate that both higher immersion (as measured by the IDLS) and greater QDE (across the three sub-dimensions of the QDES) are significantly, though modestly, associated with a faster PoT. Specifically, individuals reporting greater DT use and greater perceived benefits—such as enhanced Wellbeing, Social Connectedness, and Time and Efficiency—also tend to experience a more rapid PoT. These findings empirically support the "time compression" hypothesis of digital engagement proposed by Mullen and Davidenko (2021) which suggests that the perception of time spent in virtual reality is faster.

Building on these empirical findings, several theoretically grounded interpretations can be offered. While our previous qualitative study (Černohorská et al., 2025) had revealed a transitory loss of lived time through the use of digital devices (in the range of minutes and hours), here we quantitatively show that lived time across the day, is perceived to pass faster in individuals who are more involved with DT in a positive way.

Emotional valence and the personal relevance of events also play a critical role in how long-term memories are formed and retrieved (Teghil, 2024; Wittmann et al., 2015), suggesting that these factors similarly influence subjective time over extended intervals—such as the perceived passage of a day or one's general sense of time acceleration. DT use, however, may constrain the range of lived experiences. Routine activities such as repeatedly checking apps or prolonged online engagement for professional purposes could reduce the frequency of novel, embodied, and enactive experiences. This, in turn, results in fewer rich or meaningful events being encoded in autobiographical memory. Consequently, such periods may retrospectively appear less eventful and more compressed, contributing to the feeling that time has passed quickly (Draaisma, 2004; Flaherty & Meer, 1994). Moreover, a TF-Future-already linked to an accelerated sense of time (as also shown in its correlation with unmediated present-focus; see Table 1)—appears to promote increased and more positively valanced DT engagement, likely in the service of anticipating and organizing future activities. As previous studies showed, TF-Future is correlated with personality traits such as conscientiousness and a tendency to think about future consequences (Kairys & Liniauskaite, 2015). Hence, it also seems to transfer to the context of digital usage. Future-oriented individuals may be immersed in digital life, in order to achieve goals that are part of their everyday functioning. They use DT for the purpose of meeting their needs, which would imply that digital engagement increases their satisfaction, which in turn reinforces the overall perception of a faster PoT. Higher levels of positive emotions as well as more satisfaction is associated with a faster PoT (Kosak et al., 2022).

Regarding the country specific SEM analyses the findings showed that for QDES1 and QDES2 the direct effect of TFF on PoT is not significant in Switzerland, the Czech Republic and Spain. Furthermore, for QDES3 the same effect was insignificant in Spain. In all three subscales (QDES1, QDES2 and QDES3) the direct effect of IDLS on PoT was insignificant in Germany. A last deviation was that the association of QDES1 and PoT was significant in Spain.

Furthermore, the study revealed significant cross-national differences, regarding means and one-way analyses of variance. Particularly in IDL, perceived PoT, and TF-Past, with IDL exhibiting the largest effect size. A plausible interpretation could be that these variations are likely shaped by country-level factors such as access to DT, digital literacy, and prevailing attitudes toward technology (Goodman-Deane et al., 2024). Recent statistics have shown existing differences in digitalization and digital immersion across European countries (Eurostat, 2024). In our study, participants from Poland reported the highest levels of IDL across all countries surveyed, alongside the fastest perceived PoT. This pattern aligns with the theoretical framework proposed above, whereby greater IDL—especially when accompanied by reduced real-world, embodied interactions—is associated to fewer memorable events being encoded in autobiographical memory, and thus contributes to a subjective acceleration of time. This observation may also reflect broader sociocultural dynamics. A recent cover story in The Economist (2025) described Poland's "remarkable rise" and increasing global influence, suggesting that intensified engagement with DT may be one facet of the country's socioeconomic transformation. The digitalization process in Poland commenced later than in many other European countries, partly due to the socioeconomic delays stemming from the communist era, which had long-term consequences. As a result, contemporary Poland can now be characterized as a 'network society,' currently undergoing a peak phase of digital immersion. This has to be further investigated.

Among all surveyed nations, the United Kingdom exhibited the highest mean score for TF-Past. Consistent with this, the UK (alongside Germany) reported the lowest level of TF-Future and the slowest PoT. A similar relationship—where increased past orientation corresponded with a decelerated sense of time—was observed in a student sample from Uruguay during the COVID-19 pandemic (Loose et al., 2022) and was attributed to heightened uncertainty about the future.

