**Abstract**

**Objectives**: The Bipolar Continuum Hypothesis posits an inverse relationship between compassionate self-responding (CS) and uncompassionate self-responding (UCS), suggesting they lie on a continuum. However, some researchers propose that CS and UCS may function independently. This study aimed to investigate this debate by examining real-time fluctuations of state self-compassion components in response to contextual factors. **Method**: Across two longitudinal field studies (Study 1, *n* = 326; Study 2, *n* = 168), 494 participants provided weekly Ecological Momentary Assessment (EMA) data over three months. We assessed how immediate emotional states, decentering (a mindfulness-related skill), and event unpleasantness influenced CS and UCS in daily life. **Results**: Partial support was found for the Bipolar Continuum Hypothesis, with CS and UCS generally showing inverse fluctuations in response to negative affect and decentering. Negative affect was the strongest predictor, linked to higher UCS and lower CS. Decentering showed a stronger association with reducing UCS than increasing CS, suggesting an asymmetry in their interaction. An idionomic analysis revealed individual variability, with a subset of participants displaying no clear inverse relationship, or even a positive association, between CS and UCS. Event unpleasantness had a minor impact. **Conclusions**: These findings partially support the Bipolar Continuum Hypothesis, particularly regarding responses to emotional states and mindfulness practices, while also highlighting individual differences. Future research should refine interventions to enhance CS, tailoring approaches to accommodate individual variations in CS and UCS dynamics in therapeutic contexts.

**Keywords:** self-compassion; ecological momentary assessment; contextual factors; emotion regulation; decentering; negative affect.

**State Self-Compassion Dynamics: Partial Evidence for the Bipolar Continuum Hypothesis**

Self-compassion – the capacity to respond to one’s own suffering and perceived shortcomings with kindness and understanding – has emerged as a central construct in contemporary psychological research. Since Neff's (2003) introduction of the Self-Compassion Scale, which has garnered over 9,786 citations, this construct has been rigorously examined across diverse psychological contexts. Nevertheless, despite the substantial body of research, the theoretical foundations of self-compassion continue to be a subject of active debate (Cha et al., 2023).

Central to this debate is the Bipolar Continuum Hypothesis (Neff, 2022), which posits that compassionate self-responding (CS) and uncompassionate self-responding (UCS) are not distinct constructs but rather represent opposite poles of a single continuum. Within this framework, self-kindness, common humanity, and mindfulness occupy the compassionate end, while self-judgment, isolation, and over-identification characterize the uncompassionate end. Supporting this conceptualization, psychometric analyses indicate that the Self-Compassion Scale captures both a global self-compassion factor and six specific subfactors (Neff et al., 2017, 2021). Consequently, Neff (2022) contends that viewing CS and UCS as separate constructs constitutes a conceptual fallacy and advocates for using the Self-Compassion Scale total score as a unified measure.

Competing theoretical frameworks, however, question this unidimensional view. Some researchers argue that CS and UCS are distinct psychological constructs rather than polar opposites (Muris et al., 2018; Muris & Otgaar, 2020; Muris & Petrocchi, 2017). This perspective is supported by studies indicating that UCS has stronger associations with psychopathology than CS (Muris, 2016). Additionally, evidence that individuals can exhibit high levels of both CS and UCS concurrently (Ullrich-French & Cox, 2020) poses a challenge to the strict bipolar continuum model, suggesting a more complex relationship between these constructs.

Until recently, research in this area has largely conceptualized self-compassion as a stable trait, reflecting a relatively enduring personality characteristic. However, recent advances have shifted attention towards viewing self-compassion as a dynamic construct that may vary across time and context. This evolving perspective suggests that observational longitudinal studies, as opposed to traditional psychometric approaches, may be more suitable for capturing the nuanced and context-dependent nature of self-compassion (Ferrari et al., 2022), aligning with broader psychological trends that emphasize state-dependent variability over trait stability.

For instance, Krieger et al. (2016) conducted a longitudinal study across three time points following depression treatment, finding that both the Self-Compassion Scale total score and its subcomponents (CS and UCS) were equally predictive of depression outcomes. Although CS and UCS effects differed in direction due to the polarity of the scales, the strength of these effects was comparable, indicating that the total self-compassion score provides a robust representation of the self-compassion construct. These findings align with Neff’s Bipolar Continuum Hypothesis. Nonetheless, despite its longitudinal design, the study by Krieger et al. (2016) remains rooted in a trait-based framework.

More recently, Mey et al. (2023) proposed investigating self-compassion as a dynamic, state-level construct that varies with momentary emotional and contextual influences. Through Ecological Momentary Assessments (EMA), they explored the relationship between state self-compassion and well-being, distinguishing between the CS and UCS components. Their findings showed that high state CS predicted positive affect, whereas high UCS was more strongly linked to psychological distress. These differential effects, which challenge the Bipolar Continuum Hypothesis, emphasize the importance of analyzing CS and UCS as distinct, state-dependent dimensions.

The use of EMA has proven particularly valuable for capturing the temporal dynamics of self-compassion (e.g., Gavrilova & Zawadzki, 2023). Recent studies indicate that fluctuations in momentary self-compassion are predictive of concurrent changes in affect and stress reactivity, with strong links to adaptive outcomes such as increased mindfulness, reduced stress reactivity, and improved well-being (Biehler & Naragon-Gainey, 2022; Ewert et al., 2021; Sahdra et al., 2023). The consistency of these temporal associations supports a reconceptualization of self-compassion as a dynamic process rather than a stable trait. These findings highlight the importance of state-level assessments over shorter intervals to better capture the nuanced role of self-compassion in everyday life.

Despite advances in understanding self-compassion’s temporal dynamics and contextual variability, substantial methodological limitations persist in the current literature. One limitation concerns the restricted temporal scope of existing studies, which have typically employed brief assessment periods (≤ 7 days; e.g., Mey et al., 2023; Sahdra et al., 2023). Such short durations may fail to capture the full complexity of state self-compassion dynamics. A second limitation relates to the validity of the measures used. In earlier research, the absence of validated state-level measures led to reliance on ad hoc instruments, potentially compromising both the validity and reliability of the assessments.

Our study addresses these limitations through a three-month EMA using the validated State Self-Compassion Scale (Neff, 2022). It is the first to examine the Bipolar Continuum Hypothesis within an EMA framework over an extended timeframe, investigating how the CS and UCS components of state self-compassion fluctuate across a complex, multilayered temporal structure within individuals. By collecting data across multiple levels – moments, days, and individuals – this approach offers a nuanced analysis of self-compassion dynamics in real-life contexts.

