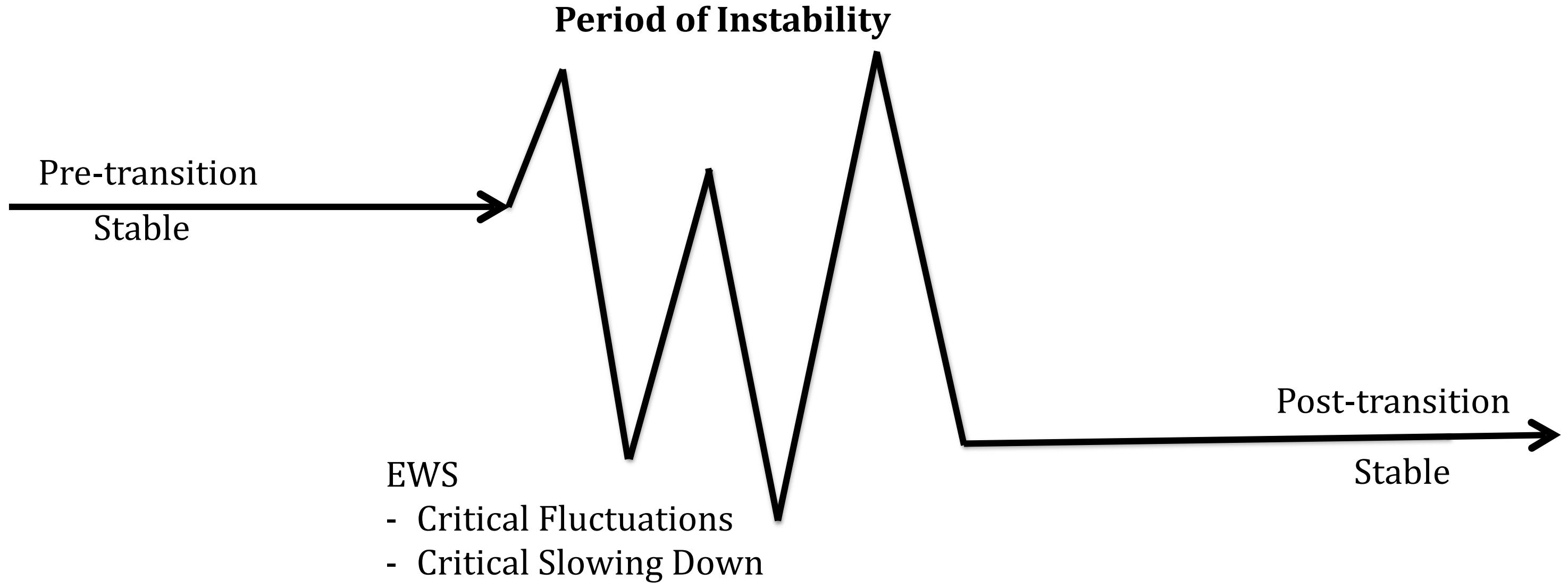


Early-Warning Signals and Phase Transitions in Psychotherapy

Early-warning signals for phase transitions



Lichtwarck-Aschoff et al., 2012; Gelo & Salvatore, 2016; Scheffer et al., 2009



Instability is related to clinical improvement

- Adults with mood disorders (Hayes & Strauss, 1998; Hayes & Yasinski, 2015; Van de Leemput et al., 2014; Schreuder et al. n.d.)
- Adults with obsessive-compulsive disorders (Schiepek, Tominschek & Heinzel, 2014)
- Adults with mixed diagnosis (Haken & Shiepek, 2006)
- Children with aggression problems (Lichtwarck-Aschoff, Hasselman, ... & Granic, 2012)
- Children with anxiety problems (Lichtwarck-Aschoff & Van Rooij, 2019)

Studies have small sample sizes or neglect possible destabilization periods during therapy.



Study 1: The relation between destabilization and treatment outcome

Olthof, Hasselman, Strunk, Aas, Schiepek & Lichtwarck-Aschoff (2019) Destabilization in self-ratings of the psychotherapeutic process is associated with better treatment outcome in patients with mood disorders, Psychotherapy Research, DOI: 10.1080/10503307.2019.1633484