In the case of the UK, ongoing political and economic shifts following Brexit may contribute to a comparable sense of future uncertainty, potentially driving this TF pattern. In that case rumination and regret often connected to the focus on the past may be active. Likewise, Germany's characteristically low future focus might reflect broader cultural factors such as the often-cited German Angst. While these interpretations—regarding both Poland and the UK—remain speculative, they appear to align with the broader socio-political context and current national trajectories observed at the time of data collection.

5. Limitations

Although our six-nation sample offers a degree of cultural diversity, a key limitation lies in the study's temporal framework. We have used Structural Equation Modeling (SEM), in order to offer additional insights by allowing for the simultaneous estimation of all model paths and the use of latent variables to account for measurement error.

Moreover, we have not included complementary objective measures—such as experimental chronometry tasks, reaction-time tests or daily time diaries—, leaving the study vulnerable to social desirability bias and the limitations of self-report data. While our findings highlight the role of cognitive absorption, it is important to consider these states within their broader affective context. The experience of flow or deep engagement is rarely effectively neutral; it is typically accompanied by positive emotions such as enjoyment and interest (Csikszentmihalyi, 2009). Research robustly demonstrates that emotion, particularly positive valence, can lead to a compression of time (Droit-Volet, 2013). Therefore, the perceived acceleration of time reported by our participants is likely not a purely cognitive phenomenon but emerges from the interplay of intense focus and the positive task-related gratification (pleasure, meaning) that such focus often generates (Kosak et al., 2022). Naturally, the relationship between digital immersion and time perception is moderated or mediated by the user's affective state. For instance, a user experiencing stress or fatigue while immersed in a task might perceive time as passing slowly, whereas another user experiencing pleasure and interest in a similarly immersive task might perceive it as passing quickly. Such affective responses during an individual social media contact were not the focus of our study which would necessitate the real time recording of subjects' social media experiences.

The results raise more questions and suggest a need for further exploration of time perception in the digital age. The way DT use impacts individuals depends on individual factors (TF), but may also depend on situational factors and the way DT is used. Future experimental studies could control for variables like actual digital behaviour, motivations or aims of using DT. It would also be worth controlling quantitatively for flow states while engaging in digital experiences. We may experience an acceleration of time while doomscrolling social media, but we may also “lose track of time” while engaging in goal-oriented digital activities. The acceleration of time in both cases may be different on a quantitative level. Finally, the results connecting higher IDL with faster perceived PoT while using DT raise the question of whether a future advancement of technology and increased IDL will make time feel like it even passes faster, leading to more subjectively vanishing hours.

6. Conclusions

Our findings challenge the popular belief that DT inherently fragments attention and wellbeing. Instead, we reveal a more nuanced pathway: a future-oriented mindset promotes a deeper and more positive engagement with the digital world, which is the key to understanding a faster subjective PoT. Specifically, individuals who are focused on the future are more likely to use digital tools in a way that is associated to greater **IDL** and a better perceived **QDES.** It is this state of being ‘lost’ in a meaningful and beneficial digital environment that primarily accounts for the accelerated perception of time. This suggests that ‘time flying’ is not a sign of digital distraction but rather a marker of high engagement and seamless integration of technology into one's life and goals. The cross-national differences further suggest that cultural contexts may shape how readily individuals achieve this immersive and beneficial state. Cross-national differences emerged, which are probably related to political sentiments in the countries, with Poland showing the highest IDL and fastest PoT, while the UK exhibited the strongest TF-Past and slowest PoT.

Our study provides a nuanced framework for understanding time perception in the 21st century, moving beyond simplistic “screen time” metrics to a qualitative understanding of digital engagement. It positions the digital environment as a powerful and pervasive modulator of human temporality.