This research aims to empirically evaluate the Bipolar Continuum Hypothesis by investigating how situational factors differentially influence the CS and UCS components of state self-compassion. According to the Bipolar Continuum Hypothesis, if self-compassion functions as a unified construct, situational factors should have opposing effects on CS and UCS. Conversely, evidence of independent or asymmetrical responses to contextual influences would support a dual-construct framework. Moreover, a rigorous test of the Bipolar Continuum Hypothesis requires examining whether these opposing effects on CS and UCS are consistently observed at the individual level.

Drawing on Ferrari et al.'s (2022) conceptualization of self-compassion as a dynamic process, we propose three specific hypotheses.

**H1:** A purely cross-sectional psychometric analysis, conducted at a single time point, may be insufficient to determine the dimensionality of self-compassion because multiple CFA models with distinct theoretical implications can yield comparable goodness-of-fit indices (e.g., Bifactor ESEM vs. Correlated Two-Bifactor ESEM; Neff et al., 2019). By contrast, state-level Compassionate Self (CS) and Uncompassionate Self (UCS) are expected to exhibit robust temporal dynamics, reflecting moment-to-moment regulatory processes in which increases in one component coincide with decreases in the other, depending on the context. These temporal fluctuations thus offer richer insight into the underlying structure of the self-compassion construct. Consequently, to test the Bipolar Continuum Hypothesis, we will examine the factor structure of state self-compassion in EMA data, thereby leveraging these within-person temporal dynamics.

**H2:** According to the Bipolar Continuum Hypothesis, the valence of contextual situations should exert an equal, opposite, and symmetric effect on the two components (CS and UCS) when considered separately. Each component can be predicted independently using a hierarchical Bayesian regression model, with predictors representing contextual valence dimensions. If the Bipolar Continuum Hypothesis holds, we expect the regression coefficients from the two models to be statistically comparable in magnitude but opposite in sign.

**H3:** Contextual stressors or heightened negative affect may amplify the bipolar relationship between CS and UCS by activating self-regulatory mechanisms that intensify the emotional distinction between these two components (Dejonckheere et al., 2021). Previous research indicates that emotionally salient events, which bring central personal concerns to the forefront, can increase affective polarization. In such cases, positive and negative emotional states become more mutually exclusive, serving as an adaptive mechanism to highlight the event's relevance and direct attention toward appropriate responses. This heightened bipolarity focuses cognitive and emotional resources on evaluating success or failure in relation to the concern, streamlining emotional processing to facilitate effective behavioral reactions. By leveraging on this phenomenon, we will assess the association between CS and UCS before and after a salient event that participants experience, where emotional arousal is expected to vary (high vs. low). According to the Bipolar Continuum Hypothesis (BCH), the relationship between CS and UCS should remain stable regardless of changes in emotional arousal.

**H4:** At the individual level, the Bipolar Continuum Hypothesis predicts a consistently negative relationship between CS and UCS for every subject. Notably, if any individuals were to exhibit a zero or positive correlation between these components, such findings would directly challenge the validity of the Bipolar Continuum Hypothesis.

In the previous literature, the evaluation of hypotheses such as those described above is commonly conducted using multilevel models. However, multilevel models have notable limitations that may obscure the temporal dynamics and individual variability inherent in EMA data. Specifically, multilevel models often operate under the assumption of psychological homogeneity, treating individual differences as statistical noise or unexplained variance rather than as meaningful information (Sahdra et al., 2024). Furthermore, multilevel models tend to aggregate data toward group-level trends (Gelman, Hill, & Vehtari, 2020), thereby "smoothing out" individual-level heterogeneity and potentially misrepresenting within-person associations over time. This limitation is particularly problematic when the ergodic assumption—that group-level effects are representative of individual-level processes—is violated.

To overcome these limitations, we will complement multilevel models analyses with an idionomic approach (Hayes et al., 2022). This approach focuses first on modeling idiographic patterns—those unique to the individual—before generalizing to nomothetic (group-level) patterns. Only nomothetic generalizations that incrementally enhance our understanding of idiographic insights are retained (Ciarrochi et al., 2024; Ferrari et al., 2022; Sahdra et al., 2024; Hayes & Hofmann, 2021; Ciarrochi et al., 2022).

To test these hypotheses, we conducted two EMA studies. Study 1 examined the associations between immediate emotional states, event unpleasantness, and the components of state self-compassion in daily life. Study 2 extended this inquiry by assessing state self-compassion before and after a high-stakes university examination, providing a naturalistic context to investigate how self-compassionate responses vary with situational demands (for stress and self-compassion, see also Scott et al., 2024). Additionally, Study 2 included a measure of decentering (Biehler & Naragon-Gainey, 2022; Naragon-Gainey et al., 2023; Xie, 2023) – a key mindfulness process that allows for observing thoughts and emotions without attachment – to explore its distinct effects on CS and UCS. This approach introduces a novel dimension to testing the Bipolar Continuum Hypothesis by examining whether decentering differentially influences the two components.

Understanding the dynamic interplay between state CS and UCS has important implications for psychological interventions aimed at enhancing well-being (Körner et al., 2015). By clarifying how situational factors shape real-time self-compassionate responses, this research seeks to deepen theoretical insights into self-compassion and provide evidence that can inform evidence-based strategies for promoting adaptive self-relations across varied contexts (Hofmann et al., 2011; MacBeth & Gumley, 2012; Paetzold et al., 2023).

## Common Method

### Participants and Recruitment

Participants in both studies were recruited from undergraduate and graduate psychology courses at a university. Enrollment was entirely voluntary, and no incentives or course credits were offered. Inclusion criteria for both studies required individuals to (1) be at least 18 years of age, (2) possess a proficient level of Italian, (3) have prior experience with smartphones, and (4) report no current or past psychiatric disorders or drug/alcohol addictions. Participants who did not meet a minimum compliance threshold (50% response rate) were excluded from analyses.

### Baseline Assessments

All participants, prior to the Ecological Momentary Assessment (EMA) phase, completed an initial session where baseline questionnaires were administered. These assessed: **Trait Self-Compassion**, using the Self-Compassion Scale (SCS; Neff, 2003); **Depression, Anxiety, and Stress**, using the Depression Anxiety Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995); **Emotion Regulation Capabilities**, using the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). Further details on scale items, validity indices, and scoring procedures are provided in the Supplementary Information (SI).

