Emotional Inertia and Interpersonal Adaptation in Intimate Relationships

Dissertation zur Erlangung der Doktorwürde an der Philosophischen

Fakultät der Universität Freiburg (CH)

Tamara Luginbühl, Oberthal, 2018

Genehmigt von der Philosophischen Fakultät auf Antrag der Professoren Dr. Dominik Schoebi (1. Gutachter) und Dr. Gertrud Stadler (2. Gutachter).
Freiburg, den 20.12.2018 (Datum der Thesenverteidigung).
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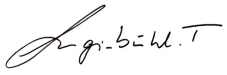
Erklärung der Selbstständigkeit

Ich erkläre ehrenwörtlich, dass ich meine Dissertation selbstständig und ohne unzulässige fremde Hilfe verfasst habe und sie noch keiner anderen Fakultät vorgelegt habe.

Bern, 27. Oktober 2018



Tamara Luginbühl

Dedication

This work is dedicated to my best friend and intimate partner, Marcel. Thank you for all the emotions we have been sharing over the last 12 years.

Acknowledgement

My special thanks goes to Dominik Schoebi for being my mentor throughout this dissertation process. Thank you for sharing your knowledge and time, for your support, your encouraging words, and the numerous inspiring discussions.

I extend my gratitude to the "Vincent Merkle Foundation" and "Alumni und Freunde der Universität association" for the generous financial support for my research stay at the Arizona State University (ASU).

I would also like to thank Ashley Randall and the whole team of the "Couples Coping with Stress Lab" at ASU for welcoming me so warmly and giving me insight into their expertise.

A special thanks goes to Chris Chescoe for proofreading this dissertation.

Thanks to my family. To my parents Werner and Carmen Luginbühl for not hesitating a single moment that I can achieve my aims and for always being there for me. To my sister Vanessa Luginbühl: I am so happy and proud to call you my sister! To my partner Marcel Antonini: for your unconditional support, your humor, and love. Thank you for being you.

Thanks to my friends. To Alessandra Czerski, Annick de Buman, Antonella Ludmila Zapata-Calvente, Florence Sidler, Nathalie Meuwly, Nina Bertschy, Pei Goh Hwa, Susanne Baierlé and Tatjana DiDonna. Thank you for the good distractions, coffees, and laughs.

I also want to thank all the couples that participated in our studies and the numerous students and interns who helped me collect the data and conduct the studies.

Curriculum Vitae

Education

Sept. 2015 – present	Post-gradual Training in Psychotherapy (AIM: Akademie für Verhaltenstherapie und Methodenintegration)
Nov. 2012 – present	PhD Student, University of Fribourg
Oct. 2016	Research stay at ASU (Arizona State University, US, Couples Coping with Stress Lab, Head of the Unit: Asst. Prof. Ashley K. Randall)
2010 – 2012	Master of Science in Psychology, University of Bern (Major: Clinical Psychology and Psychotherapy, Minor: General Psychology and Neuropsychology)
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Professional experience

Aug. 2017 – present	Clinical Psychologist at the Psychiatric Services in Thun (PDT; Psychiatrische Dienste Thun)
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Teaching

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Publications

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Luginbuehl, T., Goh, P. H., Meuwly, N., Randall, A.K, & Schoebi, D. (submitted). Emotion dynamics in daily life and reciprocity of facial expressions of emotions in couple interactions.

Luginbuehl, T., & Schoebi, D. (in press). Emotion dynamics and responsiveness in intimate relationships. *Emotion.*

Luginbuehl, T., & Schoebi, D. (2015). Using intensive repeated measures designs to study family processes: Emotional inertia and interpersonal emotion perception in daily life. *TPM, 22*, 219-234. doi:10.4473/TPM22.2.4

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Book Contributions

Luginbuehl, T., & Schoebi, D. (2018). Emotional dynamics and emotion regulation in intimate relationships. In P. Cole & T. Hollenstein (Eds.), *Emotion regulation: A matter of time* (pp. 208-225). Oxford, United Kingdom: Taylor & Francis.

Talks

Luginbuehl, T., & Schoebi, D. (2018). Emotional inertia and responsive behaviors in intimate relationships. Paper presented at the 9th Congress of the European Society on Family Relations (ESFR), September 5th - 9th, Porto, Portugal.

Luginbuehl, T., Randall, A.K, & Schoebi, D. (2017). Is shared joy a double joy and shared sorrow half a sorrow? Paper presented at the International Convention of Psychological Science (ICPS), March 23rd - 25th, Vienna, Austria.

Luginbuehl, T., & Schoebi, D. (2016). Emotionale Dynamik und emotionale Reaktivität auf partnerschaftliche Situationen. Paper presented at the 34rd Symposium of the German Society of Psychology (DGPs), Mai 4th - 7th, Bielefeld, Germany.

Luginbuehl, T., & Schoebi, D. (2016). Emotion dynamics and emotional reactivity to interpersonal events. Paper presented at the 8th Congress of the European Society on Family Relations (ESFR), August 31st - September 3rd, Dortmund, Germany.

Luginbuehl, T., & Schoebi, D. (2015). Emotion dynamics and emotional reactivity to interpersonal events. Paper presented at the 4th Biennal Conference (Society for Ambulatory Assessment), June 24th - 27th, Pennsylvania State University, US.

Luginbuehl, T., & Schoebi, D. (2014). Examining emotional dynamics at the family level: A study of emotional experience and family interactions in families with adolescents. Paper presented at the 7th Congress of the European Society on Family Relations (ESFR), September 3rd - 6th, Madrid, Spain.

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Abstract

Emotions are not static but fluctuate over time as a function of contextual changes (Kuppens, Allen, & Sheeber, 2010). This temporal feature of emotions is considered in the concept of *emotional inertia*, which reflects the degree to which emotions are resistant to change over time (Kuppens et al., 2010). Several studies suggest an association between emotional inertia and psychological maladjustment (e.g., Koval & Kuppens, 2012; Kuppens et al., 2010). The current work aims to extend the literature by elucidating the maladaptive impact of emotional inertia on intimate relationships. Three empirical contributions are included in the present doctoral thesis.

Study I has a methodological focus. The paper illustrates how processes that occur within individuals and dyads can be accessed using intensive repeated measures designs based on ambulatory assessment procedures, and discusses advantages and challenges of such designs. The example that is used as illustration examines associations between emotional inertia and accuracy in perceiving partners' emotions in daily life. Parents from 172 families rated their own and their partner's emotional states six times a day during one week. The results revealed that both parents were able to predict the emotions of their partners' accurately, but women with high levels of emotional inertia were particularly accurate in tracking emotional changes in their partners'.

Study II examined short-and long-term correlates of emotional inertia in two studies. Study 1 examined associations between emotional inertia and emotional reactivity to conflict and intimacy. Momentary assessments from 44 participants were collected with an ambulatory assessment four times per day over 4 weeks. Emotional inertia showed a curvilinear association with context-sensitive emotional responses to

conflict, with individuals high or low in emotional inertia experiencing blunted emotional reactions to conflict as compared to individuals with intermediate levels of emotional inertia. Study 2 assessed emotional inertia based on four emotional reports per day over 10 days of both partners in a total of 103 couples, and examined associations with perceptions of partners' responsiveness and relationship satisfaction over 12 months. Compared to partners of individuals with intermediate levels of emotional inertia, partners of individuals high or low in emotional inertia perceived them to be less responsive during their interactions together, which then predicted steeper declines in their relationship satisfaction over the subsequent 12 months.

Study III combined an ambulatory assessment procedure with an observational approach to explore whether emotional inertia is associated with emotion response patterns in couple support interactions that are predictive of relationship dysfunction. Individual differences in emotional inertia of 134 individuals (n=67 couples) were captured using a smartphone-based ambulatory assessment with four daily emotional self-reports across two weeks. Emotions in couple interactions were operationalized through reciprocity of facial expressions of emotions during videotaped social support interactions in the laboratory. Facial expressions of emotions were analyzed with the facial expression recognition and analysis software FACET (iMotions, 2015), and defined as the helper (or support provider) responding with equivalent facial expressions of emotions as the helpee (or support receiver). The results suggest that emotional inertia is associated with greater reciprocity of non-affiliative facial expressions of emotions (hard negative affect), but less reciprocity of affiliative facial expressions of emotions (positive affect, soft negative affect).

Taken together, the results suggest that emotional inertia may interfere with the social function of emotions, that is to guide an individual's behavior in adaptive ways within relational situations (Keltner & Gross, 1999; Keltner & Haidt, 2001), affecting individual and relational functioning.

1. Introduction

Intimate relationships help to fulfill an individual's basic needs (e.g., attachment, sex, security, love, recognition, growth). Studying emotions in couple relationships is of crucial importance because the emotions that couples feel and express in their interactions together are predictive of relationship functioning (e.g., Gottman & Levenson, 1999; Reis & Gable, 2015; Rogge & Bradbury, 1999). Emotions guide an individual's behavior (Ekman, 1992; Keltner & Gross, 1999). Intimate partners' behavior in response to each other's emotional signals and needs may thus be driven by the extent to which their emotions are susceptible to change. Individuals differ in their patterns of emotional fluctuations over time, termed emotion dynamics (Koval, Pe, Meers, & Kuppens, 2013), and specific patterns of emotion dynamics have been found to be either beneficial or disruptive for an individual's adaptation to environmental and social demands (Keltner & Kring, 1998; Trull, Lane, Koval, & Ebner-Priemer, 2015). One of these emotional patterns is termed *emotional inertia*, reflecting the extent to which emotions are resistant to change over time (Kuppens et al., 2010). The studies included in the current work used an ambulatory assessment approach to capture an individual's extent of emotional inertia in daily life. This approach offers several strengths: (1) high ecological validity, as it assesses processes "as lived in daily life" in the natural environment, (2) the likelihood of a recall bias is minimized, and (3) within-person processes, such as emotions, can be captured over time (Bolger, Davis, & Rafaeli, 2003; Perrez, Schoebi, & Wilhelm, 2000)[1].

1 Other approaches have relied on systematic coding to assess emotional inertia during interactions (Kuppens, Sheeber, Yap, Whittle, & Allen, 2012), emotional reports after watching a series of emotional film clips (Koval, Butler, Hollenstein, Lanteigne, & Kuppens, 2015), or on retrospective reports of emotional experiences while watching one's own performance on a monitor using a continuous affect rating dial (Koval, et al., 2015). However, these approaches have been measuring emotional inertia on a very short time scale (second-to-second or minute-to-minute changes in emotions).