CRediT authorship contribution statement

Julie Papastamatelou: Writing – review & editing, Writing – original draft, Methodology, Data curation, Conceptualization. **Marc Wittmann:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Conceptualization. **Christine Schoetensack:** Writing – review & editing, Methodology, Conceptualization. **Tereza Klegr:** Writing – review & editing, Methodology, Conceptualization. **Katarzyna Goncikowska:** Writing – review & editing, Methodology, Conceptualization. **Georgina Giner-Domínguez:** Writing – review & editing, Methodology, Conceptualization. **Sébastien Chappuis:** Writing – review & editing, Methodology, Conceptualization. **Mónica Fernández Boente:** Writing – review & editing, Methodology, Conceptualization. **Quentin Meteier:** Writing – review & editing, Methodology, Conceptualization. **Alexander Unger:** Methodology. **José Vicente Pestana:** Writing – review & editing, Methodology, Conceptualization. **Rafael Valenzuela:** Writing – review & editing, Methodology, Conceptualization. **Nuria Codina:** Writing – review & editing, Methodology, Conceptualization. **Vanda Černohorská:** Writing – review & editing, Methodology, Conceptualization. **Chantal Martin-Soelch:** Writing – review & editing, Methodology, Conceptualization. **Ruth Ogden:** Writing – review & editing, Methodology, Conceptualization. **Joanna Witowska:** Writing – review & editing, Methodology, Conceptualization.

Declaration of competing interest

The author(s) declare no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Table A1
Mean and S.D. values of questionnaires.

	Mean	S.D.
IDLS [0 – 100]	49.52	21.06
QDES total	3.41	0.70
QDES Wellbeing [1 – 5]	3.36	0.82
QDES Connectedness [1 – 5]	3.16	0.85
QDES Time & Efficiency [1 – 5]	3.78	0.72
TF-Past [1 – 7]	4.14	1.22
TF-Present [1 – 7]	4.70	0.93
TF-Future [1 – 7]	4.46	1.15
PoT [0 – 100]	69.30	18.44

Table A2
Intercorrelations (Pearson’s r; *p* values) between variables in Czechia.

	1	2	3	4	5	6	7	8
1. IDLS								
2. QDES total	0.505***							
3. QDES1	0.447***	0.814***						
4. QDES2 (	0.493***	0.903***	0.656***					
5. QDES3	0.332***	0.788***	0.555***	.489***				
6. PoT	0.136***	0.112***	0.057	0.087	0.129***			
7. TF-Past	0.149***	0.094***	0.103***	.122***	0.003	0.090		
8. TF-Present	0.036	0.098***	0.068	0.077	0.103***	0.130***	0.108***	
9. TF-Future	0.189***	0.189***	0.150***	.147***	.172***	0.062	0.337***	0.314***

Note. ***p < .001 (two-tailed). All correlation coefficients with p < .001 are significant after BF = Bonferroni correction for n = 36 calculations (p = .00138).

Table A3
Intercorrelations (Pearson's r; p values) between variables in Germany.

	1	2	3	4	5	6	7	8
1. IDLS								
2. QDES total	0.605***							
2. QDES1	0.557***	0.891***						
3. QDES2	0.577***	0.943***	0.767***					
4. QDES3	0.431***	0.630***	0.630***	0.567***				
5. PoT	0.075	0.123***	0.096***	0.092***	0.182***			
6. TF-Past	0.198***	0.194***	0.180***	0.193***	0.132***	0.023		
7. TF-Present	−0.083	0.022	0.004	0.001	0.096***	0.157***	−0.256***	
8. TF-Future	0.265***	0.303***	0.262***	0.295***	0.248***	0.116***	0.259***	0.175***

Note. ***p < .001 (two-tailed). All correlation coefficients with p < .001 are significant after BF = Bonferroni correction for n = 36 calculations (p = .00138).

Table A4
Intercorrelations (Pearson's r; p values) between variables in Poland.

	1	2	3	4	5	6	7	8
1. IDLS								
2. QDES total	0.611***							
3. QDES1	0.547***	0.868***						
4. QDES2	0.539***	0.722***	0.747***					
5. QDES3	0.513***	0.802***	0.625***	0.543***				
6. PoT	0.175***	0.179***	0.134***	0.156***	0.178***			
7. TF-Past	0.183***	0.180***	0.178***	0.192***	0.089***	0.091***		
8. TF-Present	0.057	0.121***	0.085***	0.110***	0.114***	0.135***	−0.009	
9. TF-Future	0.231***	0.274***	0.230***	0.268***	0.198***	0.130***	0.354***	0.217***

Note. ***p < .001 (two-tailed). All correlation coefficients with p < .001 are significant after BF = Bonferroni correction for n = 36 calculations (p = .00138).

Table A5
Intercorrelations (Pearson's r; p values) between variables in Spain.