<https://osf.io/fhrw4/>



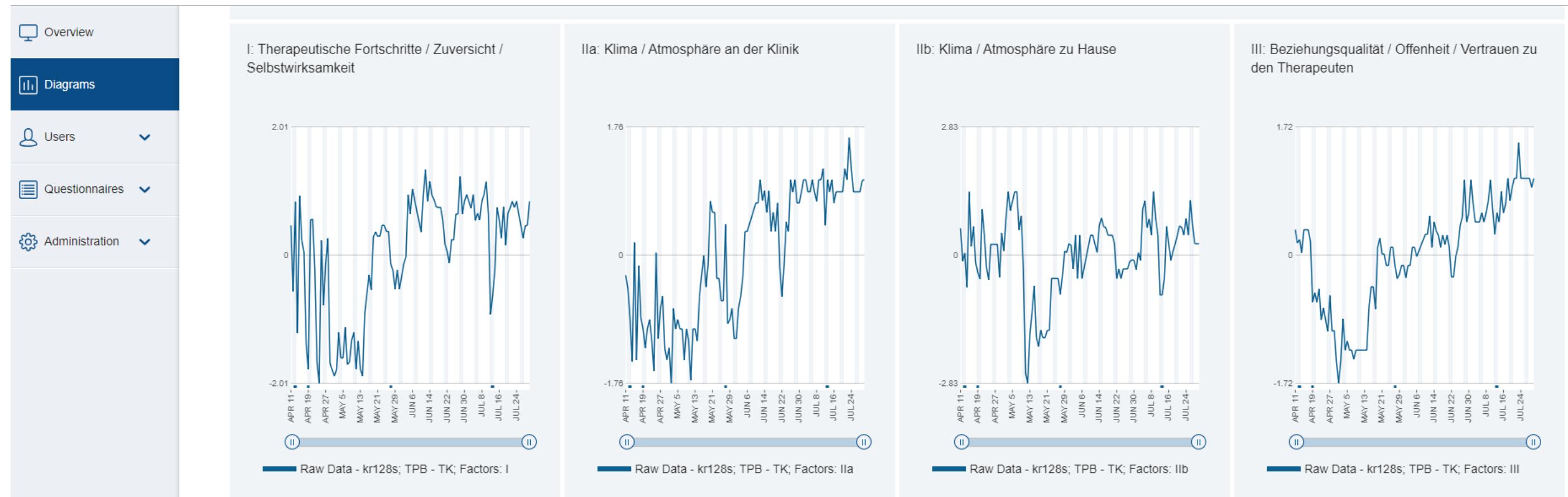
Design

- Patients with mood disorders (N=328)
- Collected with the Synergetic Navigation System¹ between 2008-2014
- Therapy Process Questionnaire (TPQ²)
 - Factor I: Therapy progress
 - Factor II: Problem Intensity
 - Factor III: Relationship quality and trust in therapist
 - Factor IV: Dysphoric affect
 - Factor V: Relationship with fellow patients

¹Schiepek et al. (2016), ²Haken & Schiepek (2010)

Data Collection

- Collected in real-world psychiatric care setting with the SNS



Why daily self-ratings?