### EMA Platform and General Procedure

In both studies, participants were trained to use the **m-Path mobile application** (Mestdagh et al., 2023) on their smartphones. The EMA prompts were configured to appear five times per day (between 10:00–10:30, 15:00–15:30, 17:00–17:30, 19:00–19:30, and 21:00–21:30), though the total number of days and any special context-based prompts varied between the two studies (see Study-Specific Methods below).

In each prompt, participants answered a short survey evaluating:

* **Pleasant or Unpleasant Event** since the last notification (1 = extremely unpleasant to 5 = extremely pleasant).
* **Positive and Negative Affect**, using adapted items from the PANAS (Watson et al., 1988) and Kuranova et al. (2020). Negative affect items included nervous and upset; positive affect items included cheerful and satisfied. Each item was rated on a 5-point Likert scale (1 = not at all to 5 = very).
* **State Self-Compassion**, using the State Self-Compassion Scale–Short Form (SSCS-SF; Neff et al., 2021), augmented by two additional items (one for Compassionate Self [CS] and one for Uncompassionate Self [UCS]) to ensure at least four items per dimension. Items were rated on a 6-point Likert scale (1 = extremely false to 6 = extremely true). At the time of data collection, a validated Italian version of the SSC-SF was not available, so we translated the scale ourselves. All items from the original SSC-SF were translated into Italian by two independent researchers. In the next phase, the two Italian versions were back-translated into English by a bilingual individual with extensive knowledge of psychological terminology. A comparison of the back-translations resulted in the finalized Italian version of the SSC-SF.

### Data Analysis

Hypothesis **H1** was tested with a multilevel CFA analysis. Hypotheses **H2** and **H3** were tested employed **Bayesian multilevel models**, run via Markov Chain Monte Carlo (MCMC) methods (specifically Hamiltonian Monte Carlo in Stan; Stan Development Team, 2020). Weakly informative priors were used, and posterior distributions were estimated from a minimum of 2,000 samples per chain across four chains, following a 1,000-step warm-up phase. We compared possible fixed and random effects structures using Leave-One-Out Cross-Validation (LOO). All continuous predictors were standardized (mean 0, SD 1) for interpretability of coefficients. We present posterior distributions using means (β) and 89% credibility intervals (CI), with contrasts reported as 89% highest posterior density intervals (HPDI). This choice aligns with Bayesian approaches that prioritize estimation over hypothesis testing (McElreath, 2020). Additional analytic details—such as model specifications, priors, and convergence diagnostics—are reported in the SI. Hypothesis **H4** was tested using a two-stage idionomic analysis. First, we adopted an idiographic approach, using a hierarchical Bayesian model in Stan to estimate the within-person relationship between UCS and CS for each participant. Second, a nomothetic approach employed a hierarchical model in the brms package (R) to identify group-level patterns and quantify the variability in UCS–CS associations across participants (e.g., Sahdra et al., 2024).

Traditional multilevel modeling (MLM), while useful for separating within-person and between-person variance, often underestimates individual-level heterogeneity due to shrinkage towards the group mean (Gelman, Hill, & Vehtari, 2020). In contrast, the idionomic framework integrates idiographic and nomothetic insights, preserving individual variability while identifying shared patterns. This approach allows a more nuanced understanding of individual differences and contextual dynamics in EMA studies, combining detailed within-person analyses with group-level generalizations.

**Study 1: Temporal Dynamics of State Self-Compassion in Daily Life**

Study 1 investigated the fluctuations of state self-compassion in response to everyday emotional experiences and challenging events. Specifically, we focused on momentary negative affect (Haney et al., 2023) and event unpleasantness as potential drivers of these fluctuations, examining their impact across multiple temporal scales: within days, between days, and between individuals (see Hypothesis 1 in the Introduction).

According to the Bipolar Continuum Hypothesis, contextual influences should produce opposing effects on the CS and UCS components. Moreover, emotionally salient contexts may amplify this bipolar relationship (Dejonckheere et al., 2021; Ferrari et al., 2022), as outlined in Hypothesis 2 of the Introduction. Study 1 tested these predictions through intensive longitudinal assessment of daily experiences.

## Study 1 Method

### Design and Procedure

**Study 1** examined fluctuations in state self-compassion (CS vs. UCS) across everyday experiences over three months. Data collection occurred on **10 specific days**, once per week, and the five daily prompts were delivered **exclusively on Saturdays** via semi-random sampling. On each prompt, participants answered the standard EMA questions on event valence, positive and negative affect, and state self-compassion.

### Sample and Compliance

* Initial enrollment included students meeting the above eligibility criteria.
* Of the total enrollment, participants who completed data on at least **four of the ten EMA days** were included in the final analysis.
* **Final sample**: 326 participants (M\_age = 24.08 years, SD = 7.88). Seven participants were excluded for failing to meet the 50% response criterion.
* **Overall compliance** was high, with participants responding to 85% of daily notifications and completing an average of 8.7 out of 10 study days.

## **Results**

**Analysis 1: Correlations Between the CS and UCS Components.** At the trait level, the correlation between CS and UCS, estimated using a robust t-distribution-based approach, was strongly negative, *r* = -0.66; 89% CI: [-0.73, -0.60]. At the state level, a multilevel analysis accounting for the nested data structure (i.e., measurements nested within days, and days nested within participants) revealed a moderate negative correlation between CS and UCS, *r* = -0.48; 89% CI: [-0.49, -0.47]. In contrast, the correlation between state CS at a given time point and state UCS at the immediately preceding time point was considerably weaker, *r* = -0.10; 89% CI: [-0.12, -0.08].

These results, which examine correlations across different temporal lags, highlight the dynamic and context-dependent nature of self-compassion. While CS and UCS demonstrate a clear inverse relationship within a single moment, their weaker lagged correlation suggests substantial variation over time, likely driven by immediate emotional and contextual influences. These findings emphasize the importance of considering situational moderators (e.g., momentary negative affect or interpersonal dynamics) to fully understand the fluctuations in the relationship between CS and UCS at the momentary level.