	1	2	3	4	5	6	7	8
1. IDLS								
2. QDES total	0.573***							
3. QDES1	0.467***	0.819***						
4. QDES2	0.567***	0.913***	0.667***					
5. QDES3	0.400***	0.807***	0.571***	0.540***				
6. PoT	0.152***	0.139***	0.121***	0.105***	0.139***			
7. TF-Past	0.199***	0.133***	0.109***	0.148***	0.067	0.084		
8. TF-Present	0.066	0.139***	0.095***	0.102***	0.160***	0.153***	−0.143***	
9. TF-Future	0.228***	0.227***	0.167***	0.211***	0.189***	0.062	0.434***	0.114***

Note. ***p < .001 (two-tailed). All correlation coefficients with p < .001 are significant after BF = Bonferroni correction for n = 36 calculations (p = .00138).

Table A6
Intercorrelations (Pearson's r; p values) between variables in Switzerland.

	1	2	3	4	5	6	7	8
1. IDLS								
2. QDES total	0.624***							
3. QDES1	0.600***	0.862***						
4. QDES2	0.615***	0.935***	0.771***					
5. QDES	0.404***	0.794**	0.577***	0.558***				
6. PoT	0.198***	0.148***	0.126***	0.120***	0.149***			
7. TF-Past	0.232***	0.095***	0.126	0.134***	−0.027	−0.015		
8. TF-Present	0.099***	0.127***	0.091***	0.100***	0.143***	0.216***	−0.040	
9. TF-Future	0.211***	0.198***	0.155***	0.168***	0.193***	0.085	0.303***	0.251***

Note. **p < .01; ***p < .001 (two-tailed). All correlation coefficients with p < .001 are significant after BF = Bonferroni correction for n = 36 calculations (p = .00138).

Table A7
Intercorrelations (Pearson's r; p values) between variables in UK.

	1	2	3	4	5	6	7	8
1. IDLS								
2. QDES total	0.567							
3. QDES1	0.461***	0.833***						
4. QDES2	0.589***	0.933**	0.717***					
5. QDES3	0.347***	0.782***	0.549***	0.547***				

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Table A7 (*continued*)

	1	2	3	4	5	6	7	8
6. PoT	0.170***	0.125***	0.110***	0.120***	0.087			
7. TF-Past	0.151***	0.098***	0.082	0.103***	0.056	0.013		
8. TF-Present	0.078	0.203***	0.202***	0.174***	0.163***	0.155***	−0.123***	
9. TF-Future	0.268***	0.302***	0.217***	0.311***	0.207***	0.132***	0.311***	0.315***

Note. ** $p < .01$; *** $p < .001$ (two-tailed). All correlation coefficients with $p < .001$ are significant after BF = Bonferroni correction for n = 36 calculations ($p = .00138$).

Table A8
Tukey post-hoc analyses.

Variables	Mean value differences	Lower limit	Upper limit
IDLS			
UK and Spain	5.17	2.79	7.54
UK and Czechia	10.07	7.69	12.44
UK and Germany	7.90	5.52	10.27
Switzerland and Spain	6.87	4.50	9.23
Switzerland and Czechia	11.76	9.40	14.13
Switzerland and Germany	9.60	7.23	11.95
Spain and UK	−5.17	−7.55	−2.79
Spain and Switzerland	−6.86	−9.23	−4.50
Spain and Poland	−8.02	−10.29	−5.75
Spain and Czechia	4.90	2.52	7.27
Poland and Spain	8.02	5.75	10.29
Poland and Czechia	12.92	10.65	15.19
Poland and Germany	10.75	8.48	13.01
Czechia and UK	−10.07	−12.44	−7.69
Czechia and Switzerland	−11.76	−14.20	9.33
Czechia and Spain	−4.90	−7.34	−2.45
Czechia and Poland	−12.92	−15.26	−10.58
Germany and UK	−7.90	−10.34	−5.46
Germany and Switzerland	−9.59	−12.02	−7.16
Germany and Poland	−10.75	−13.08	−8.41
QDES total			
UK and Czechia	0.15	0.07	0.23
UK and Germany	0.17	0.09	0.25
Switzerland and Germany	0.12	0.04	0.20
Spain and Czechia	0.11	0.03	0.19
Spain and Germany	0.13	0.05	0.21
Czechia and UK	−0.15	0.03	−0.07
Czechia and Spain	−0.11	−0.19	−0.03
Germany and UK	−0.17	−0.25	−0.09
Germany and Switzerland	−0.12	−0.20	−0.04
Germany and Spain	−0.13	−0.21	−0.05
QDE1			
UK and Spain	0.16	0.06	0.26
UK and Germany	0.16	0.06	0.26
Spain and UK	−0.16	−0.26	−0.06
Germany and UK	−0.16	−0.26	−0.06
QDE2			
UK and Poland	0.15	0.05	0.25
UK and Czechia	0.18	0.08	0.28
Switzerland and Poland	0.13	0.04	0.23
Switzerland and Czechia	0.17	0.07	0.27
Spain and Poland	0.18	0.08	0.28
Spain and Czechia	0.21	0.11	0.31
Spain and Germany	0.15	0.05	0.25
Poland and UK	−0.15	−0.25	−0.05
Poland and Switzerland	−0.13	−0.23	−0.04
Poland and Spain	−0.18	−0.28	−0.08
Czechia and UK	−0.18	−0.28	−0.08
Czechia and Switzerland	−0.17	−0.27	−0.07
Czechia and Spain	−0.21	−0.31	−0.11
Germany and Spain	−0.15	−0.25	−0.05
QDE3			
UK and Czechia	0.13	0.04	0.21
UK and Germany	0.13	0.05	0.22
Czechia and UK	−0.13	−0.21	−0.04
Germany and UK	−0.13	−0.22	−0.05