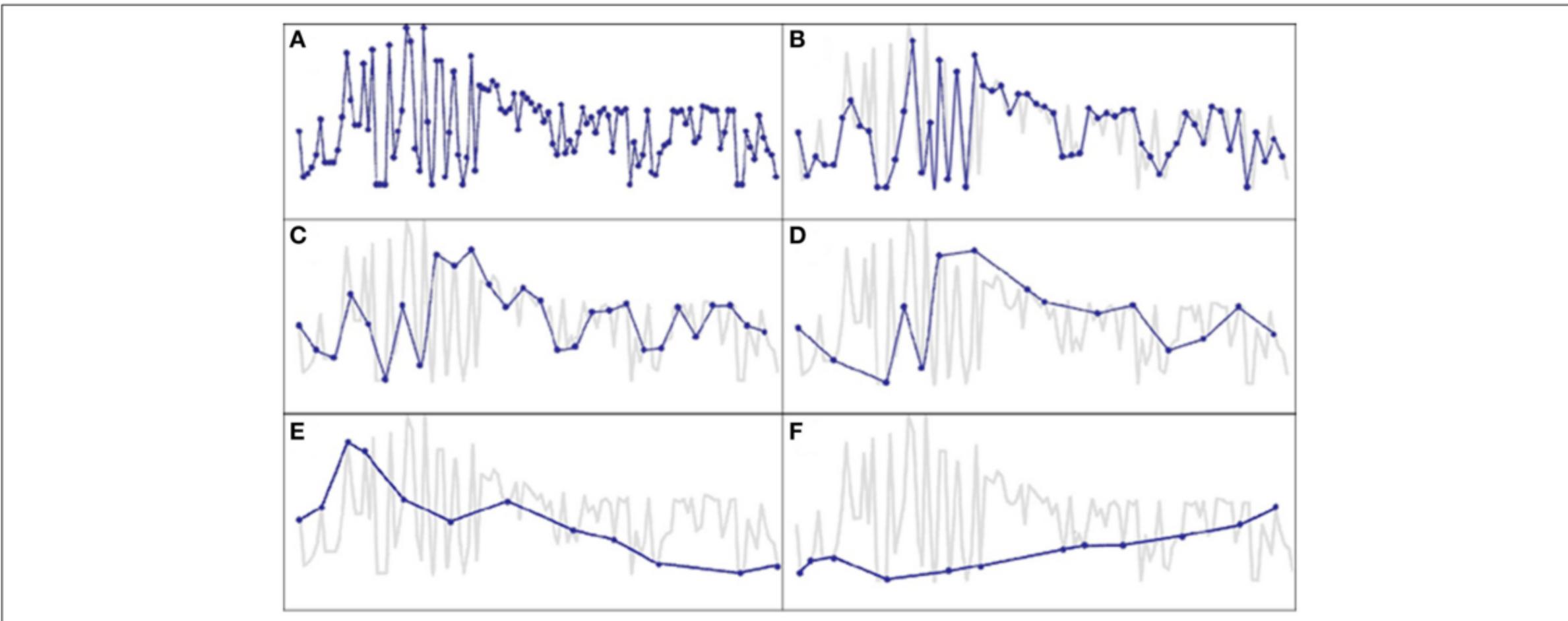
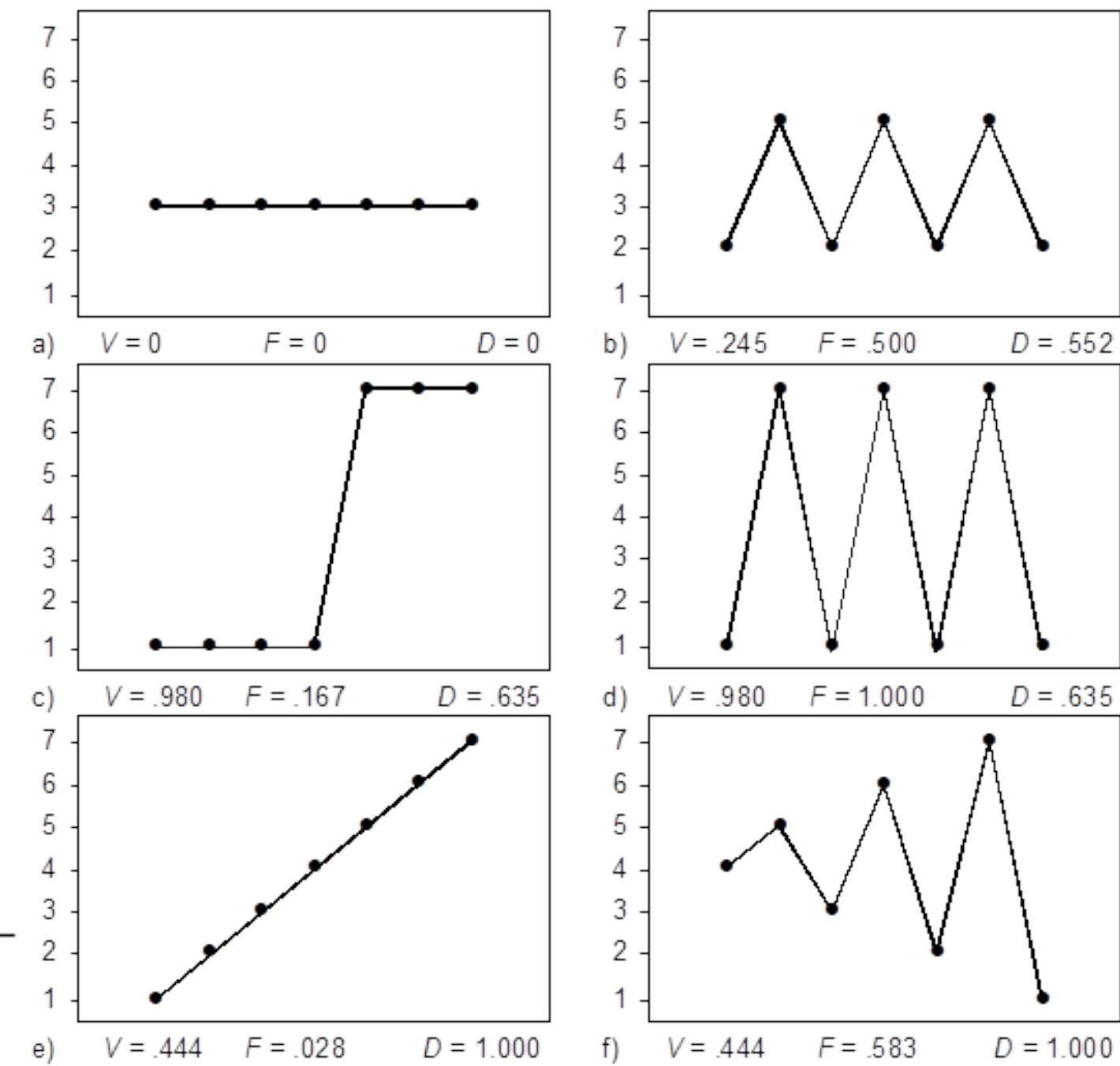