The goal of the present work is to examine the role of emotional inertia for interpersonal adjustment, and intimate relationships in particular. The first section elaborates on the importance of studying emotions in intimate relationships. I will then focus on key relationship situations to illustrate adaptive and maladaptive patterns of emotion dynamics within intimate relationships, highlighting its significance for relationship functioning. The second section discusses aspects that play a decisive role for emotions to be beneficial or detrimental for intrapersonal and interpersonal functioning. The third section introduces the concept of emotional inertia along with empirical findings regarding its significance for psychological adjustment, and elaborates on processes that may underlie emotional inertia. I will then discuss possible implications of emotional inertia for interpersonal adaptation and give a short overview on the three empirical contributions included in this thesis. Finally, the last section discusses the strengths and limitations of the studies, future directions, and practical implications of the findings.

2. Intimate Relationships and Individual and Interpersonal Functioning

Being in a relationship has implications for an individual's health. Several studies have demonstrated a link between marital status and enhanced physical and mental health (e.g., Braithwaite, Delevi, & Fincham, 2010; Horwitz, White, & Howell-White, 1996; Kiecolt-Glaser & Newton, 2001; Kim & McKerny, 2002; Liang & Chikritzhs, 2011; Lillard & Waite, 1995; Marks & Lambert, 1998; Umberson, 1992). A driving force behind this association is the quality of a relationship (e.g., Holt-Lunstad, Birminghamn, & Jones, 2008; Ren, 1997), since being *unhappily* married is associated with higher levels of depressive symptoms (Beach, Katz, Kim, & Brody, 2003; O'Leary, Christian, &

Mendell, 1994), poorer immune system functioning (Kiecolt-Glaser et al., 1987), morbidity and mortality (Robles & Kiecolt-Glaser, 2003). Because of the negative health outcomes associated with marital distress it is of the utmost importance to examine what kind of processes predict dysfunctional relationship trajectories. The emotions that intimate partners express and experience during significant couple interactions, have received strong empirical support across several studies (e.g., Gottman, Coan, Carrère, & Swanson, 1998; Johnson et al., 2005; Rogge & Bradbury, 1999). Emotions shape couple interactions. Intimate partners adjust their behavior in response to each other's emotional signals (Keltner & Haidt, 2001) and the emotions that arise and unfold within dyads foreshadow trajectories of relationship satisfaction (e.g., Bradbury, Fincham, & Beach, 2000).

In the following I will review how emotions evolve in adaptive and maladaptive ways within key relationship situations, such as when requesting change from one's partner in conflictual interactions, when disclosing a personal problem, or when sharing good news.

2.1 Emotion Dynamics in Conflictual Interactions

Nearly 5 decades ago scholars started to systematically observe how intimate partners interact with each other (e.g., Eisler, Hersen, & Agras, 1973; Gottman & Levenson 1985). Many scholars aimed to determine behavioral indices during couple interactions that could discriminate happily from unhappily married couples and predict marital dissolution (e.g., Gottman & Levenson, 1999; Heavey, Lane, & Christensen, 1993; Rogge & Bradbury, 1999). Conflictual interactions have been the most studied relationship situations in couple research. Scholars typically used the observational

conflict paradigm to examine how couples manage conflict. Thereby couples are asked to discuss a problem that is a source of ongoing disagreement in their marriage while being video recorded, and the emotional behavior is subsequently analyzed with an observational coding system (such as for example the Specific Affect Coding System (SPAFF); Gottman, McCoy, & Coan, 1996). In addition to the observational approach, scholars used a self-report measure of marital satisfaction with repeated measurements over several years (e.g., Johnson et al., 2005; Rogge & Bradbury, 1999) to examine the link between emotional behavior in couple interactions and concurrent and prospective relationship satisfaction.

The major findings of these longitudinal studies were that compared to happy couples, divorced or unhappily married couples expressed higher levels of negative affect (e.g., anger, contempt; Johnson et al., 2005; Rogge & Bradbury, 1999), and lower levels of positive affect (e.g., humor, affection; Gottman et al., 1998; Johnson et al., 2005; Rogge & Bradbury, 1999), started the discussion with greater displays of negative emotions (Carrere & Gottman, 1999), did not hit the positive-to-negative affect 5 to 1 ratio in their interactions (which states that one negative behavior in conflict interactions should be compensated by a minimum of five positive behaviors) (e.g., Gottman & Levenson, 1999) and were more likely to engage in specific affective sequences, such as negative affect reciprocity (Gottman, 1998), and demand-withdraw patterns (e.g., Gottman & Krokoff, 1989; Heavey, Christensen, & Malamuth, 1995; Heavey et al., 1993). Negative affect reciprocity describes an interaction pattern in which displays of negative affect by partner A are reciprocated by negative affect from partner B, ending up in a negative affect cycle. Distressed couples take longer to downregulate negative

emotions and exit from these negative exchanges (Gottman, 1998). The demand - withdraw pattern occurs when partner A pressures partner B with demands, complaints and criticism, while partner B reacts by withdrawing from the discussion through defensiveness and passive inaction (e.g., Christensen & Heavey, 1990; Christensen & Shenk, 1991).

Negative emotional behaviors during conflict interaction go along with physiological changes, having negative effects on health (for a review see Robles & Kiecolt-Glaser, 2003). For example hostility during marital conflict interaction has been linked to heightened cardiovascular reactivity (Ewart, Taylor, Kraemer, & Agras, 1991; Smith & Brown, 1991). Positive emotions may serve to downregulate the physiological arousal caused by negative emotions (Fredrickson, Mancuso, Branigan, & Tugade, 2000; Fredrickson & Levenson, 1998). This notion was supported by Yuan, McCarty, Holley and Levenson (2010) who found increases in positive emotional behaviors (e.g., interest, affection, humor, validation, and joy) during couple interactions to be associated with physiological downregulation from high to low arousal.

Taken together, the above-mentioned studies suggest that how emotions unfold in conflictual interactions reveals important information about the functioning of couple relationships.

2.2 Emotion Dynamics when Disclosing a Personal Problem

Individuals tend to share negative emotional experiences with people to whom they feel emotionally close (Rimé, Philippot, Boca, & Mesquita, 1992). Intimate partners assume an important function in regulating each other's emotions (for a review see Luginbuehl & Schoebi, 2018). How romantic partners support each other can either

promote or undermine intimacy (Manne & Badr, 2008), and marital functioning (Dehle, Larsen, & Landers, 2001; Fekete, Stephens, Mickelson, & Druley, 2007; Pasch & Bradbury, 1998; Sullivan, Pasch, Eldridge, & Bradbury, 1998). According to Reis and Shaver's (1988) interpersonal process model of intimacy, an interaction becomes intimate if partner A discloses or expresses (verbal or nonverbal) self-relevant feelings and information, to which partner B exhibits or expresses *responsiveness*, that is perceived as such by partner A.[2] Responsiveness consists of three components: understanding (e.g., accurately capturing the discloser's needs, desires, feelings, and situation), validation (i.e., confirming that the discloser is accepted and valued), and caring (i.e., showing affection, warmth, and concern for the discloser) (Reis, 2014; Reis & Gable, 2015). The interpersonal process model of intimacy has been empirically supported in several studies (e.g., Laurenceau, Barrett, & Pietromonaco, 1998; Laurenceau, Barrett, & Rovine, 2005; Manne et al., 2004). Observational studies have shown that compared to non-distressed couples, distressed couples provided less positive and more negative behavior when supporting their partners (Sullivan, Pasch, Eldridge, & Bradbury, 1998). Verhofstadt, Lemmens and Buysse (2013) further found distressed marital couples to be more critical and blaming when their partners were asking questions and making suggestions to support them.

2.3 Emotion Dynamics when Sharing Good News

When people experience positive events in their daily life they may want to share the good news with others. *Capitalization* refers to the sharing of positive events with someone else (Langston, 1994). A capitalization attempt by partner A has beneficial

[2] In the responsiveness model (see Reis & Gable, 2015) partner B starts the interaction. I reversed the denomination of partners A and B to be consistent throughout this work.

intrapersonal effects (e.g., increased positive affect, daily life satisfaction, well being, and self-esteem), and interpersonal effects (e.g., higher relationship satisfaction, stability, and intimacy) if partner B reacts with an enthusiastic response (Gable, Gonzaga, & Strachman, 2006; Gable, Reis, Impett, & Asher, 2004). None or little emotional reactivity may reflect emotional disengagement and fail to convey to the capitalizer that he is understood, validated, and cared for (Gable et al., 2004).

Taken together, intimate partners influence each other's emotions and behaviors during their interactions together. Significant interactions, such as when requesting change from one's partner in conflictual interactions, disclosing a problem in support interactions, or sharing good news in capitalization interactions, provide an opportunity for partners to demonstrate responsiveness, which promotes feelings of intimacy between them. The emotional and behavioral responses that an intimate partner shows in these kinds of interactions thus affects whether or not an individual feels understood, validated, and cared for by him or her.

3. The (Mal)Adaptiveness of Emotions

3.1 Defining Emotions

Despite a lack of consensus on how to define an emotion (Frijda & Scherer, 2009), scholars adopting a functional perspective agree that emotions are reactions to challenges and opportunities in the environment (Keltner & Gross, 1999; Levenson, 1994). Emotions arise and unfold involving coordinated patterns of change in experience, behavior, and physiology (e.g., Gross & Thompson, 2007; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). Emotions are thought to activate behavioral tendencies that have been solutions to physical and social problems in the past (Ekman, 1992; Keltner &

Gross, 1999). For example, fear is associated with wide-eyed expressions which increase the visual field size serving the function of enhanced detection of potential or actual harm in the environment (Susskind et al., 2008). In social interactions emotions shape own and others behaviors in adaptive ways, when the emotion is appropriate to the given context (Keltner & Haidt, 2001). For example, expressions of sadness are adaptive when an individual is in need of support or when comforting behavior from others is needed (Hackenbracht & Tamir, 2010; Sanford, 2007). Positive emotions such as joy are adaptive when one has the opportunity to affiliate with others (e.g., Campos, Schoebi, Gonzaga, Gable, & Keltner, 2015). However, the other side of the story is that emotions can have harmful effects as well. Individuals appraise situations not merely based on what has been adaptive in the past history of the human species, but also on what has been adaptive in their own learning history (Ekman, 1992). Thus individuals differ in their levels of emotional reactivity in response to changes in the environment. Different psychological disorders feature either too strong emotional reactivity (e.g., borderline personality disorder, social anxiety disorder), insufficient emotional reactivity (e.g., depression, antisocial personality disorder) or inadequate emotions (e.g., schizophrenia) for the given context (Gross & Jazaieri, 2014; Keltner & Kring, 1998). The next section will consider three aspects that play an important role for the (mal)adaptive function of emotions: *context-sensitivity*, *emotion regulation,* and *emotional flexibility*.