**Analysis 2: Multilevel Reliability.** A multilevel reliability analysis, following Lai's (2021) procedure, revealed that for the CS component, the between-subject reliability (*),* was 0.82, demonstrating the scale's effectiveness in distinguishing stable individual differences. The within-subject reliability () was 0.63, indicating moderate consistency across different measurement occasions and reflecting the dynamic nature of self-compassion over time. The overall composite reliability () for CS was 0.79, suggesting a reliable integration of within- and between-subject variabilities. For the UCS component, the between-subject reliability was robust at 0.88, the within-subject reliability was slightly higher at 0.68, and with a composite reliability of 0.83. These findings indicate that, while the scale effectively captures stable individual differences, self-compassion as a state exhibits natural fluctuations due to changing circumstances and internal states.

**Analysis 3: Impact of Contextual Influences on CS and UCS.** To examine the influence of contextual factors on state self-compassion (**H2**), we applied Bayesian hierarchical models with CS and UCS as dependent variables. These models accounted for variance at three levels: between individuals, between days, and within days. Negative affect and event unpleasantness were included as predictors, each centered at the moment, day, and person levels.This approach also enabled a nuanced test of the Bipolar Continuum Hypothesis by identifying how these predictors drive opposing trends in CS and UCS across different temporal contexts.

**Negative Affect**. Negative affect exerted strong and opposing effects on CS and UCS across all levels of analysis. Higher negative affect was associated with decreased CS and increased UCS. **CS**. Moment level: beta = -0.24; 89% CI: [-0.25, -0.23]. Day level: beta = -0.26; 89% CI: [-0.27, -0.25]. Person level: beta = -0.51; 89% CI: [-0.57, -0.45]. **UCS**. Moment level: beta = 0.26; 89% CI: [0.25, 0.27]. Day level: beta = 0.31; 89% CI: [0.30, 0.32]. Person level: beta = 0.65; 89% CI: [0.60, 0.71]. These findings indicate that negative affect has a consistent and substantial impact on the self-compassion components, with stronger effects observed at the person level.

**Event Unpleasantness**. In contrast, the effects of event unpleasantness were minimal and predominantly positive. **CS**. Moment level: beta = 0.04; 89% CI: [0.03, 0.05]. Day level: beta = 0.01; 89% CI: [-0.00, 0.02]. Person level: beta = 0.01; 89% CI: [-0.05, 0.07]. **UCS**. Moment level: beta = 0.00; 89% CI: [-0.01, 0.01]. Day level: beta = 0.04; 89% CI:[0.03, 0.05]. Person level: beta = 0.12; 89% CI: \([0.07, 0.17]. While event unpleasantness showed some influence on state self-compassion, its effects were minor compared to the pronounced impact of negative affect.

In summary, these results underscore the dominant role of negative affect in shaping state self-compassion, with distinct effects on the CS and UCS components. In comparison, event unpleasantness plays a more limited role, suggesting that state self-compassion is more sensitive to fluctuations in emotional states than to evaluations of specific events.

**Discussion**

The results of Study 1 offer partial support for the Bipolar Continuum Hypothesis while revealing important distinctions between trait and state manifestations of self-compassion. The strong negative correlation (*r* = −0.66) between CS and UCS at the trait level supports the Bipolar Continuum Hypothesis core premise of bipolarity. However, the more moderate state-level correlation (*r* = −0.48) and particularly weak temporal association (*r* = −0.10) between consecutive measurements suggest that this bipolar relationship becomes more flexible in response to situational demands.

We also found that negative affect had strong, opposing effects on CS and UCS across all levels of analysis (moment, day, person), aligning with the Bipolar Continuum Hypothesis. However, event unpleasantness showed minimal on CS and UCS, suggesting that the bipolar structure is more responsive to internal emotional states than external circumstances.

The reliability analyses highlight the dual nature of state self-compassion, reflecting both stable individual differences and flexible, context-sensitive responses. High between-subject reliability suggests a stable continuum at the trait level, while moderate within-subject reliability captures the adaptability of CS and UCS in response to changing contexts. These findings support Hypothesis 3, emphasizing the need for a person-centered approach to capture both stable and situational aspects of self-compassion.

In sum, Study 1 supports the Bipolar Continuum Hypothesis by showing an inverse relationship between CS and UCS, particularly under internal stressors like negative affect. However, the modest role of external factors suggests a more flexible and internally-focused bipolar relationship, underscoring the need to consider both trait and state aspects of self-compassion.

**Study 2: State Self-Compassion Dynamics in High-Stress Environments**

High-stress environments offer a critical test of the Bipolar Continuum Hypothesis, as stress may affect CS and UCS differently. While stress is generally thought to decrease CS and increase UCS (Neff, 2003), recent findings suggest that both components can be elevated under extreme stress, as seen in cancer patients (Wei et al., 2023) and also in some individuals in the general population (Ullrich-French & Cox, 2020). These findings challenge the view of CS and UCS as strict opposites, suggesting they may co-occur under high stress. This aligns with emotion regulation theories, which propose that multiple regulatory processes can be activated simultaneously in response to stress (Gross, 2015; Aldao & Nolen-Hoeksema, 2013). Conversely, high stress levels may increase the typical inverse association between CS and UCS, as proposed by Ferrari et al. (2022).

Study 2 thus examines whether CS and UCS maintain an inverse relationship in high-stress contexts or function as distinct, co-occurring responses, exploring whether the dynamics observed in Study 1 hold under more challenging conditions (see Hypothesis 2 in the Introduction).

Study 2 Method

### Design and Procedure

**Study 2** explored whether the inverse relationship between CS and UCS observed in daily life (Study 1) holds under **high-stress conditions**. The EMA protocol spanned **16 days** (over ~3 months), with the same five daily prompts delivered on Saturdays. Crucially, **four of these 16 days** incorporated **context-specific notifications** around a known stressor—academic exams—to capture responses in the moments immediately before and after the stressor. We divided the study period into three phases: **Pre-Exam Phase** (immediately before the exam); **Post-Exam Phase** (immediately after the exam); **Distant Time Point Phase** (later in the semester, when the stressor was less salient).

Beyond the standard EMA items (pleasant/unpleasant events, affect, and state self-compassion), Study 2 included **four decentering items** (adapted from Biehler & Naragon-Gainey, 2022). These items probed participants’ capacity for detached self-observation, theorized to influence how they respond to stress and potentially moderate the relationship between CS and UCS.

### Sample and Compliance

* Participants were drawn from the same recruitment pool as Study 1 and had to meet the same eligibility criteria.
* **Final sample**: 168 participants (M\_age = 19.6 years, SD = 1.9). Two participants were excluded due to <50% compliance.
* Average compliance was 82% of daily prompts and 72% across the 16 total days.