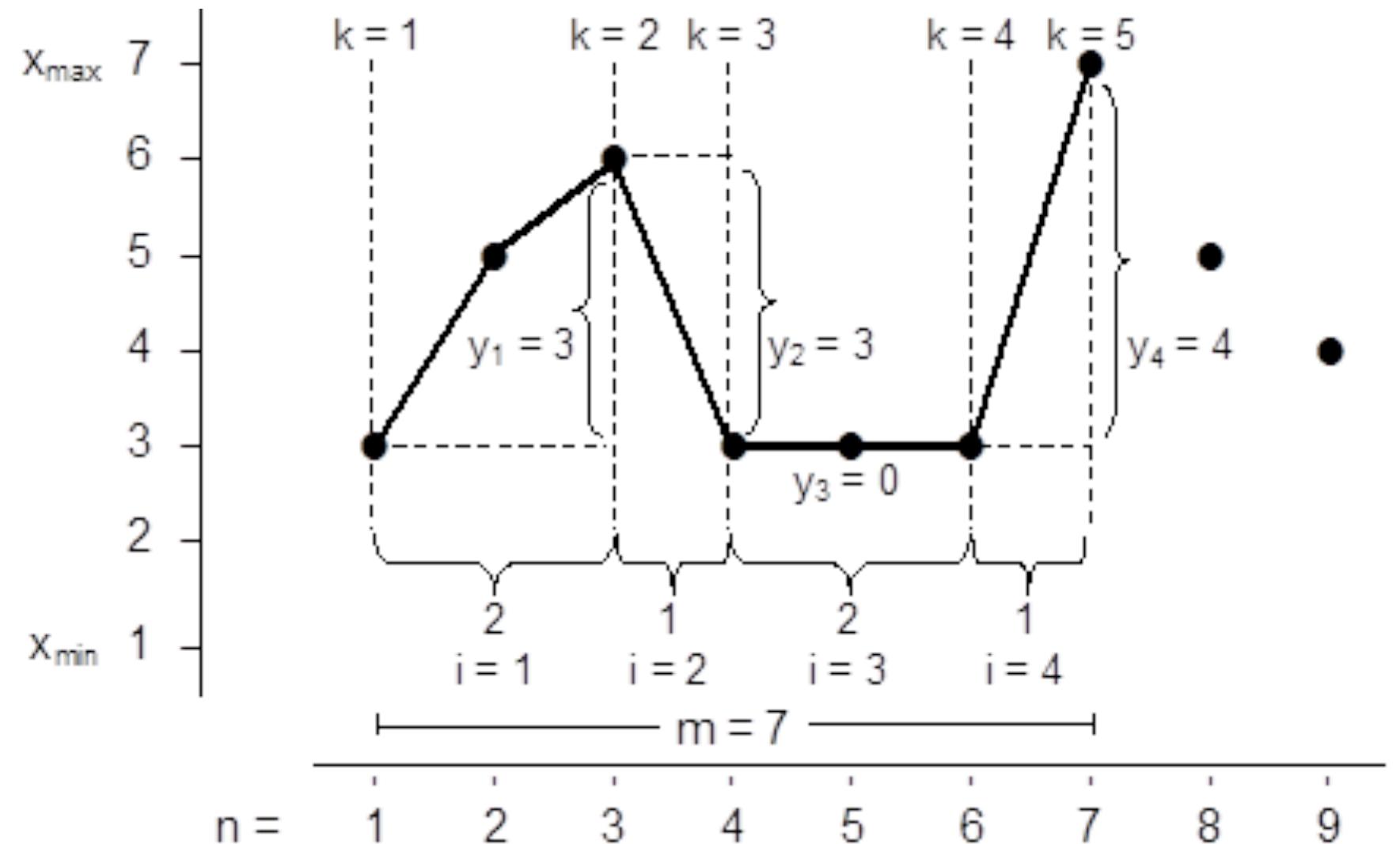