3.1.1 Context-Sensitivity

According to the context sensitivity theory emotional responses are most likely to be adaptive if they emerge in the context for which they likely have evolved (Coifman & Bonanno, 2010a). For instance, anger evolved as a solution in contexts where an

individual's personal boundaries are violated, motivating actions to protect himself against these transgressions (Averill, 1982; Lerner, Dahl, Hariri, & Taylor, 2007). None or insufficient anger in such situations may inhibit action, respectively defense, and thus undermine an individual's interests and goals. A number of studies suggest that context-sensitive emotional changes are crucial for psychological health (e.g., see Buss, 2011; Buss, Davidson, Kalin, & Goldsmith, 2004; Lerner et al., 2007; Rottenberg, Kasch, Gross, & Gotlib, 2002). For example, Buss (2011) found toddlers at age 2 who showed high fear responses in low threatening situations (i.e., freezing) to exhibit more anxious behavior and social withdrawal at age 5, as compared to children who displayed contextually appropriate emotions (stronger fear in high threatening and lower fear in less threatening conditions). In a study conducted by Rottenberg and colleagues (2002) depressed individuals who exhibited the least behavioral expressions of amusement and heart rate reactivity to an amusing film were also the ones to be least likely to recover from depressive symptoms 6 months later.

In the interpersonal realm, longitudinal studies suggest that negative emotional behaviors are not inherently harmful to intimate relationships and can even be *beneficial*, depending on the context in which they are expressed (Cohan & Bradbury, 1997; Karney & Bradbury, 1997; McNulty & Russel, 2010). In a study by McNulty and Russel (2010) spouses negative behaviors (e.g., blaming, rejecting) were predictive of steeper declines in relationship satisfaction trajectories in the context of marriages facing rather minor marital problems. However, these same behaviors predicted more stable relationship satisfaction trajectories when exchanged in the context of marriages facing more severe marital problems. Thus, negative emotional behaviors may be adaptive to the extent that

they raise couples awareness for the necessity of a change, and encourage them to deal with their difficulties (Cohan & Bradbury, 1997), and this may be of particular relevance when facing severe problems. In key relationship situations, such as in conflict, support or capitalization interactions, context-sensitive emotional responses can signal an individual's willingness to engage in such interactions with the partner (Keltner & Haidt, 2001). An individual's emotional disengagement, as reflected in none or little emotional reactivity, or inadequate emotions, may thus convey to the intimate partner that his concerns and feelings are not important.

3.1.2 Emotion Regulation

Emotion regulation refers to processes through which individuals influence what kind of emotions they have, when they have them, and how they experience and express them (Gross, 1998). These processes may occur deliberately or without awareness (Gross, 2001), alone or with others (for an interpersonal perspective see Luginbuehl & Schoebi, 2018; Niven, Totterdell, & Holman, 2009; Schoebi & Randall, 2015). Importantly, emotion regulation serves to alter (i.e., intensify, dampen, maintain) positive *and* negative emotional experiences and expressions (Bridges, Denham, & Ganiban, 2004; Gross & Thompson, 2007). Many studies have supported the notion that individuals may sometimes want to increase the experience of negative emotions when it helps them to meet their emotion related and/or other goals in a given context. For example, in a study by Kim, Ford, Mauss and Tamir (2015) psychologically healthier individuals (with fewer depressive symptoms and higher global functioning) preferred to experience stronger feelings of anger within contexts that demanded greater confrontation (i.e., protection of their own interests), as compared to less psychologically healthy

individuals. Hence, scholars have called into question the tendency often found in the literature that categorizes emotion regulation strategies as inherently „good/healthy“ (e.g., acceptance, reappraisal, problem solving) vs. „bad/unhealthy“ (i.e., rumination, avoidance, suppression) and highlight the importance of taking into account the context in which emotions are regulated (e.g., Bonanno & Burton, 2013; Gross & Thompson, 2007). A study by Troy, Shallcross and Mauss (2013) provides support for this notion. Higher cognitive-reappraisal -- altering the meaning of a situation to reduce its emotional impact -- was associated with lower levels of depression when participants experienced uncontrollable stress but higher levels of depression when stress was controllable. The authors concluded that when a situation can be changed, when the stress is controllable, it may be more adaptive to change the aversive situation (e.g., put in some extra time at work due to a forthcoming deadline) than altering its meaning through cognitive-reappraisal.

Taken together, individuals attempt to alter their emotions in daily life by means of emotion regulation strategies, which are used deliberately or without awareness. These strategies directly affect an individual's emotion dynamics in daily life (Brose, Schmiedeck, Koval, & Kuppens, 2015; Koval, Kuppens, Allen, & Sheeber, 2012).

3.1.3 Emotional Flexibility

Emotional flexibility refers to flexibly changing one's emotions in response to changing contextual demands, an ability that is essential to psychological health and adjustment (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; Kashdan & Rottenberg, 2010). Findings from the field of resilience provide empirical evidence. Highly resilient individuals are able to flexibly match their emotional responses to the

changing context (Waugh, Thompson, & Gotlib, 2011). However, there might be "too much of this good thing" (Kashdan & Rottenberg, 2010; Kogan, Gruber, Shallcross, Ford, & Mauss, 2013). Several scholars have raised the question of whether there is an upper limit, or critical point, beyond which flexibility tips over into erraticism (Bonanno & Burton, 2013; Kashdan & Rottenberg, 2010), reflecting very rapid and strong emotional changes. A study by Kogan and colleagues (2013) provides empirical support for this notion. The authors examined the link between the emotion dynamics of physiology, indexed by heart rate variability (HRV), and well-being. Individuals with moderate levels of HRV reported more life satisfaction and less depressive symptoms than individuals with a high or low HRV. These results suggest that the relationship between emotion dynamics and individual functioning may be more accurately described by a curvilinear relationship than a linear relationship.

Taken together, responding appropriately to an intimate partner's emotional signals and needs requires one's emotional responses be reactive. However, too much flexibility may reflect an *erratic emotion dynamic* with frequent, rapid and strong moment-to moment changes and undermine individual functioning, as previous studies suggest (Kogan et al., 2013). A lack of emotional flexibility may also compromise context-sensitive emotional changes. This lack of emotional flexibility is reflected in the concept of emotional inertia.

4. Emotional Inertia: Conceptualization and Empirical Findings

4.1 Defining Emotional Inertia

Emotional inertia reflects the degree to which emotions are resistant to change (Kuppens et al., 2010). Emotional inertia is often considered a trait-like characteristic

(but see Fairbairn & Sayette, 2013; Koval & Kuppens, 2012) and has commonly been operationalized using first order autocorrelations across repeated emotion measurements (e.g., Koval & Kuppens, 2012; Kuppens et al., 2010; Suls, Green, & Hillis, 1998), capturing the extent to which the current emotional state is predicted by the previous emotional state (Kuppens et al., 2010). High levels of emotional inertia (or stronger autocorrelations) indicate that a person's emotion at a given moment is likely followed by the same emotion of similar intensity at the next moment, being more resistant to change over time. In contrast, moderate levels of emotional inertia reflect an emotion dynamic that changes more rapidly and is likely more susceptible to contextual changes. Low levels of emotional inertia (or weak autocorrelations) stand for quickly fluctuating emotions with weak temporal dependence, probably reflecting affective instability.

Importantly, emotional inertia should be differentiated from two other conceptually related constructs: *variability* (or within-person variance; WPV; Jahng, Wood, & Trull, 2008) and *emotional instability*. While emotional inertia refers to the velocity with which emotions change from one moment to the next, variability reflects how much an individual's emotional states deviates from his average emotions, and is commonly operationalized with the standard deviation of repeated measures across time (SD; Kuppens et al., 2010). Thus emotional inertia (or autocorrelations) does not reflect the extremity or degree of amplitude of fluctuations (Ebner-Priemer et al., 2007). An individual's emotion dynamics can simultaneously feature (1) high inertia and high variability (e.g., slow emotional changes with a large range of emotional fluctuations) (2) high inertia but low variability (e.g., slow emotional changes with a small range of emotional fluctuations), (3) low inertia but high variability (e.g., fast emotional changes

with a large range of emotional fluctuations) or (4) low inertia and low variability (e.g., fast emotional changes with a small range of emotional fluctuations) (Kuppens et al., 2012).

Emotional instability, frequently quantified with the mean square successive difference (MSSD; e.g., Ebner-Priemer, Eid, Kleindienst, Stabenow, & Trull, 2009) refers to the magnitude of emotional changes from moment to moment (Houben, Van Den Noortgate, & Kuppens, 2015), with higher levels of MSSD reflecting higher emotional instability. Emotional instability overlaps conceptually with emotional inertia and emotional variability (Jahng et al., 2008; Thompson et al., 2012). Emotional instability includes both, the variability and temporal dependency of emotional measurements (e.g., Jahng et al., 2008; Trull et al., 2008). Emotional inertia and instability are inversely related (Thompson et al., 2012). A high value of emotional instability requires a high level of variability and a low level of temporal dependency (Jahng et al., 2008). Each of these measures (emotional inertia, emotional variability and emotional instability) reveal important information about an individual's emotion dynamics and has been associated with indicators of psychological health (for a meta-analysis see Houben et al., 2015). In the following, processes that have been suggested to underlie emotional inertia are discussed.

4.1.1 Processes Underlying Emotional Inertia

A number of processes have been suggested to underlie emotional inertia, such as specific *emotion regulation strategies*, reduced *exposure* and *reactivity* to events, and *recovery* from events (e.g., Brose et al., 2015; Koval et al., 2012, 2015). Emotional inertia has been associated with rumination (Brose et al., 2015; Koval et al., 2012), an

emotion regulation strategy that involves responding to distress by repetitively thinking about one's problems and negative feelings (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Through rumination an individual stays stuck in a problem and its associated negative feelings, prolonging its duration, and thereby probably contributing to an inert emotion dynamic. Emotional inertia has further been associated with expressive suppression, a behavioral emotion regulation defined as the inhibition of ongoing emotion-expressive behavior (Koval, Butler, et al., 2015). Importantly, Butler and colleagues (2003) demonstrated that expressive suppression can be stressful for the person that interacts with the suppressor, as reflected in increased physiological stress responses.

It has further been suggested that individual differences in emotional inertia might be explained by *exposure,* which involves the frequency and intensity of encountered events in daily life. However, Koval, Brose and colleagues (2015) demonstrated that higher levels of emotional inertia were not associated with less emotional encounters in daily life, but with more intense events in daily life, which require more effort to be downregulated.