### Data Analysis Plan

Study 2’s Bayesian multilevel models paralleled those from Study 1 but included **stress (exam vs. non-exam periods)** and **decentering** as additional predictors. We tested whether CS and UCS remained bipolar opposites under high-stress, or whether they could co-occur (both increasing) when stress was elevated. **????????**

**Analysis 1: Impact of Academic Exam Stress on State Self-Compassion.** This analysis investigated the contextual effects of academic exam stress on the components of state self-compassion, CS and UCS, as hypothesized in **H2**. We applied two hierarchical Bayesian models to assess changes in CS and UCS across three key time periods: the day before an academic exam (pre-exam), the day after the exam (post-exam), and a baseline period (non-exam days). These models accounted for the hierarchical structure of the EMA data, which included repeated measures collected across multiple days and times. Specifically, the dataset comprised 12 administrations across separate days (with five notifications per day) compared to a single notification collected on the evening following the exam.

To examine the influence of stress, the study period was divided into three distinct phases: 1. Pre-exam phase: Captures the anticipatory stress period the day before the exam. 2. Post-exam phase: Reflects the recovery period the day after the exam. 3. Baseline phase: Represents typical non-exam days, serving as a control. We hypothesized that CS would decrease, and UCS would increase during the pre-exam phase due to heightened stress. Conversely, we expected these trends to reverse symmetrically in the post-exam phase, consistent with the Bipolar Continuum Hypothesis.

**Results. Pre-exam Phase:** CS decreased relative to baseline, beta = -0.29; 89% CI: [-0.51, -0.08], indicating reduced self-compassion. UCS increased relative to baseline, beta = 0.66; 89% CI: [0.38, 0.95], reflecting heightened self-criticism. **Post-exam Phase:** CS rebounded above baseline, beta = 0.23; 89% CI: [0.02, 0.45], suggesting recovery of self-compassion. UCS decreased below baseline, beta = -0.67; 89% CI: [-0.95, -0.39], indicating reduced self-criticism.

These results reveal opposing but symmetric trends in CS and UCS across the pre- and post-exam periods. The observed patterns align with the Bipolar Continuum Hypothesis, demonstrating that academic stress disrupts the balance between self-compassion and self-criticism in a predictable manner, with subsequent recovery once the stressor is removed. The findings emphasize the dynamic and context-sensitive nature of state self-compassion (see Figure 1).

**Figure 1**

*Study 2: Posterior Distribution of CS and UCS Components Before and After Exam Days.* Immagine che contiene diagramma, Diagramma, testo, schermata

Descrizione generata automaticamente

*Note.* **Top Panel:** This panel illustrates the differences in self-compassion levels, both CS and UCS, on the day before an exam relative to typical non-exam days. The differences were calculated by subtracting the self-compassion levels on non-exam days from those on the day before the exam. **Bottom Panel:** This panel presents the differences in self-compassion levels on the day after an exam, again compared to non-exam days. Contrary to the day before the exam, the day after an exam typically witnesses a reversal in the trends of CS and UCS levels. The graph depicts that, as expected, the UCS component sees an elevation the day before the exam, indicating increased stress or negative self-concept, while the CS component declines, suggesting a decrease in positive self-compassion. This trend reverses the day after the exam, with the CS component rebounding above the pre-exam average and the UCS component diminishing. The zero line on the graph represents the reference level of self-compassion during periods not influenced by exam stress, serving as a steady-state benchmark for comparison.

**Analysis 2: Impact of Contextual Influences on CS and UCS.** This analysis investigated how negative affect, decentering, and event unpleasantness influenced state self-compassion components (CS and UCS), using data from both exam-related and unrelated moments to explore a wide range of contextual variability. The analysis paralleled Analysis 3 of Study 1 and tested Hypothesis **H2**, which posits that contextual factors exert equal and opposite effects on CS and UCS, consistent with the Bipolar Continuum Hypothesis.

Separate Bayesian hierarchical models were used for CS and UCS as dependent variables, sharing the same structure but differing in the outcome variable. Fixed effects included negative affect (emotional distress), decentering (the ability to observe one’s thoughts without becoming overwhelmed), and event unpleasantness (subjective evaluation of negative experiences). Predictors were centered at three levels—person (inter-individual differences), day (variations between days), and moment (within-day fluctuations). Random intercepts for participants and days accounted for the hierarchical data structure. Predictors were scaled for consistent interpretation across levels. Model specifications are provided in the SI.

**Results**. Negative affect was negatively associated with CS (person-level β = -0.31; day-level β = -0.17; moment-level β = -0.13) and positively correlated with UCS (person-level β = 0.33; day-level β = 0.16; moment-level β = 0.14). Decentering positively influenced CS (person-level β = 0.20; day-level β = 0.12; moment-level β = 0.08) and negatively influenced UCS (person-level β = -0.36; day-level β = -0.22; moment-level β = -0.15). Event unpleasantness showed minimal impact on both CS and UCS. These inverse effects of negative affect and decentering on CS and UCS support the Bipolar Continuum Hypothesis.

**Analysis 3: Levels of Personal Concern and Stress.** The third analysis investigated whether the inverse relationship between CS and UCS remains stable across contexts with differing stress levels, specifically high-stress (pre-exam) and low-stress (baseline) contexts, as hypothesized in **H3**. A multivariate Bayesian model with random slopes and intercepts at multiple levels (participant, day, and within-day occasion) was applied to estimate the correlation between CS and UCS across these contexts. The model incorporated stress levels as predictors and allowed for heteroscedasticity by modeling the residual standard deviation as a function of stress context.

**Results**. In high-stress situations (e.g., pre-exam), the CS-UCS correlation was strongly negative (r = -0.70; 89% CI: [-0.76, -0.62]) and remained similarly negative post-exam (r = -0.70; 89% CI: [-0.78, -0.59]). In a low-stress baseline context, the CS-UCS correlation was also negative (r = -0.79; 89% CI: [-0.95, -0.60]). Overlapping credible intervals across stress levels suggest that the inverse CS-UCS relationship is stable, supporting the Bipolar Continuum Hypothesis.

**Analysis 4: Decentering and the CS-UCS Relationship**. This analysis explored whether decentering, viewed as a contextual factor influencing individuals' responses to the emotional valence of a situation, moderates the inverse relationship between CS and UCS (**H2**). Decentering was examined as an additional way to evaluate the Bipolar Continuum Hypothesis. A Bayesian hierarchical regression model was used, predicting UCS with CS, decentering, and their interaction at person, day, and moment levels. While the Bipolar Continuum Hypothesis predicts a stable inverse relationship, any moderation by decentering would suggest flexibility in the CS-UCS coupling.