FIGURE 1 | Distortion of the dynamics of a time series by omitting measurement points. Depicted is a self-esteem time series of a single client (with borderline personality disorder diagnosis). **(A)** Shows the original time series with daily responses (opaque in **B–F**). In **(B)** only every second day is omitted as missing day. Fluctuations of the first weeks of the time series vanish, if ratings are only made on every fourth day **(C)** or weekly with some variation **(D)**. A major loss of information and possible source of therapeutic misjudgment occurs with the common practice of occasional weekly and fortnightly measurement intervals **(E,F)**.

Schiepek et al., 2016

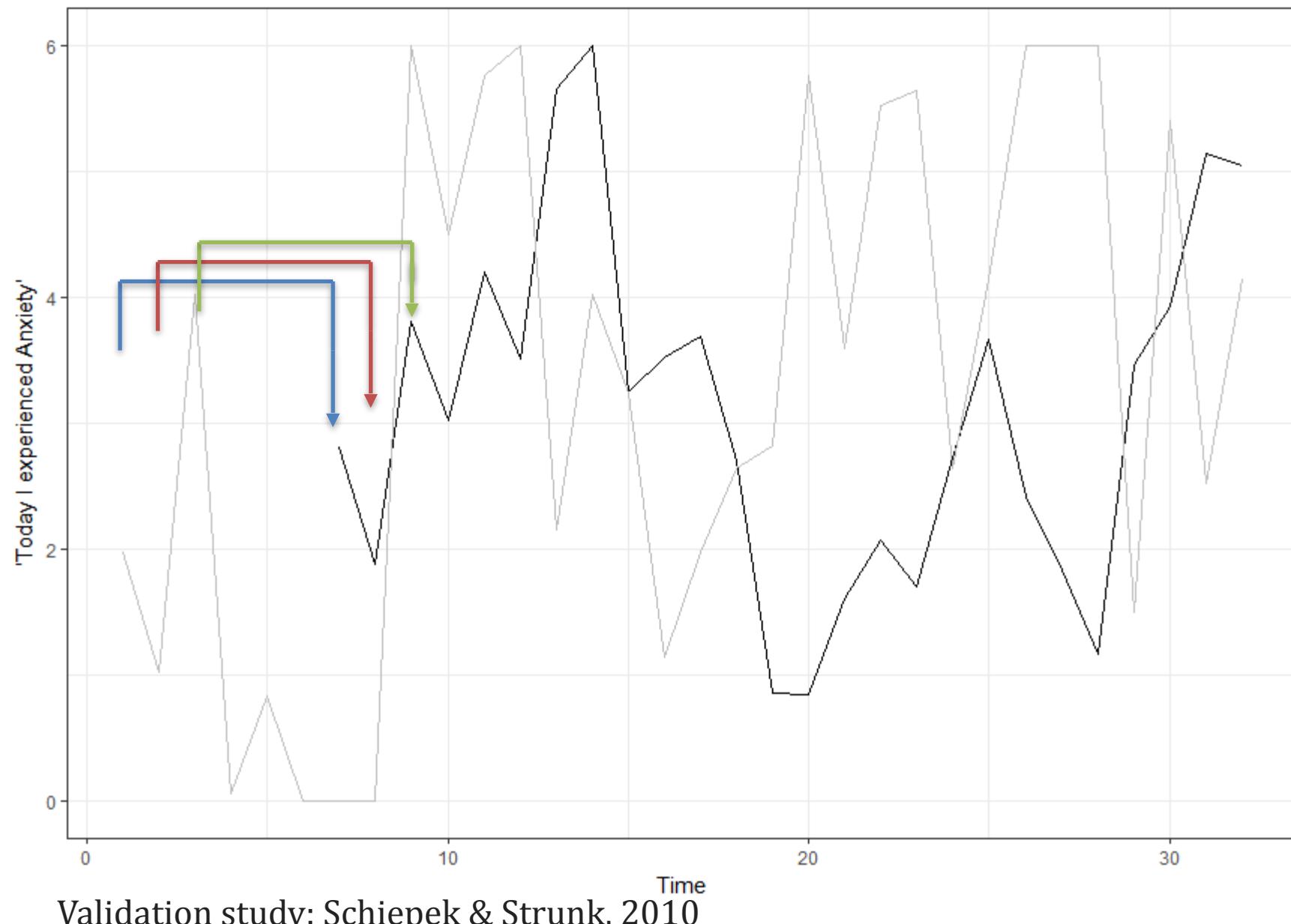


Dynamic Complexity

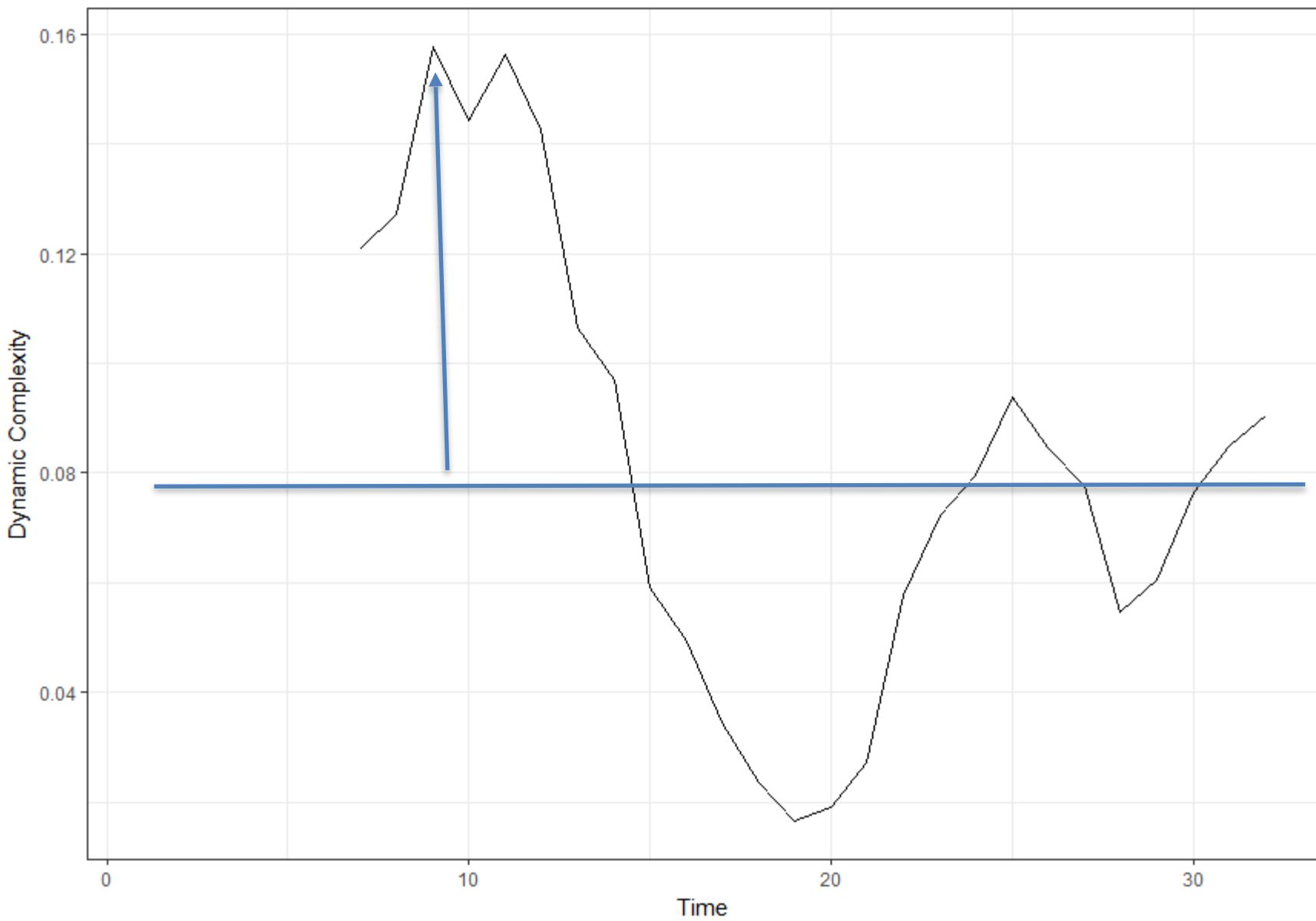


Schiepek & Strunk, 2010

Dynamic Complexity in a moving window



Validation study: Schiepek & Strunk, 2010

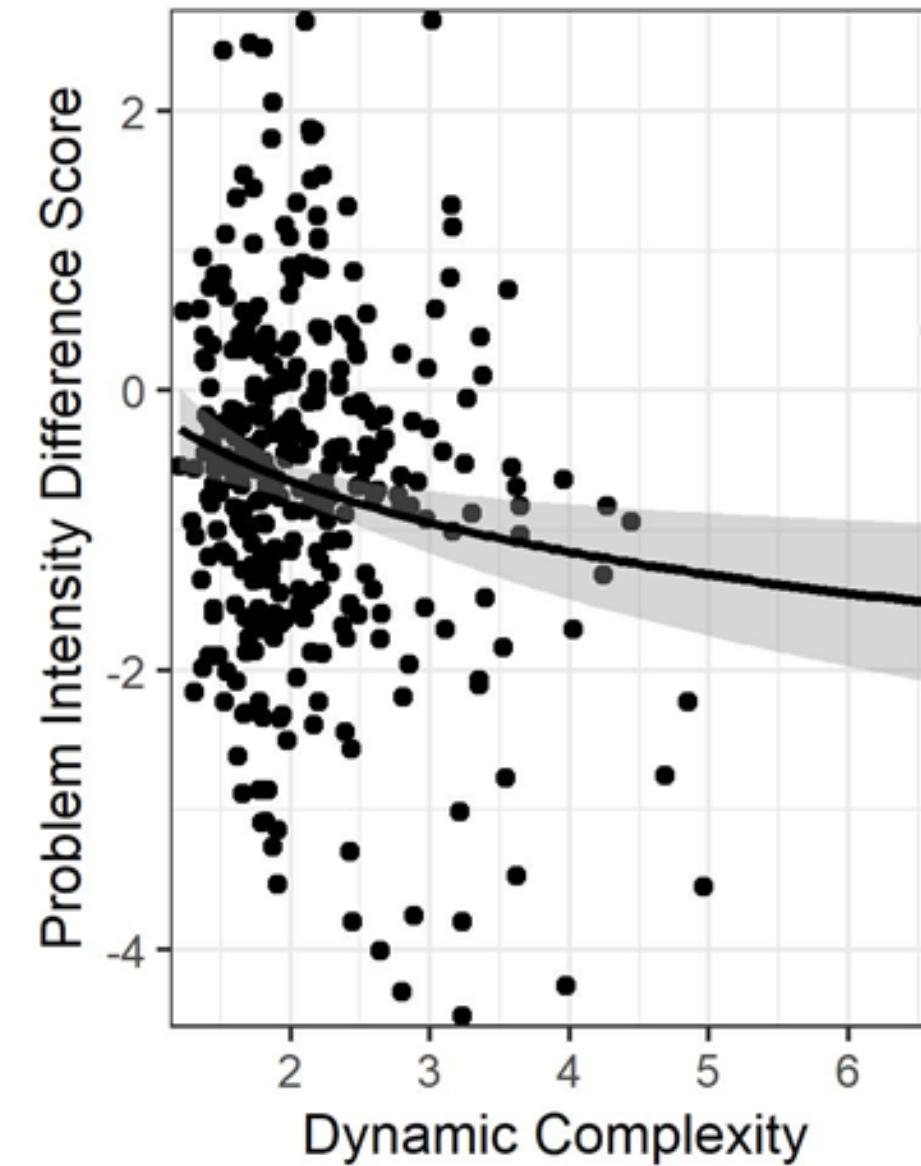
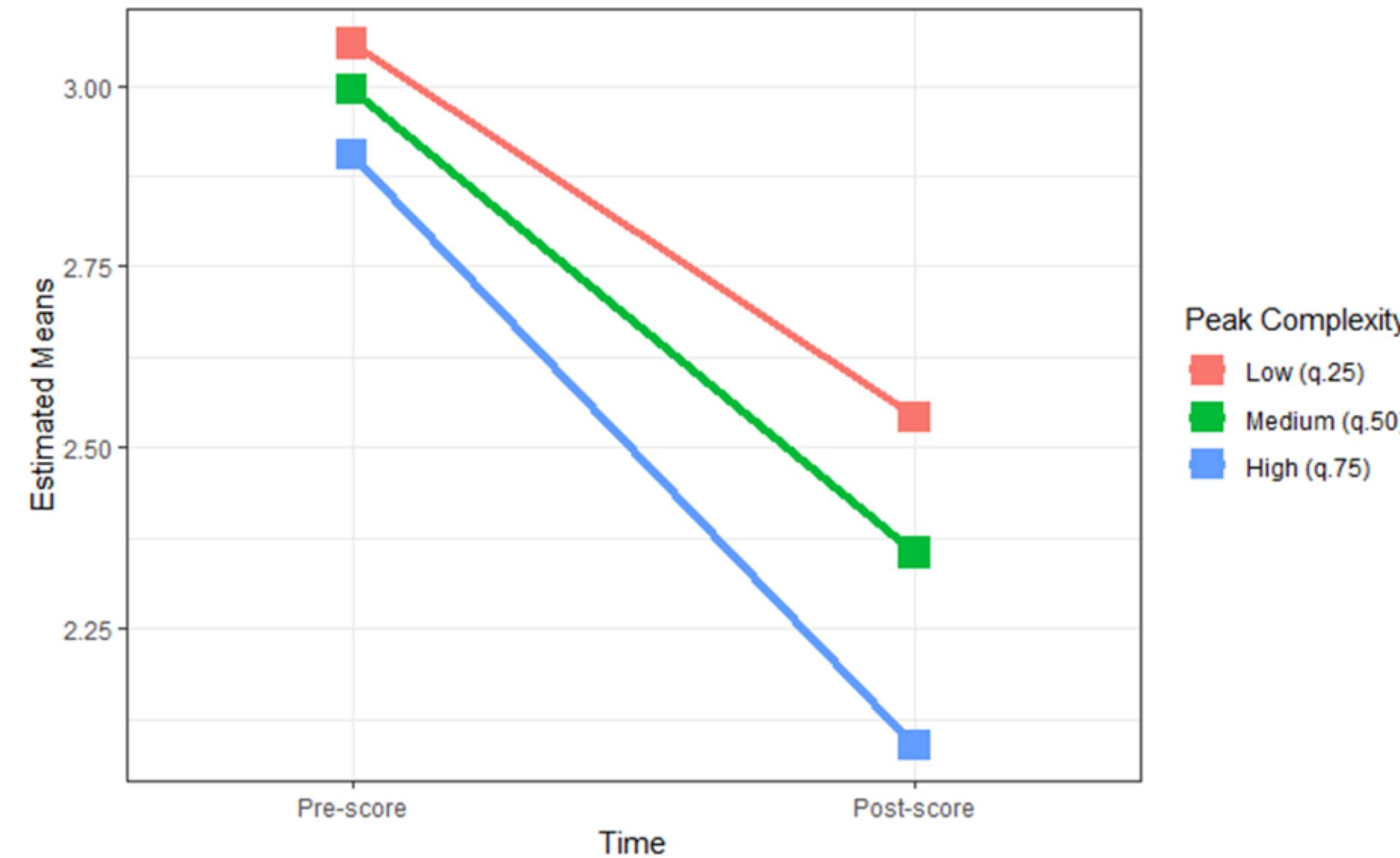


Data Analysis

- Peak Complexity (previous slide)
- Treatment Duration
- Problem Intensity (factor 2 of the TPQ)
 - Prescore: first week
 - Postscore: last week
- Linear mixed-effects model

¹Schiepek et al. (2016), ²Haken & Schiepek (2010)

Results



Conclusions

- Patients with higher Peak Complexity have a stronger reduction in Problem Intensity
- Destabilization periods that might seem obstructive in clinical observation may actually be beneficial for the patients change process, as these destabilization periods can result in a Phase Transition towards clinical improvement
- But can we use this knowledge for short-term prediction?