Another process that has been suggested is *reactivity*, defined as the magnitude of emotional change in response to an external event (Kuppens et al., 2010; Thompson et al., 2012). This perspective is consistent with the emotion context-insensitivity (ECI) view of emotional reactivity in depression. The ECI posits that depression (a correlate of emotional inertia) is associated with reduced emotional reactivity, regardless of the valence of the context (Bylsma, Morris, & Rottenberg, 2008; Rottenberg, 2017). However, only a handful of studies have taken into account the context in which

emotions unfold (but see Koval, Brose, et al., 2015; Thompson et al., 2012). Koval, Brose and colleagues (2015) did not find a significant association between negative affect inertia in daily life and reactivity to positive or negative events. Similarly, Thompson and colleagues (2012) found no associations between negative affect inertia in daily life and negative affect reactivity to positive and negative events, nor between positive affect inertia in daily life and positive affect reactivity to negative events. However, they found empirical support for a curvilinear association between positive affect inertia and reactivity to positive events. Individuals with high and low levels of positive affect inertia reported reduced positive affect reactivity to positive events, whereas individuals with intermediate levels of positive affect inertia were more reactive.

The concept of *recovery* describes the extent to which an individual's emotions return to its baseline level following an event (Koval, Brose, et al., 2015). Negative affect inertia in daily life has been associated with slow recovery from negative emotional events.

Taken together, negative emotional inertia seems to be driven by specific emotion regulation strategies (e.g., rumination, expressive suppression), exposure to more intense negative events in daily life and less recovery from negative emotional events. The frequency of encountered events was not associated with negative affect inertia. The divergent and partly conflicting findings regarding emotional reactivity make it difficult to draw conclusions. Following on from these findings the second empirical contribution of this work examines how emotional inertia affects the magnitude of reactivity following key relationship events, namely conflict and intimacy. These events occur relatively frequently in intimate relationships and are important for its functioning.

4.1.2 Emotional Inertia and Psychological Maladjustment

Inert emotion dynamics in daily life have been linked to poor psychological adjustment. High levels of emotional inertia (or strong autocorrelations) were found to predict lower psychological well-being (Houben et al., 2015), low trait self-esteem (Kuppens et al., 2010), neuroticism (Suls et al., 1998), fear of negative evaluation (Koval & Kuppens, 2012), and depressive symptoms (Kuppens et al., 2012). Importantly, adverse health effects were found for both, inertia in positive and negative affect (Kuppens et al., 2010; 2012), although the effect sizes were stronger for negative than positive affect inertia (for a meta-analysis see Houben et al., 2015).

Other scholars have argued that many emotional changes are maladaptive and that emotional states should better be kept stable (e.g., Gruber, Kogan, Quoidbach, & Mauss, 2013). Very low levels of emotional inertia (or weak autocorrelations) stand for quickly fluctuating emotions with weak temporal dependence, an emotion pattern that has been linked to various psychopathological disorders, including borderline personality disorder (Ebner-Priemer et al., 2007), attention deficit hyperactivity disorder (Philipsen, 2006; Skirrow & Asherson, 2013), post-traumatic stress disorder, and bulimia (Santangelo et al., 2014). Thus, an emotion dynamic characterized by high or low levels of emotional inertia may undermine individual adjustment. Moreover, because one's emotions have effects on others (Keltner & Gross, 1999), compared to intermediate levels of emotional inertia, high and low levels of emotional inertia are likely to have maladaptive implications for the intimate partner as well. In the following I will discuss possible implications of emotional inertia at the dyadic level and then introduce the three empirical contributions of this thesis, which aim to elucidate how emotional inertia is

associated with relationship functioning.

4.1.3 Possible Implications at the Dyadic Level

Emotions frequently emerge from intense social interactions (Butler, 2011), and convey important information about an individual's own and the interaction partner's current emotional states, beliefs and action tendencies (Keltner & Haidt, 2001). To convey feelings of responsiveness to one's intimate partner individuals need to be reactive when their intimate partner expresses positive or negative emotions, discloses concerns, expectations or good news. The absence of such responses in important relational situations (e.g., conflict, support or capitalization interactions) may leave the partner feeling less validated, understood and cared for, and undermine relationship satisfaction lastingly. Thus the interpersonal costs of unresponsive behavior should become noticeable in the intimate partner's relationship satisfaction. High levels of emotional inertia may be an indicator of restricted emotional flexibility (Kuppens et al., 2010; Suls et al., 1998) and thus interfere with the social function of emotions and its associated adaptive benefits. Persisting in negative affective states during interactions has been associated with relationship dysfunction (Gottman, Murray, Swanson, Tyson, & Swanson, 2002). On the other hand, too frequent emotional changes over time (Kashdan & Rottenberg, 2010), respectively low levels of emotional inertia, reflecting an emotion dynamic with frequent, rapid and strong changes may also undermine contingent responses to an intimate partner's emotional signals and needs (Butler, 2003). Thus, low levels of emotional inertia may also be associated with negative interpersonal outcomes, as seen in individuals with borderline personality features (e.g., Tolpin, Gunthert, Cohen, & O'Neill, 2004), and in a study by Miller and Pilkonis (2006), where emotional

instability was predictive of impairment in relationship functioning at a 12-month follow up. Moderate levels of emotional inertia by contrast should reflect flexible and contingent responding, and therefore be associated with more adaptive interpersonal functioning.

5. Overview of the Included Studies

The following empirical contributions examined how individual differences in emotional inertia are associated with short-and long-term relationship processes. The first two studies used an ambulatory assessment approach, whereas the third study used a mixed-method design, combining an ambulatory assessment approach with an observational approach.

5.1 Study I

The first study illustrates how an intensive repeated measures design can be used to examine individual and interpersonal processes, and discusses the advantages and challenges of such designs. The example that is used as an illustration examines whether perceptions of partners daily emotions vary as a function of individual differences in emotional inertia. Parents from 172 families rated their own and their partner's assumed momentary emotional states with an electronic self-report measure six times a day during one week. Thus, the paper shows how within-person (emotional inertia) and within-dyad processes (perception of partner emotions) can be accessed and examined.

5.2 Study II

The second study examines short-and long-term correlates of emotional inertia in two studies. Study 1 addresses the question of whether high or low emotional inertia predicts less context-sensitive emotional responses to key relationship events (conflict,

intimacy) as compared to intermediate levels of emotional inertia. Momentary assessments from 44 participants were collected by means of an ambulatory assessment four times a day over 4 weeks. In line with the assumption that none or little emotional reactivity may reflect emotional disengagement and convey to the partner that his concerns and feelings are unimportant, the subsequent study focuses on partner effects of emotional inertia. Study 2 assessed emotional inertia based on four emotion reports per day over 10 days of both partners in a total of 103 couples and examines how individual differences in emotional inertia are associated with perceptions of partners responsiveness during their interactions together, and relationship satisfaction over the subsequent 12 months.

5.3 Study III

The third study uses a mixed-method approach, combining a smartphone-based ambulatory assessment with an observational approach to examine whether high or low levels of emotional inertia are associated with lower reciprocity of facial expressions of affiliative emotions (e.g., joy, sadness or fear) but greater reciprocity of non-affiliative emotions (e.g., anger or contempt) during social support interactions between romantic partners. Individual differences in emotional inertia of 134 individuals (n=67 couples) were captured using a smartphone-based ambulatory assessment with four daily emotional self-reports over two weeks. Following this, couples were video-recorded during a social support task in the laboratory. Facial expressions of emotions were assessed and analyzed with the software FACET (iMotions, 2015), a facial expression analysis software that detects and analyzes facial expressions of basic emotions in real time.

6. Study I: Using Intensive Repeated Measures Designs to Study Family Processes: Emotional Inertia and Interpersonal Emotion Perception in Daily Life[3]

Abstract

The current article illustrates how intensive repeated measures designs can be used to study family processes. Interpersonal processes are of key importance in family research, but rarely studied as such. In the present article, we provide an example of how intensive longitudinal data provides insight into family processes. The example we use focuses on how spouses' emotional dynamics are associated with their perception of the partner's daily emotions. Parents from 172 families rated their own and their partner's emotional states six times a day during one week. Variables of interest were inferred from repeated measurements of momentary experience within individuals and dyads over time. Multilevel analyses revealed that mothers who featured less changeability in their emotions provided more accurate reports of their partners' emotions. This example illustrates how over time processes within individuals and dyads can be accessed using intensive repeated measures designs and analyzed in a multilevel analytic framework.

[3] Citation: Luginbuehl, T., & Schoebi, D. (2015). Using intensive repeated measures designs to study family processes: Emotional inertia and interpersonal emotion perception in daily life. *TPM, 22*, 219-234. doi:10.4473/TPM22.2.4

Using intensive repeated measures designs to study family processes:

Emotional inertia and interpersonal emotion perception in daily life

A Systems Theory perspective on the family and family processes emphasizes the importance of considering individual factors alongside interpersonal and contextual factors (e.g., Stanton, 2013), a call that is difficult to answer in quantitative family research. Assessing psychological characteristics and processes of families is particularly challenging when subjective and other covert variables are of interest. Such information can only be assessed from individuals, and is subject to bias due to each individuals' personal characteristics and experiences (Kenny & Acitelli, 2001). Moreover, family relationships become observable via their effects on individuals (Berscheid, 1999), and assessing these effects entails combining assessments from all individuals of interest. Finally, investigation of psychological processes, or of characteristics referring to behaviors in psychological processes, focus on phenomena that unfold within individuals over time, and couple- or family-processes unfold within couples or families over time. As a result, studying couple- and family-processes require methodological approaches that capture the over time dynamics of experiences and behaviors of multiple members of the dyad or family simultaneously, and analytic approaches that allow for integration of these data are necessary.

Over the past two decades, intensive repeated measures designs based on ambulatory assessment procedures — daily diaries, ecological momentary assessments (EMA), experience sampling methods (ESM) — have become a well-established tool to study everyday life processes. Collecting intensive repeated measures makes it possible

to assess dynamic processes in real time (Repetti, Reynolds, & Sears, 2015), and this is immediately relevant for the study of two core components of family processes: i) individual responses and change across time within the family context, and ii) correspondence between and interconnection of these responses and changes. Studying how these two dynamic levels in the family process relate and mutually affect each other can provide unique insight into the interpersonal dimension of individual experience and behavior (Schoebi & Randall, 2015). In the current article, we illustrate how interpersonal extensions of ambulatory assessment designs can be used to illuminate the interplay between individual process characteristics and interpersonal processes over time and in the natural family environment.

The example we use focuses on emotional processes in parental dyads. Emotions play a key role in many family processes. Specifically, they organize cognitions and behaviors of family members, and therefore their interactions (Keltner & Haidt, 2001). As a result, family relationships are characterized by a unique degree of emotional connection between family members (e.g., Prager & Roberts, 2004; Reis, 2014), and emotions provide a unique point of access to understand the dynamics of family interactions. In the remainder of the introduction, we first address methodological issues in studying interpersonal emotion dynamics, and make a case for using intensive repeated measures designs. We then discuss the relevance of emotional dynamics for individual adjustment, and its implications for the interpersonal realm.