**Results**. At the person level, the interaction between CS and decentering was negative (β = -0.05; 89% CI: [-0.08, -0.02]), indicating that individuals with higher decentering exhibit a stronger inverse CS-UCS relationship. At the day and moment levels, the interactions were near zero, with credible intervals including zero. These results suggest that decentering strengthens the bipolar structure of self-compassion at a trait level, supporting the hypothesis that mindfulness-related processes reinforce the inverse relationship between CS and UCS.

**Discussion**

The results of Study 2 offer nuanced insights into the Bipolar Continuum Hypothesis, particularly in the context of stress and internal versus external factors. As anticipated by the Bipolar Continuum Hypothesis, Analysis 1 showed that exam-related stress led to a decrease in CS and an increase in UCS during the pre-exam period, indicative of a shift towards self-criticism under stress. After the exam, this pattern reversed, with CS rebounding and UCS decreasing, suggesting recovery to baseline or enhanced levels of self-compassion. This opposing response to academic stress supports the Bipolar Continuum Hypothesis prediction of an inverse relationship between CS and UCS that varies with contextual stress.

Analysis 2 revealed that internal factors, such as negative affect and decentering, had symmetrical but opposing effects on CS and UCS. Elevated negative affect corresponded to reduced CS and increased UCS, while higher decentering was associated with increased CS and reduced UCS across all levels of analysis. This pattern reinforces the Bipolar Continuum Hypothesis by highlighting the opposing impacts of mood and mindfulness-related traits on self-compassion components. In contrast, event unpleasantness showed minimal impact, suggesting that internal states may have a more robust influence on self-compassion than external situational factors.

Analysis 3 examined the stability of the CS-UCS relationship across high-stress (pre-exam) and low-stress (baseline) conditions. The results showed a stable inverse correlation between CS and UCS, with overlapping confidence intervals across stress levels, suggesting that the inverse relationship is resilient and consistent regardless of stress intensity. This finding aligns with the Bipolar Continuum Hypothesis by supporting a stable, inverse coupling of CS and UCS under varying levels of stress.

Analysis 4 explored whether decentering moderates the CS-UCS relationship. Findings showed that individuals with higher trait-level decentering exhibited a stronger inverse CS-UCS relationship, implying that mindfulness-related traits may enhance the coupling between self-compassionate and self-critical responses. However, this effect was observed only at the person level, with minimal influence at the day and moment levels. This specificity challenges the Bipolar Continuum Hypothesis assumption of a universally fixed inverse relationship by suggesting that individual differences in mindfulness-related traits, such as decentering, may influence the strength of the CS-UCS relationship.

In sum, Study 2 provides partial support for the Bipolar Continuum Hypothesis. Analyses 1 and 3 confirm a consistent inverse relationship between CS and UCS across different stress levels, while Analyses 2 and 4 highlight the symmetrical effects of internal factors such as negative affect and trait-level decentering on these components. Nonetheless, certain findings suggest flexibility beyond the Bipolar Continuum Hypothesis framework, particularly the limited effect of external factors like event unpleasantness and the differential influence of decentering.

These results indicate that while the Bipolar Continuum Hypothesis holds under many conditions, additional factors, particularly mindfulness-related traits, may moderate the interaction between CS and UCS.

**Multilevel Dimensionality Analysis**

Building on prior evidence for the Bipolar Continuum Hypothesis in trait self-compassion, we assessed the dimensionality of **state** self-compassion through multilevel confirmatory factor analysis (CFA). This approach accounts for the nesting of repeated EMA measurements within days and individuals in both studies. We compared three theoretical models: (1) a **One-Factor Model** positing a single self-compassion dimension, (2) a **Two-Factor Model** distinguishing Compassionate Self (CS) and Uncompassionate Self (UCS) components, and (3) a **Bifactor Model** incorporating both a general factor and specific CS/UCS factors.

Results showed that the Two-Factor Model fit better than the One-Factor Model, indicating that state self-compassion comprises distinct CS and UCS dimensions. The Bifactor Model, however, yielded an even better fit.

FIT INDICES

\*\*Table with loadings\*\*

The Bifactor Model identified a robust general factor—especially at the between-subject level—suggesting that most items tap into a unidimensional construct. Negative-specific items captured additional unique variance, whereas positive-specific factors showed weaker loadings. Together, these results underscore the dominance of a general factor, with negative items playing a more pronounced role in explaining individual differences.

Despite this indication of “essential unidimensionality” (Reise et al., 2013), recent research cautions that Bifactor Models can overestimate model fit (Bonifay et al., 2017). Consequently, these findings alone do not definitively support the Bipolar Continuum Hypothesis.

Finally, it is important to recognize that multilevel CFA primarily reflects stable, person-level relationships rather than the moment-to-moment interplay of CS and UCS in different contexts. Hence, these CFA results may not fully capture the dynamic processes that underlie state self-compassion.

**Idionomic Analysis of CS-UCS Relationships**

To complement the group-level findings and investigate individual-specific dynamics, we conducted an idionomic analysis (Ciarrochi et al., 2024a; 2024b; Ferrari et al., 2022) on the relationship between CS and UCS, combining samples from both studies. This approach enabled us to capture individual heterogeneity in state self-compassion processes that may be obscured in aggregate analyses (see Hypothesis 3 in the Introduction).

**Statistical Analysis.** The analysis proceeded in two stages. In Stage 1, we applied participant-specific hierarchical Bayesian models using Stan to estimate the relationship between UCS and CS for each individual, controlling for negative affect, context evaluation, and the lagged effect of CS. For each participant, UCS was modeled as a function of CS at the same observation, with an intercept capturing baseline UCS levels. The primary predictor, CS, was assessed alongside negative affect, context evaluation, and an autoregressive term representing prior CS measurements within the same day. We also included an interaction term between CS and negative affect to test whether the influence of CS on UCS varied by affect levels. The error structure was defined using a Student's *t*-distribution to handle potential outliers. Posterior distributions were examined for each parameter to assess the strength and direction of associations at the individual level, focusing primarily on the coefficient associated with CS to determine if higher CS consistently related to lower UCS.