(*continued on next page*)

Table A8 (*continued*)

Variables	Mean value differences	Lower limit	Upper limit
PoT			
UK and Switzerland	−4.84	−7.01	−2.68
UK and Spain	−3.75	−5.92	−1,58
UK and Poland	−10.45	−12.53	−8.37
UK and Czechia	−4.16	−6.33	−1.99
UK and Germany	−5.13	−7.30	−2.97
Switzerland and UK	4.84	2.68	7.01
Switzerland and Poland	−5.60	−7.67	−3.53
Spain and UK	3.75	1.58	5.92
Spain and Poland	−6.70	−8.77	−4.62
Poland and UK	10.45	8.37	12.53
Poland and Switzerland	5.60	3.53	7.67
Poland and Spain	6.70	4.62	8.77
Poland and Czechia	6.29	4.21	8.36
Poland and Germany	5.32	3.25	7.39
Czechia and UK	4.16	1.99	6.33
Czechia and Poland	−6.29	−8.36	−4.21
Germany and UK	5.13	2.96	7.29
Germany and Poland	−5.32	−7.39	−3.25
TF-Past			
UK and Switzerland	0.40	0.25	0.54
UK and Spain	0.44	0.29	0.58
UK and Poland	0.30	0.16	0.44
UK and Czechia	0.40	0.25	0.54
UK and Germany	0.38	0.23	0.52
Switzerland and UK	−0.40	−0.54	−0.25
Spain and UK	−0.44	−0.58	−0.29
Poland and UK	−0.30	−0.44	−0.16
Czechia and UK	−0.40	−0.54	−0.25
Germany and UK	−0.38	−0.52	−0.23
TF-Present			
UK and Switzerland	−0.27	−0.38	−0.16
UK and Spain	−0.18	−0.30	−0.07
UK and Poland	−0.19	−0.29	−0.08
UK and Czechia	−0.20	−0.32	−0.09
UK and Germany	−0.26	−0.37	−0.15
Switzerland and UK	0.27	0.16	0.38
Spain and UK	0.18	0.07	0.30
Poland and UK	0.19	0.08	0.29
Czechia and UK	0.19	0.09	0.32
Germany and UK	0.26	0.15	0.37
TF-Future			
UK and Switzerland	−0.26	−0.40	−0.13
UK and Poland	−0.19	−0.32	−0.06
Switzerland and UK	0.26	0.13	0.40
Switzerland and Spain	0.22	0.09	0.36
Switzerland and Czechia	0.24	0.10	0.37
Switzerland and Germany	0.27	0.13	0.40
Spain and Switzerland	−0.22	−0.36	−0.08
Poland and UK	0.190	0.06	0.32
Poland and Germany	0.195	0.05	0.32
Czechia and Switzerland	−0.24	−0.37	−0.10
Germany and Switzerland	−0.27	−0.40	−0.13
Germany and Poland	−0.19	−0.32	−0.06

Note: Tests on an alpha level of 0.1%, $p < .001$.

Data availability

Data will be made available on request.

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