How to Capture Emotional Dynamics in Daily Life?

Emotional experience is dynamic and fluctuates as a function of external changes. Various self-report approaches to assess emotions have been used in the past, capturing

affective experience generally (e.g., Goldberg, 1993) or retrospectively over the past weeks (e.g., Watson, Clark, & Tellegen, 1988), but these approaches do not capture the dynamics of emotional experiences. Although some approaches include direct assessments of emotional dynamics, doubts remain regarding the accuracy of generalized or retrospective assessments (Robinson & Clore, 2002). To more accurately capture emotional changes intensive repeated measures designs are well suited (Ebner-Priemer, Eid, Kleindienst, Stabenow, & Trull, 2009). Intensive sampling of momentary self-reports of emotional states provides the researcher with serial data on affective experience in the natural environment (Shiffman, Stone, & Hufford, 2008). These data bear at least two major advantages: minimized bias by keeping emotional reports close in time to their actual experience (Schwarz, 2012), and the possibility to assess change and changeability in emotional states. In particular, assessing affect variables in a real world setting captures the contribution of the rich situational variability to which individuals are exposed to in daily life (Moskowitz, Russell, Sadikaj, & Sutton, 2009). This strengthens the study of context-sensitive microprocesses such as emotions (Shiffman et al., 2008).

Examining the temporal dynamics of emotions provides insight into the core processes underlying individual well-being and psychological distress, and several recent studies have documented an association between low emotional changeability, so-called emotional inertia, and psychological maladjustment (Koval & Kuppens, 2012; Kuppens, Allen, & Sheeber, 2010; Kuppens et al., 2012; Rottenberg, 2005). Emotional changeability can have various facets: it may reflect flexibility, reactivity or more generally (in)stability. While these terms cannot be used interchangeably, neither the literature to which we refer here nor our own data allow for strong conclusions about

whether emotional changes actually happen as adaptive or maladaptive responses to events or changes in their environment. Nevertheless, because some changeability can be considered a prerequisite for emotions to be adaptive, very low changeability should interfere with adaptive responding. At the same time, high emotional changeability need not be adaptive. Investigating the implications of emotional inertia for interpersonal adaptation requires a methodological approach that combines a between-person framework with a within-person design. Emotional inertia needs to be assessed as a within-person phenomenon, and individual differences in emotional inertia are reflected at the between-person level. Similarly, interpersonal adaptation refers to processes that can be assessed at the within-dyad level, unfolding within dyads across time and situations (see also Gable, Gosnell, & Prok, 2012). Momentary data series can be collected from two interaction partners simultaneously, allowing us to assess the degree of accuracy between partner perceptions of emotions and the emotional self-report of the partner (see also Wilhelm & Perrez, 2004). Assessing these processes within each dyad allows for the examination of differences in interpersonal adaptation across dyads, which may vary as a function of emotional inertia at the between-subject level, as we shall propose hereafter. In this way, the current approach allows us to examine how individual emotional dynamics (e.g., emotional inertia) relate to interpersonal emotion processes, as reflected by the degree of accuracy in tracking the partner's emotion fluctuations over time.

Emotional Inertia and Psychological Maladjustment

Emotions are supposed to guide our everyday behavior in an adaptive way (Planalp, Fitness, & Fehr, 2006). To serve the function of preparing an individual for

adaptive responses, emotions need to be reactive to relevant events and changing contexts (Ekman, 1992; Keltner & Gross, 1999; Planalp et al., 2006). For instance, negative emotions such as anger or fear drive us to abandon or confront the source of threat, whereas positive emotions such as love or joy facilitate approach behaviors. A lack of emotional flexibility may thus compromise an individual's capacity to respond adaptively across varying conditions and demands. High levels of emotional inertia may reflect this adaptive deficit. Moderate levels of emotional inertia, by contrast, reflect an emotional dynamic that is potentially more susceptible to external changes (Kuppens et al., 2010), whereas very low levels of emotional inertia, or in other words, very high emotional changeability may point to emotional instability or hyperreactivity and also undermine adaptive behavior (Ebner-Priemer et al., 2007; Tolpin, Gunthert, Cohen, & O'Neill, 2004).

A slow changing emotional dynamic, as reflected by high levels of emotional inertia, may adversely affect individual and interpersonal adaptation. On the individual level, emotional inertia has been related to psychological maladjustment, and studies have documented links with psychological dysfunctions such as depression, neuroticism, low self-esteem, and fear of negative evaluation (Koval & Kuppens, 2012; Kuppens et al., 2010; Rottenberg, 2005), and high levels of emotional inertia can be considered an antecedent or even risk factor of clinical depression in adolescence (Kuppens et al., 2012).

On an interpersonal level, emotional changeability is equally essential for interpersonal adaptation since emotions play an important role in structuring and shaping interpersonal interactions (Niedenthal & Brauer, 2012). For example, adaptive

responding to the disclosures of an interaction partner is a key ingredient of relationship functioning and a building block for a sense of intimacy (Reis & Clark, 2013). Interaction partners adjust their behaviors in response to each other's emotional signals, responding with similar or complementary emotions, in presumable accordance with the demands of the situation (Keltner & Haidt, 2001). A high level of emotional inertia may deprive an individual from responding in a context-sensitive manner to the needs and emotions of the other person. One central mechanism in this process of emotional reciprocity is the perception of the interaction partners' emotional state.

Psychological Maladjustment and Interpersonal Perception

Although emotional inertia is thought to undermine context-sensitive responding, this does not necessarily translate into a lack of accuracy in tracking others' emotions. In contrast, emotionally inert individuals may even track their partners' emotions more closely than their less inert counterparts. Although this assumption may seem counterintuitive at first glance, there is growing evidence suggesting a link between sensitivity in perceiving emotional and behavioral changes in close others and psychological maladjustment. Many psychological disorders are characterized by inflexibility on an affective, cognitive, and behavioral level (e.g., Kashdan & Rottenberg, 2010), but when it comes to recognizing emotional and behavioral changes in close others, psychological maladjusted individuals seem to be highly sensitive (e.g., Harkness, Jacobson, Sinclair, Chan, & Sabbagh, 2012). Several studies suggest that psychologically maladjusted individuals are particularly vigilant when exposed to socially threatening situations. Individuals with elevated depressive symptoms, for instance, perceive and overestimate drops in their partners' commitment and increases in negative behavior

more readily than non-depressed individuals (Overall & Hammond, 2013). Given that such sensitivity is particularly activated in socially threatening situations, it may reflect insecure attachment, and indeed, individuals with a highly anxious attachment style are particularly accurate in inferring their partners' thoughts during discussions of relationship threatening topics (Simpson et al., 2011). Similarly, Harkness et al. (2012) found dysphoric individuals to be more accurate in decoding peoples' emotional states than non-dysphoric individuals during interactions where relationship goals were at stake.

Studies examining the effects of accuracy in intimate relationships are more inconsistent, documenting both positive and negative effects. Whether a situation evokes threat appears to be an important factor (Ickes & Simpson, 2001). In nonthreatening contexts, accuracy tends to be related to positive relationship outcomes. Accuracy heightens intimate partners' mutual understanding and thus contributes to effective support provision and feelings of closeness between them (Simpson, Ickes, & Oriña, 2003; Verhofstadt, Buysse, Ickes, Davis, & Devoldre, 2008). However, accuracy in relationship-threatening situations deprives individuals of protecting themselves from the hurtful thoughts and emotions that their partners may harbor (Simpson, Ickes, & Blackstone, 1995). Indeed, when situations implicate threat for a relationship greater accuracy tends to be associated with less satisfaction, stability and feelings of closeness (Simpson, Ickes, & Grich, 1999; Simpson, Ickes, & Oriña, 2001).

Maladjusted individuals are characterized by high levels of emotional inertia in daily life except when a stressful event is about to happen. Koval and Kuppens (2012) examined the impact of social stress anticipation on emotional inertia. Emotional inertia was assessed with an intensive repeated measures design over two days, involving

several momentary emotional self-reports per day, before and after an experimental manipulation. The manipulation involved anticipating to the participants that they would have to complete a Trier Social Stress Test (TSST) at a later time. This social stress anticipation changed the emotional dynamics of psychological maladjusted individuals causing their inertia levels to drop. The authors suggest that this drop may be due short-lived, ineffective coping attempts leading temporarily to more fluctuations in their emotional dynamics, respectively a decrease in their emotional inertia levels. These results also imply that psychological maladjusted individuals are particularly vigilant in anticipatory stressful situations.

Psychological Maladjustment and Interpersonal Distress

Interpersonal distress is substantially linked with psychological maladjustment, and with affect-related pathology or maladjustment in particular. Neuroticism, for example, is a powerful predictor of relationship distress and dissolution (Karney & Bradbury, 1995). A high level of neuroticism is associated with greater exposure to interpersonal conflicts in daily life and particularly high displays of anger and depression in response to conflict (Bolger & Zuckerman, 1995). Conversely, relationship distress is also a reliable precursor of psychological maladjustment. In fact, Whisman and Uebelacker (2009) found evidence for relationship dysfunction to be both a predictor and consequence of depressive symptoms. In their two-year longitudinal study, baseline depressive symptoms were found to predict subsequent relationship dysfunction to the same extent as baseline relationship dysfunction predicted subsequent depressive symptoms. Psychological maladjustment involving self-regulation problems may go along with insecurities and draw individuals closer to their social partners, as evidenced

by increased emotional susceptibility to and connection with the partner's emotions (Meuwly, Bodenmann, & Coyne, 2012; Schoebi, 2008), possibly as an attempt to access others as external regulators (Randall & Schoebi, 2015). This may result in behavioral excesses regarding external regulation attempts such as reassurance seeking, typically observed in depressed individuals (e.g., Joiner & Metalsky, 2001) and in association with insecure attachment styles (Shaver, Schachner, & Mikulincer, 2005).

Taken together, the association between psychological maladjustment and relationship distress is well established. Relationship outcomes are influenced by the way spouses talk and respond to each other (Fincham & Beach, 1999), and a driving force behind those mutual responses may be the accuracy in perceiving one partner's emotions (e.g., Overall & Hammond, 2013).

The Current Study

Investigating interpersonal processes among individuals in families involves specific requirements that have to be met by an appropriate methodological approach. Family processes essentially emerge within persons and dyads or families across multiple situations. Studying links between individuals' psychological processes and interpersonal processes are of pivotal importance in clinical family psychology, and these phenomena therefore need to be captured appropriately and accurately. In the current article, we demonstrate how intensive repeated measures designs using electronic self-report procedures, applied to all members of a dyad or family, provide a useful way to access interpersonal processes in family relationships. We illustrate this case with a study on the relationship between emotional inertia, an emotion dynamic characterized by low changeability of emotional experience within an individual, and interpersonal perceptions

of emotions, a process which occurs within dyads. Using this example of emotional inertia and interpersonal emotion perception, we exemplify the investigation of individual and interpersonal adaptation processes based on an intensive repeated measures design.