Stage 2 aggregated these individual-level estimates using hierarchical models. This allowed us to determine the proportion of participants showing negative CS-UCS relationships and to estimate the general effects of negative affect, context evaluation, and the CS-negative affect interaction across individuals.

**Results of the Idionomic Analysis**

**CS-UCS Relationship:** Across participants, 81.0% (89% CI: 79.6% to 82.3%) of the posterior estimates for the association between CS and UCS were negative, lending strong support to the Bipolar Continuum Hypothesis at the individual level. However, the substantial variability in these estimates *(s* = 1.25, corresponding to 0.196 on the probability scale) highlights marked heterogeneity in the strength – and occasionally the direction – of the CS-UCS relationship across participants, suggesting that person-specific factors influence this dynamic.

**Influence of Negative Affect on UCS:** The analysis indicated a positive effect of negative affect on UCS *(b* = 0.38, 89% CI: 0.34 to 0.42), meaning that elevated negative affect typically associated with higher UCS. Yet, individual variability was notable *(s* = 0.19, corresponding to 0.547 on the probability scale), implying that the impact of negative affect on UCS varies, likely due to differences in individual coping styles or emotional resilience.

**Effect of Context Evaluation on UCS:** The context evaluation parameter showed a minor negative effect on UCS *(b* = -0.04, 95% CI: -0.07 to -0.01), suggesting that positive situational evaluations slightly reduce UCS. Variability was considerable *(s* = 0.17, corresponding to 0.543 on the probability scale), indicating that some individuals are more responsive to contextual factors in managing UCS than others.

**Interaction Between CS and Negative Affect:** The CS-negative affect interaction effect was negligible, with the 89% CI spanning zero (-0.03 to 0.00), indicating no credible evidence that negative affect moderates the CS-UCS relationship. This suggests that momentary fluctuations in negative affect do not substantially alter the inverse relationship between CS and UCS within individuals, pointing to a stable underlying dynamic regardless of transient emotional states.

**Discussion**

The idionomic analysis provides nuanced support for the Bipolar Continuum Hypothesis while revealing important individual differences in self-compassion dynamics. Our two-stage hierarchical Bayesian approach show that for 81.0% of participants (89% CI: 79.6% to 82.3%), CS and UCS exhibited the hypothesized negative relationship, supporting the Bipolar Continuum Hypothesis at the individual level. However, the substantial heterogeneity in these relationships (*SD* = 1.25) suggests that the bipolar structure of self-compassion may not be universal, as approximately 19% of participants showed neutral or even positive CS-UCS associations. This result aligns with previous research (Ferrari et al., 2023; Ullrich-French & Cox, 2020) and emphasizes the importance of person-specific approaches in understanding self-compassion.

The analysis revealed a consistent positive association between negative affect and UCS *(b* = 0.38, 89% CI: 0.34 to 0.42), indicating that increased negative emotional states generally enhance uncompassionate self-responding. However, the marked individual variability in this relationship *(s* = 0.19) suggests that personal factors, such as emotional regulation capabilities or coping strategies, moderate how negative affect influences self-critical responses. The minimal impact of context evaluation on UCS *(b* = -0.04) further suggests that moment-to-moment fluctuations in self-compassion may be more strongly driven by internal emotional states than external circumstances.

Notably, the absence of a credible CS-negative affect interaction (89% CI: -0.03 to 0.00) challenges previous findings suggesting that emotional states modulate self-compassionate responses (Dejonckheere et al., 2021). Instead, our results indicate that the inverse relationship between CS and UCS remains relatively stable across different emotional states, pointing to a more trait-like underlying structure in how these components interact within individuals.

This idionomic investigation underscores the complexity of self-compassion dynamics and the limitations inherent in a purely nomothetic approach. While the Bipolar Continuum Hypothesis is generally supported at the individual level, the observation that a subset of participants exhibits positive or null associations between CS and UCS suggests the presence of diverse, person-specific patterns rather than a universally applicable bipolar continuum.

**General Discussion**

This study investigated the Bipolar Continuum Hypothesis by examining the dynamic relationship between CS and UCS in real time, drawing on Ferrari et al.’s (2022) conceptualization of self-compassion as a dynamic, adaptive process. We tested three hypotheses exploring whether CS and UCS fluctuate with situational factors, whether contextual stressors intensify their inverse relationship, and whether individual differences shape this dynamic. Here, we discuss our findings in relation to these hypotheses and their implications for the Bipolar Continuum Hypothesis and clinical practice.

The first hypothesis proposed that state-level CS and UCS would exhibit strong temporal dynamics, reflecting real-time regulatory processes (Ciarrochi et al., 2024a; Gavrilova & Zawadzki, 2023; Mey et al., 2023; Sahdra et al., 2023; 2024). Our findings provided robust support for this hypothesis. Both CS and UCS demonstrated notable fluctuations in response to immediate emotional and contextual changes, with negative affect reliably predicting decreases in CS and increases in UCS across time points. This adaptive responsiveness aligns with Ferrari et al. (2022), who conceptualize self-compassion as a flexible regulatory process that adjusts to changing emotional contexts. The observed temporal dynamics highlight the Bipolar Continuum Hypothesis’s perspective of CS and UCS as interrelated yet opposing components that adaptively shift to meet emotional demands (Neff et al., 2021).

The second hypothesis posited that contextual stressors or elevated negative affect would intensify the inverse relationship between CS and UCS, suggesting that stress activates self-regulatory mechanisms that strengthen this opposition (Dejonckheere et al., 2021). Our results, however, do not support this hypothesis. While stress independently affected CS and UCS – decreasing CS and increasing UCS before university exams and reversing after exams – the strength of their inverse association remained stable across stress levels. This consistency implies that, although CS and UCS levels adjust with stress, the strength of their relationship is not amplified by heightened stress. This stability aligns with the Bipolar Continuum Hypothesis, indicating that the CS-UCS relationship is robust and unaffected by stress levels, contrasting with suggestions from prior research (Dejonckheere et al., 2021) that stress may heighten their bipolarity.

The third hypothesis suggested that the CS-UCS relationship would vary across individuals, requiring a person-centered approach to capture the complexity of state self-compassionate responses (Ciarrochi et al., 2024a; Hayes et al. 2020; Sanford et al., 2022; Sahdra et al, 2024). Our idionomic analysis supported this hypothesis reveals two primary findings: (1) substantial variability in the strength of the CS-UCS association across individuals, and (2) a subset of participants who displayed positive or null associations, indicating diverse person-specific patterns rather than a uniform bipolar continuum.