Study 2: Early-warning signals for sudden gains and losses

Olthof, Hasselman, Strunk, van Rooij, Aas, Helmich, Schiepek & Lichtwarck-Aschoff (in press). Critical Fluctuations as an Early-Warning Signal for Sudden Gains and Losses in Patients receiving Psychotherapy for Mood Disorders. *Clinical Psychological Science*.

<https://osf.io/fhrw4/>



Analyses

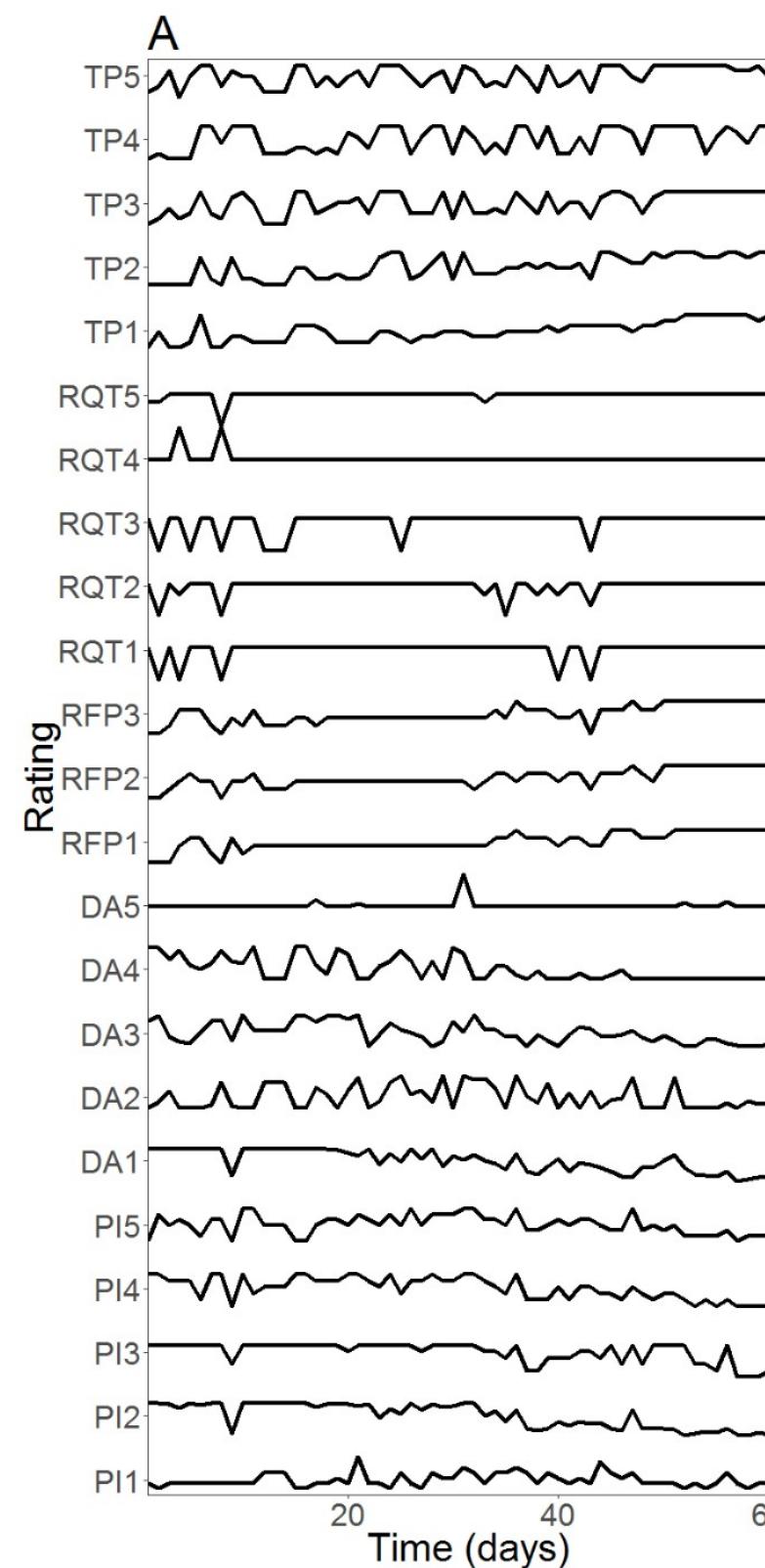
Individual level:

- Sudden gains / losses*
- Dynamic complexity

Multi-level:

- Survival analysis

*Google scholar: ‘Ceulemans, change point analysis’ for an alternative approach, or ask Marieke!



Results and conclusions

- A 1 standard deviation increase in dynamic complexity is related to a 55% increased change for a sudden gain or loss in the upcoming 4 days
- Early-warning signals have a real-time predictive value for sudden gains and losses
- Sudden gains and losses are likely to represent order transitions within a patient
- Predictive early-warning signals can be used in clinical practice to identify periods of instability within a patient's change process