To this end, couples' recorded their momentary emotional experience and the perception of their partner's emotions six times a day over seven consecutive days. We used a multilevel analytic approach. Multilevel analysis is a powerful tool to examine repeated measures data, as it allows us to examine variability and covariances that exist within persons, dyads or families, as distinct from variability and covariances that emerge between couples or families in a single comprehensive analytic framework, while allowing for examining how differences between individuals, dyads and families relate to how variables unfold within individuals, dyads or families.

The concepts we use for our example reflect dynamics or processes that occur or unfold within individuals, and we assess them at the within-individual or within-dyad level: emotional inertia was operationalized as individuals' first order autocorrelation across repeated emotion reports, or in other words, the extent to which one's current affective state predicts one's subsequent affective state. Accuracy in perceiving or tracking the partner's emotions was assessed by examining the extent to which perception of partner emotions predicted the partner's self-reported emotion fluctuations across repeated measures. Differences in emotional dynamics exist between individuals, and we used this between-person variability in emotional inertia as a predictor of the within-dyad process of perceiving or tracking the partner's emotions.

Method

Participants

The sample consisted of 172 committed and mostly married (96.5%) parents of adolescent children. Families were recruited by means of flyers distributed in public schools and with ads in local newspapers in different French and German speaking regions of Switzerland. The sample comprised German-speaking (74%) and French-speaking families (26%). The average age was 46.2 years (*SD* = 5.3) for men and 44.2 years (*SD* = 4.8) for women. Children's age ranged from 9.6 to 18.5 years, having a mean age of 14.6 years (*SD* = 1.3). Couples' average relationship duration was 19.1 years (*SD* = 4.9). Most husbands were employed full-time (86%), whereas most wives were employed part-time (67.6%). Overall, the couples can be described as stable, and with above-average education (52% men and 21.8% of women holding a University degree).

Procedure

All materials were provided in the participant's preferred language (French or German). Materials were first developed in German and a translation into French was tested, corrected and validated via back-translation. All families' were visited in their home by a research assistant who provided detailed instructions on the use of the handheld computers and explained the reporting plan, all questions and items. Participants completed a practice trial to familiarize themselves with the electronic diaries and open questions were clarified. The reporting period started the next day and lasted seven consecutive days.

On each day of assessment, participants started the computer after waking up and

provided their first report. Once started, computers prompted participants to report based on a programmed reporting schedule by means of acoustic signals at five occasions throughout the day, each of them randomly timed within a two-hour time window. Except for the first report of the day, all assessment times were synchronized between couples to ensure concurrent responses of both spouses. Participants carried the handheld computers with them and were instructed to report as soon as possible after the acoustic signal. If participants failed to report immediately, they could report retrospectively with a maximum delay of two hours. Participants were instructed not to discuss their reports with their partners. Thus, each of the 344 participants provided a series of 42 reports (six reports on each of seven days).

Measures

Emotional state. At each report, participants rated their current emotional state, responding to the question "how do you feel right now?" The reports were provided by means of four bipolar 6- point scales, anchored by affect labels with opposite valence: *angry-calm* (ärgerlich-friedlich; fâché-paisible), *sad/depressed-upbeat/content* (traurig/bedrückt-fröhlich/heiter; triste/déprimé joyeux), *anxious-confident* (besorgt/ängstlich-zuversichtlich; soucieux/angoissé-confiant), and *burdened-unburdened* (belastet/unbelastet; préoccupé/sans souci). The ratings were averaged to form a general measure of the perceived valence of the current emotional state. Evaluation of the reliability of change across time of the scale (following Wilhelm & Schoebi, 2007) yielded an acceptable score of R_C = .71, and the reliability of between-person differences was estimated at R = .97.

Perceived partner emotions. Participants not only rated their own emotional

states, but also reported on the perceived or assumed emotional state of their intimate partner ("How do you think [name partner] is feeling right now?") based on the identical items used for reporting the own emotional state. Partner emotion ratings were also averaged to form an overall measure "partner affect." For perceptions of partner emotions, it appeared that differential change in emotional tones were tracked with some sensitivity, which might have contributed to a rather moderate reliability of change R_C = .65. The between-person reliability was satisfactory (R = .80).

Data Analysis

The data featured multiple sources of non-independence: individuals provided series of repeated measurements (Level 1), and fathers and mothers belonged to a dyad, and thus likely sharing not only children and a home, but also past and present experiences, values, interests, friends, and other aspects of their daily life context (Level 2). Ignoring non-independence in these data would yield biased significance tests. Multilevel Modeling takes into account this nested data structure, and its extensions for dyads and families offers a key advantage to studying family processes, as it allows to flexibly model variance that occurs within individuals and dyads or families (at Level 1) and variance that occurs between individuals, dyads or families (Level 2). Here, we follow the general approach proposed by Laurenceau and Bolger (2005). We examined emotional inertia and accuracy in partner perceptions at Level 1, to test the association between individual differences in partner perceptions of emotions and emotional inertia as between- and within-person association at Level 2.

We first set up a model to estimate emotional inertia. As mentioned earlier, we operationalized emotional inertia as the degree of the first-order autocorrelation among

reports on the own emotional state within each person. This coefficient reflects the extent to which the current emotional state is a function of the emotional state report at the previous measurement (a lagged emotional state effect; t-1). To capture only within-person covariance, we centered the lagged emotional state predictor variable around the person's mean across all of his or her emotional self-reports. The within-person model for the measurement of emotional inertia can thus be expressed with the following Equation 1:

$$\text{EMOTION}_{ti} = \pi_{0i} + \pi_{1i}\,(\text{EMOLAG}_{ti}) + e_{ti} \tag{1}$$

EMOTION_{ti} denotes the momentary emotional state of person *i* at time *t*, which is predicted by an intercept π_{0i} capturing the mean emotional state of person *i,* and the slope π_{1i} of the lagged emotional state (EMOLAG_{ti}), which represents the extent to which the previous emotional state predicts the current emotional state. The error term e_{ti} captures the residual variance at Level 1. We allowed each individual to have its own intercept and its own estimate of the autocorrelation parameter π_{1i}, by estimating random variance components u_{0i} and u_{1i}. Equations 2 display the Level 2 model:

$$\begin{aligned} \pi_{0i} &= b_{00} + u_{0i} \\ \pi_{1i} &= b_{10} + u_{1i} \end{aligned} \tag{2}$$

In this model, individual *i*'s intercept (π_{0i}) and inertia (π_{1i}) estimates are expressed by the overall intercept of the samples' mean emotional state (b_{00}) and inertia estimate (b_{10}), and a residual term (u_{0i}, u_{1i}) capturing the individual's deviation of the sample estimate. The residual u_{1i} for the inertia parameter (π_{1i}) thus reflects individual differences in emotional inertia, and we used a z-score of this parameter as a Level 2 predictor in the subsequent

model to examine perceptions of partner emotions.

Because the first model presented here served to compute an emotional inertia estimate significance tests were not of primary interest. For reasons of parsimony, we did not incorporate the dyadic structure of the data. In contrast, the model examining perceptions of partner emotions served to test our hypothesis. We therefore set up a dyadic model, specifying the dyad at Level 2 and repeated measures at Level 1, with each of the partner obtaining a separate set of parameters, and therefore, being nested within the equation. This multiple intercept approach was used by Raudenbush, Brennan, and Barnett (1995), and is more generally described in Laurenceau and Bolger (2005), or in Kenny, Kashy, and Cook (2006).

The Level 1 of the model modeled each individuals degree of accuracy in interpersonal emotion perception — or the degree of correspondence between the perception of the partner's emotional states and partners own self-reports — across all repeated measures. The equation examined to what extent people differ in their degree of accuracy and was formulated as follows:

$$EMOTION_{ti} = \pi_{1i}(FATHER_{ti}) + \pi_{2i}(MOTHER_{ti}) + \pi_{3i}(MO\_PERC\_FA_{ti}) + \pi_{4i}(FA\_PERC\_MO_{ti}) + e_{ti} \quad (3)$$

$EMOTION_{ti}$ reflects the emotional state of a particular father or mother of dyad *i* at time *t*. An intercept is estimated for the father (π_{1i}) and the mother (π_{2i}), capturing the father's or mother's average emotional state. The estimate for parameter π_{3i} reflects the extent to

which the mother's perception of the father's emotional state covaries with the father's self-reported emotional state, and likewise, the estimate for parameter π_{4i} expresses the extent to which the father's perception of the mother's emotional state converges with the mother's self-reported emotional state. The estimate for e_{ti} captures the residual variance.

For illustration purposes, we also tested whether accuracy in partner reports of emotion varied as a function of individual differences in emotional inertia at the between person Level 2. This part of the model essentially captures accuracy as the extent to which the average partner emotion report of the perceiver corresponds to the partner's average self-report (a between-person accuracy estimate). A coefficient for this accuracy estimate emerges from a between-person comparison and it therefore does not directly reflect a process that occurs within a dyad. The within-person level of analysis, by contrast, allows a more fine-grained analysis that more closely reflects a dyadic process as it derives the accuracy estimate from both partners' emotion reports across the repeated measurements. The model capturing the between-person associations can be expressed with the following equations:

$$\pi_{1i} = b_{10} + b_{11}\,(\text{MEAN\_PERC\_MF}_i) + b_{12}\,(\text{EMO\_MOTHER}_i) + b_{13}\,(\text{INERTIA\_MOTHER}_i)$$
$$\pi_{2i} = b_{20} + b_{21}\,(\text{MEAN\_PERC\_FM}_i) + b_{22}\,(\text{EMO\_MOTHER}_i) + b_{23}\,(\text{INERTIA\_FATHER}_i)$$
$$\pi_{3i} = b_{30} + b_{31}\,(\text{EMO\_MOTHER}_i) + b_{32}\,(\text{INERTIA\_MOTHER}_i) + u_{\text{M}i}$$
$$\pi_{4i} = b_{40} + b_{41}\,(\text{EMO\_FATHER}_i) + b_{42}\,(\text{INERTIA\_FATHER}_i) + u_{\text{F}i} \quad (4)$$

The equations for π_{1i} and π_{2i} represent the between-person dimension of the model. The estimates for b_{11} and b_{21} capture the sample estimate for the association between an

individuals' average perception of the partner's emotional state, and the partner's average self-reported emotional state. Specifically, b_{11} reflects the extent to which the mother's average perception of the father's emotions predicts father's average emotional self-report whereas b_{21} captures the equivalent parameters for the father's perceptions (between-person accuracy estimates). The estimates for b_{12} and b_{22} control for the effects of the perceiver's own emotional state and the partner's self-reported emotional state. The estimates for b_{13} and b_{23} reflect the extent to which the perceiver's inertia was associated with the partner's average emotion report. To be specific, however, because the perception of the partner's emotional state was included in the model (b_{11}, b_{21}), the now residualized outcome reflects the discrepancy between the average partner perception and the average self-reported emotional state, and therefore, the estimates for b_{13} and b_{23} actually tell us whether the perceiver's inertia was associated with overperception (for negative coefficients) or underperception (for positive coefficients) of the partner's emotional state, on average.