While the first finding aligns with the Bipolar Continuum Hypothesis by revealing variability within the inverse association across individuals, the second finding suggests potential limitations in the hypothesis’s universal applicability. An analogy to Spearman’s model of intelligence (Spearman, 1904/1961) helps illustrate why inter-individual variability in the UCS-CS association is not problematic for the Bipolar Continuum Hypothesis. In terms of Spearman’s model, intelligence is often viewed as a unidimensional construct that encompasses a general factor alongside specific ability (e.g., English comprehension and knowledge of the Classics). While true-component correlations between, for example, English and Classics, remain consistent across individuals due to shared factor loadings, observed associations between individuals can vary due to unique, individual-specific factors. Similarly, variability in CS-UCS association strength across individuals does not necessarily contradict the Bipolar Continuum Hypothesis, as individual-specific influences shape observed associations alongside the bipolar construct.

However, in our sample, approximately 19% of participants showed neutral or positive CS-UCS associations. This suggests that the universally inverse relationship posited by the Bipolar Continuum Hypothesis may not apply uniformly. This finding aligns with recent literature advocating for individualized approaches to self-compassion research to capture distinct self-compassion profiles (Ferrari et al., 2022; Ullrich-French & Cox, 2020).

Further insights into the structure of state self-compassion were provided by our multilevel CFA analysis, which cast doubt on the strict factor structure proposed by Bipolar Continuum Hypothesis. Although the Bifactor Model yielded the best fit indices, suggesting some degree of underlying unidimensionality, recent studies warn that bifactor models can overfit by inflating fit indices, potentially overstating model adequacy (Bonifay et al., 2017). The Two-Factor Model’s superior performance over the One-Factor Model underscores that state self-compassion consists of distinguishable CS and UCS components. This suggests that, while a general factor may contribute to the construct, a single overarching factor does not fully capture the dynamic interplay between CS and UCS.

Some findings further challenge the Bipolar Continuum Hypothesis universality, particularly the asymmetrical influence of mindfulness traits such as decentering (Bernstein et al., 2015; Naragon-Gainey et al., 2023; Xie, 2023). Decentering consistently reduced UCS but did not correspondingly increase CS, implying that mindfulness practices may be more effective in reducing self-criticism than in enhancing self-compassion – a nuance not fully anticipated by the Bipolar Continuum Hypothesis. This aligns with studies suggesting that mindfulness may influence UCS differently from CS, indicating that the relationship between these components may not be as strictly bipolar as the Bipolar Continuum Hypothesis posits (Biehler & Naragon-Gainey, 2022; Mey et al., 2022).

It is conceivable that a single construct could include subdimensions or facets that, while part of the same overarching construct, exhibit differential sensitivity to external influences due to contextual specificity (as seen in Study 2). While this could be consistent with a general construct displaying varied expressions across contexts, such an interpretation would require additional theoretical justification to support the construct’s unidimensionality. This justification, however, does not align with Neff’s conceptualization of self-compassion as a singular, bipolar construct (Neff, 2022; 2023).

These findings carry important implications for clinical practice. The observed individual variability in the CS-UCS relationship suggests that a one-size-fits-all approach may not be effective. Instead, treatments may benefit from a personalized focus, emphasizing enhancement of CS and reduction of UCS separately in cases where the inverse relationship is weak. Additionally, the asymmetrical impact of decentering suggests that mindfulness-based interventions could be refined to specifically target self-criticism, especially where enhancing CS is challenging. This individualized approach aligns with emerging psychological care models, which stress the importance of adapting interventions to individual profiles and needs (Ferrari et al., 2022; Ullrich-French & Cox, 2020).

In conclusion, while our study partially supports the Bipolar Continuum Hypothesis, particularly revealing the inverse CS-UCS relationship in response to negative affect and stress, it also reveals potential limitations. The differential impact of mindfulness on UCS and the substantial individual differences in CS-UCS associations suggest that examining person-specific dynamics may enhance our understanding of state self-compassion. These findings advocate for a more flexible model of state self-compassion that accounts for individual variability, thereby supporting a wider range of therapeutic interventions.

**Limitations and Future Directions**. This study has several strengths, including the use of repeated naturalistic sampling within a community-based sample, providing detailed insights into fluctuations of state self-compassion in real-world contexts. However, certain limitations should be acknowledged. First, the sample consisted predominantly of university psychology students, which may not generalize to the broader population. Its non-clinical nature particularly limits its relevance to clinical settings, as our sample displayed a stronger presence of the CS component relative to UCS (Bayesian Cohen’s *d* = 1.48). Clinical populations, by contrast, often exhibit elevated levels of UCS, with lower levels of CS. For example, Neff and McGehee (2010) found that individuals with psychological disorders tend to have higher self-criticism and lower self-kindness, suggesting that further studies on clinical samples are needed to clarify the dynamics of state self-compassion across diverse populations.

Additionally, this study did not account for other potentially influential momentary variables that could impact self-compassion scores and the CS-UCS relationship, such as mindfulness (Biehler & Naragon-Gainey, 2022) and rumination (Raes, 2010). Future research should incorporate these factors to provide a more comprehensive understanding of self-compassion dynamics.

While the weekly EMA protocol employed in this study over a three-month period reduces participant burden compared to more intensive approaches, it may not fully capture the fine-grained, moment-to-moment fluctuations of self-compassion. A higher-frequency sampling protocol, such as five prompts per day over a shorter period, might yield more detailed insights into the contextual variability of self-compassion in daily life.

Lastly, this study centers on the conceptualization of self-compassion as defined by Neff’s Self-Compassion Scale. However, as Cha et al. (2023) highlight, self-compassion is a complex, multifaceted construct, with alternative frameworks that extend beyond Neff’s six-component model and consider additional facets, such as distress tolerance, for example. Furthermore, Neff’s model emphasizes an "individualistic" sense of self, prevalent in modern Western cultures, whereas Buddhist traditions view the self in more relational terms, as inherently interconnected with others and the world.

**Data availability.** Data are available at <https://osf.io/8vg3h/?view_only=815fd6e81b8e421e84428ec23b659c95>

**Declarations**

**Ethics statement.** The studies’ protocol received approval from the University of BLINDED Ethical Committee (Prot. n. 0249805) and was conducted in accordance with the principles of the Declaration of Helsinki.

**Informed Consent.** All participants provided their informed consent to participate in the studies.

**Conflict of interest.** The authors declare that they have no conflict of interest.

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