The equations for π_{3i} and π_{4i} represent the within-person part of the model and examine individual differences in tracking the partner's emotional states. The estimates for b_{32} and b_{42} capture the association of the perceiver's emotional inertia with the accuracy with which the perceptions of the partner's emotional state describe the partner's self-reported emotional state. These coefficients reflect whether accuracy in tracking the partner's emotion over time varied as a function of emotional inertia, thus responding to our example research question at the within person level. Again, these coefficients are controlled for the perceiver's average emotional state, as reflected by the coefficients b_{31} and b_{41}.

In a final step, we included a multiplicative interaction term between the perceiver's emotional inertia and the average perception of the partner's emotional state in the Level 2 to examine our research question at the between-person level. To this end, the Level 2 equations as shown in Equations 4 are extended as follows:

$$\pi_{1i} = b_{10} + b_{11}\,(\text{MEAN\_PERC\_MF}_i) + b_{12}\,(\text{EMO\_MOTHER}_i) + b_{13}\,(\text{INERTIA\_MOTHER}_i) + b_{14}\,(\text{MO\_PERCxINERTIA}_i)$$
$$\pi_{2i} = b_{20} + b_{21}\,(\text{MEAN\_PERC\_FM}_i) + b_{22}\,(\text{EMO\_FATHER}_i) + b_{23}\,(\text{INERTIA\_FATHER}_i) + b_{24}\,(\text{FA\_PERCxINERTIA}_i)$$
$$\pi_{3i} = b_{30} + b_{31}\,(\text{EMO\_MOTHER}_i) + b_{32}\,(\text{INERTIA\_MOTHER}_i) + u_{\text{M}i}$$
$$\pi_{4i} = b_{40} + b_{41}\,(\text{EMO\_FATHER}_i) + b_{42}\,(\text{INERTIA\_FATHER}_i) + u_{\text{F}i} \quad (5)$$

The estimates for the newly added parameters b_{14} and b_{24} represent multiplicative interaction terms between the perceiver's average partner emotion report, and his or her inertia, indicating whether between-person accuracy varied as a function of emotional inertia. These coefficients thus represent the equivalent of the coefficients b_{32} and b_{42} (moderator effects of inertia in perceiving the partners emotions) but at the between-person level. In the models examining perceptions of partner emotions, we adjusted for linear time trends and first order autocorrelation (not shown in the equations above, and not reported in the tables for parsimony reasons).

Results

Preliminary Analysis: Emotional Inertia between Participants

We first modeled emotional inertia as described above, and examined between-person variance components of inertia estimates to gauge whether participants actually

differed from one another in their levels of emotional inertia. The results suggested that participants varied significantly in their emotional inertia, ($\chi 2$ (343, N=344) =666.86 p < .001). It thus made sense for the variance component capturing between-person variability in emotional inertia to be used as a between-person variable in further models.

Emotional Inertia and Perception Accuracy of Emotions in Dyads

At the within-person level, the dyadic data revealed that mothers were particularly accurate in tracking emotional changes in their partners' when they were emotional inert. Although both mothers (b = .18, p < .001) and fathers (b = .24, p < .001) were accurate in tracking each other's emotions over time, emotional inertia moderated this effect in women: mothers estimates of their spouse's emotions were more accurate when they were emotionally inert (b = .06, p < .001). This pattern of findings did not emerge for fathers' perceptions of mothers' emotions (b = .03, p = .12) (Table 1).

Taken together, although both parents were able to predict the emotions of their partners' accurately, women's accuracy varied as a function of their emotional inertia. They tracked their partner's emotional changes more closely when they were more emotionally inert.

At the between-person level, the match between perceivers' average perception of their partners' emotions and partners' average emotional self-report provided significant results for fathers and mothers. Both mothers (b = .10, p < .001) and fathers (b = .14, p < .001) were generally accurate in perceiving their partners' emotions. Emotional inertia did not moderate accuracy neither in women (b = .00, p = .83) nor in men (b = -.00, p = .95). The residualized outcomes in mothers perception of fathers average emotions indicated that mothers with high levels of emotional inertia tended to underperceive their

partners' emotional states ($b = .02$, $p < .05$) as compared to women with low levels of emotional inertia, who overestimated their partners' emotions.

Table 1
Correspondence Between Perceived and Self-Reported Emotional States of Family Members, as Moderated by Emotional Inertia

Predictor	*b*	*SE*	*p*	95% CI
Within Person				
Fathers perception of mothers emotional states	.24	.020	< .001	[0.20, 0.28]
Moderator effect inertia fathers	.03	.016	.12	[-0.01, 0.06]
Mothers perception of fathers emotional states	.18	.016	< .001	[0.15, 0.22]
Moderator effect inertia mothers	.06	.013	< .001	[0.03, 0.08]
Between Person				
Fathers perception of mothers emotional states	.14	.026	< .001	[0.09, 0.19]
Moderator effect inertia fathers	-.00	.011	.95	[-0.02, 0.02]
Mothers perception of fathers emotional states	.10	.027	< .001	[0.05, 0.15]
Moderator effect inertia mothers	.00	.013	.83	[-0.02, 0.03]

Note. N =172 families

Discussion

The goal of this article was to illustrate how family processes and individual functioning can be studied empirically as they evolve over time in families' natural environments. Repeated measurements allowed us to gain insights into dyadic processes without relying on generalized or retrospective self-report measures, and therefore, on the individual's ability to accurately infer and aggregate their emotional dynamics. Whenever a dynamic phenomenon is of interest, several assessments are required to model change for each individual. Repeated measures designs provide a solid foundation for studying processes which unfold within individuals, dyads or families over time and across contexts. It allows us to collect data on process variables, namely variables that change within the realm of interpersonal interactions across hours and days. Ambulatory or other momentary assessments measure emotion, behavior and cognitions as experienced in

daily life and are therefore less prone to retrospective recall biases (Bolger, Davis, & Rafaeli, 2003). Repeated measures provide the means for a more differentiated way of thinking about family processes, because distinct sources of variability can be studied. This is of particular importance given that associations found between two variables at the between-person level are not necessarily true for the same two variables at the within-person level (Hamaker, 2012), as our example also underscores. Taken together, to adequately address processes which evolve within individuals, dyads or families, there is no way around repeated measures designs. Bolger and Laurenceau (2013) provide a more extensive discussion and introduction to using intensive repeated measures designs.

Our illustration involved individual process characteristics and interpersonal processes in couples, using the example of emotional inertia and its relationship to interpersonal perception of emotional states. We gained access to these individual and interpersonal processes by means of an intensive repeated measures design with an electronic self-report measure simultaneously in both partners' six times a day during one week. We used a multilevel technique to analyze within-person and within-dyad processes, and links between these processes at the between- and within-person level. To apply a multilevel analysis, the structure of the data requires to include multiple, preferably theoretically meaningful levels, which means that measurements that have characteristics in common and are therefore considered as interdependent are regarded as nested within another unit (Nezlek, 2011). In repeated measurements, the repeated self-reports of a person share variance because the data points are nested within the same person, thus constituting two different levels of analysis (Nezlek, 2012). Between members of a family, there is additional covariance because they belong to the same

social unit. Here, we used dyadic extensions of multilevel models to investigate between- and within-person differences while taking into account the non-independence of dyadic data. This approach incorporates a distinct set of parameters for each individual of the dyad in a single, dyadic equation. Alternatively, we could have used a model with three levels (measurements, individuals, dyads), where the clustering at the dyad level would have captured similarity in partners' data. Our approach of choice, however, allows for more straightforward modeling of interpersonal processes if partners are distinguishable (such as is the case with husbands and wives; see Bolger & Laurenceau, 2013, or Kenny et al., 2006, for a more detailed discussion).

We expected individuals with high levels of emotional inertia to perceive others' emotional states with more accuracy. This assumption was based on studies which imply that emotional inertia is a characteristic feature of the emotional dynamics of maladjusted individuals, and findings indicating an association between psychological maladjustment and sensitivity in perceiving emotional and behavioral changes in close others. Testing this assumption, we chose an example that uses a within-person dynamic (emotional inertia), assessed based on intensive repeated reports on emotional experience, as a predictor for a within-dyad association (the over time association between emotion perceptions and partner's emotion reports). In other words, we assessed the individual emotion process evolving over time of each person and used this assessment to characterize the person. We then used this characteristic and related it to an evolving, transactional dyadic process. Our expectation was partially confirmed for women, but not for men.

On the between-person level, mothers and fathers perception of their partners'

average emotional states matched their partners' average emotional self-reports. Emotional inertia did not moderate accuracy. The results, however, suggested that inertia in women was associated with more negative discrepancies of partner perceptions from the partners' self-reported emotional states. On the within-person level, we found that both, fathers and mothers predicted their partners' emotions over time with significant accuracy, but inert women were even more accurate in tracking their partner's emotional changes over time. That is, women's, but not men's accuracy in partner perceptions varied as a function of their level of emotional inertia. These results emphasize the aforementioned importance to consider both, between- and within-person processes in the analysis since they may well yield different results.

Emotional Inertia and Intimate Relationships

Emotions are a key variable in family functioning (Berscheid, 1999). To provide an adaptive benefit, emotions should change in accordance with significant events in the environment. Too many or strong fluctuations may reflect a dynamic characterized by over-reactivity or instability, but very few emotional changes over time may also undermine individual and interpersonal adaptation. The latter phenomenon, termed emotional inertia, has received little empirical attention in relationship and family research, although the study of emotional dynamics may be particularly important in the context of intimate relationships, affecting the quality and stability of relationships (Karney & Bradbury, 1995). Given the link between psychological maladjustment and interpersonal distress (Bolger & Zuckerman, 1995; Karney & Bradbury, 1995) the investigation of how individuals' vulnerabilities are associated with interpersonal processes is necessary to shed light on the mechanisms behind this link. Individuals with

high levels of emotional inertia seem to be especially alert or even vigilant to close others' emotional states. Indeed, closer tracking of the partner's thoughts and feelings reflects negative relationship outcomes in situations that pose a threat to a relationship, such as less relationship satisfaction, stability and feelings of closeness in intimate relationships (Simpson et al., 1999, 2001).

Increased vigilance in inert individuals may be motivated by a desire to detect potentially threatening interpersonal situations in their intimate relationships, perhaps compensating for a maladaptive emotion system. The close attention of maladjusted individuals to others' emotions, and compromised emotion regulation skills (Campbell-Sills & Barlow, 2007), may impair interpersonal adjustment in intimate relationships. These speculations await further empirical work on relationship and family processes. Moreover, demonstrating a linkage with prospective change in relationship outcomes is necessary to support conclusions about implications for relationship functioning. A first step in this direction may focus on interpersonal behaviors linked to interpersonal emotion perceptions.

Limitations

The current study is subject to several limitations. Our participants were individuals in stable relationships and do therefore not represent the entire population very well. In particular, our results are based on a non-clinical sample and studying dysfunctional families, or individuals with psychopathologies related to emotional inertia (Kuppens et al., 2010), may have yielded different results.

We focused exclusively on processes involving the subjective experience of the own self-reported emotions, and perceptions of the partner's emotional states. Despite the

many advantages of an ambulatory assessment approach, it should be emphasized that self-report measures do not allow a direct analysis of behavioral processes and are therefore no substitute for observational behavior (Bradbury, Fincham, & Beach, 2000). Systematic observation permits capturing behavioral responses between dyads and family members. An ambulatory assessment approach permits to capture subjective reports of experiences over long periods of time, whereas a systematic observation allows detecting microprocesses during a rather short period of time, involving the expressive component of emotions.

Although subjective experience and perceptions, not accessible by observational approaches, were of interest, an integration of results obtained from different methodological approaches could further improve future studies. Combined methods could provide refined assessments of individuals' emotional dynamics, for example, and emotion perceptions and other aspects of interpersonal sensitivity could be studied in the same individuals both in daily life and in the lab. Combining different methodological approaches has the advantage that interpersonal and family processes can be examined from different perspectives and thus offer a more complete understanding of a phenomenon (Laurenceau & Bolger, 2005). However, it is important to be aware that both methods, ambulatory assessment and observational studies, do only provide a snapshot of the emotional episodes an individual experiences in daily life.

Conclusions

All these processes evolve as we live our daily lives, navigating interactions in our families and our lives outside the family. We believe that capturing and assessing these phenomena adequately requires capturing the immediate experiences in these different

circumstances across hours and days. In the current article, we provided an example based on emotion processes, because emotions are central to family processes and family functioning. The way we perceive each other's emotions influences the way we talk and respond to each other (Keltner & Haidt, 2001), and how we track and perceive our partners may be influenced by our own emotional dynamics and adjustments, as the current findings suggest. Nevertheless, the types of methods and analyses exemplified can be used for a wide range of couple- or family-processes, and may advance research on family functioning in significant ways.

7. Study II: Emotion Dynamics and Responsiveness in Intimate Relationships[4]

Abstract

Responding appropriately to an intimate partner's emotional signals and needs requires that one's emotional responses be reactive to significant interpersonal experiences. The adaptive function of emotions is likely compromised if an individual's emotional states are insufficiently attuned to interpersonal events. The present studies examine how individual differences in moment-to moment emotion dynamics affect interpersonal responsiveness and relationship satisfaction. Study 1 examines associations between emotion dynamics and emotional reactivity to positive and negative relationship events. Emotion dynamics were operationalized using assessments of emotional inertia, which is defined as the degree to which emotions are resistant to change over time. Momentary assessments from 44 participants were collected four times per day over four weeks. Emotional inertia showed a curvilinear association with context-sensitive emotional responses to conflict, with individuals high or low in emotional inertia experiencing blunted emotional reactions to conflict. Study 2 assessed emotion dynamics based on four emotion reports per day over 10 days of both partners in a total of 103 couples. Associations of emotion dynamics with perceptions of partners' responsiveness and relationship satisfaction over 12 months were examined. Partners of individuals with high (inert) or low (erratic) emotional inertia perceived them to be less responsive, which then predicted steeper declines in their relationship satisfaction across 12 months. The results suggest that individuals with inert or erratic emotion dynamics exhibit less context-sensitive emotional responding to conflicts and are perceived by their partners to be less

[4] Citation: Luginbuehl, T., & Schoebi, D. (in press). Emotion dynamics and responsiveness in intimate relationships. *Emotion.*

responsive which subsequently undermines the quality of their intimate relationships.

Emotion dynamics and responsiveness in intimate relationships

To be adaptive, individuals' emotions need to change in response to the demands of the situation in which they are elicited (Coifman & Bonanno, 2010a; Kuppens, Allen, & Sheeber, 2010). This process extends to the social domain in which emotions are thought to fulfill important functions, shaping one's own and others' behaviors in adaptive ways, but only when the correct emotion is expressed in the correct context (Keltner & Haidt, 2001). For example, anger can be adaptive in situations of threat, as it serves to protect violations of personal boundaries (Averill, 1982). Sadness may be adaptive when comforting behavior from others is needed (Hackenbracht & Tamir, 2010; Sanford, 2007). Positive emotions such as desire, compassion, joy or love can be adaptive in the presence of opportunities to affiliate with others, facilitating the formation or maintenance of close bonds (Campos, Schoebi, Gonzaga, Gable, & Keltner, 2015; Shiota, Keltner, Campos, & Hertenstein, 2004).

For emotions to fulfill adaptive social functions, participants of a social interaction must show an appropriate emotional response when a situation demands it. People differ, however, in the extent to which they show moment-to-moment fluctuations in their emotions, and this may impact the degree to which emotions can fulfill these social functions. On the one hand, individuals with an *inert emotion dynamic,* whose emotional states are resistant to moment-to-moment change (Kuppens et al., 2010; Suls, Green, & Hillis, 1998), may fail to show appropriate emotional responses that would offer adaptive benefits (Kuppens et al., 2010). On the other hand, individuals with an *erratic emotion dynamic*, whose emotional states show frequent, rapid and strong moment-to moment changes, may also lack emotional sensitivity to important events or

cues, potentially undermining the adaptive functions of emotions as well (Kashdan & Rottenberg, 2010). Individuals at both ends of the continuum, those with inert and erratic emotion dynamics, may fail to fulfill their adaptive social functions because they likely lack contingency on significant internal or external cues. Emotion dynamics in the midrange, that are neither inert nor erratic, should allow for flexible and event-contingent responding, and therefore be more adaptive. In the current research, we tested curvilinear effects of emotion dynamics and explored the possible long-term implications. In Study 1, we examined associations between emotion dynamics and emotional responses in two important relational contexts in which emotions are likely to play an important adaptive role: interpersonal conflicts and moments of intimacy. We used an ecological momentary assessment approach (Bolger, Davis, & Rafaeli, 2003) to assess individual differences in emotion dynamics over a period of two weeks. We then examined emotional responses to conflict and intimacy in the subsequent two weeks and tested whether individual differences in the velocity of emotional changes, as reflected in inert or erratic emotion dynamics moderated the strength of emotional responses to these events (i.e., less increases in positive emotions in response to moments of intimacy; less increases in negative emotions in response to conflicts). We also tested associations between emotion dynamics and relationship satisfaction. In Study 2, we examined whether an individual's emotion dynamics affects the degree of responsiveness the partner perceives during daily interactions, and whether inert or erratic emotion dynamic predicts changes in partners' relationship satisfaction over time.

In the remainder of the introduction, we first discuss emotion dynamics and their implications for intrapersonal and interpersonal adjustment. We then consider the

importance of context-sensitive emotional responding as well as the possible implications of inert or erratic emotion dynamics for context-sensitive responding.

Emotional Dynamics and Psychological Maladjustment

The extent to which emotions are dynamic and change from moment to moment predicts psychological well-being (Houben, Van den Noortgate, & Kuppens, 2015). Very high and very low levels of emotion fluctuations have been related to poor psychological health (e.g., Kashdan & Rottenberg, 2010; Kuppens et al., 2010; Trull et al., 2008). Current explanations for the link between individual differences in emotion dynamics and psychological health emphasize the functional role of appropriate emotional responding for individual adjustment (Ebner-Priemer et al., 2007; Kuppens et al., 2010; Kuppens et al., 2012; Trull et al., 2008). On an interpersonal level, emotions and their expressions are also thought to fulfill important functions, structuring social interactions (Keltner & Haidt, 2001) and shaping relationship processes (Gable, Reis, Impett, & Asher, 2004; Shallcross & Simpson, 2012). Both a lack of emotional reactivity and emotional shifts that are too strong and rapid may undermine sensitive responding in social situations.

One's level of emotional inertia is often considered a trait-like characteristic (but see Fairbairn & Sayette, 2013; Koval & Kuppens, 2012) and has been conceptualized as an individual difference variable, reflecting the degree or velocity with which a person's emotions change from moment to moment. High levels of emotional inertia reflect a tendency for emotions to be more stable and predictable from moment to moment. A strong emotion at a given moment is likely followed by the same emotion of similar strength at the next moment, and likewise, the absence of an emotion is likely followed by the absence, or a very low level of that emotion. Importantly, emotional inertia differs

from emotional variability; a person high in emotional inertia can experience emotions at a wide range of levels or intensities, and thus exhibit relatively high variability in emotional experience, but her or his emotions will change slowly from moment to moment. Therefore, emotional inertia refers to the temporal dependency of emotions (Kuppens et al., 2010) and is commonly operationalized using the first-order autocorrelation across repeated emotion measurements, which captures the extent to which a person's current emotional state predicts her or his subsequent emotional state (e.g., Koval & Kuppens, 2012; Kuppens et al., 2010; Suls et al., 1998). A stronger positive autocorrelation coefficient indicates that a person's emotions are relatively resistant to change over time. In contrast, moderate levels of positive autocorrelation reflect an emotion dynamic that is changing more rapidly, and that is presumably more susceptible to contextual changes. Finally, very low levels of autocorrelation may reflect affective instability.

A highly inert emotion dynamic may be an indicator of restricted emotional flexibility, and thus compromise adaptive emotional responses to relevant changes in situational conditions and demands (Kuppens et al., 2010). Emotional inertia has been linked to a preferential use of specific emotion regulation strategies, such as rumination (Brose, Schmiedeck, Koval, & Kuppens, 2015; Koval, Kuppens, Allen, & Sheeber, 2012) or expressive suppression (Koval, Butler, et al., 2015), that have been linked to negative health outcomes (e.g., John & Gross, 2004; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Furthermore, inert emotion dynamics were found to predict maladjustment, such as lower psychological well-being (Houben et al., 2015), low trait self-esteem (Kuppens et al., 2010), neuroticism (Suls et al., 1998), fear of negative evaluation (Koval &

Kuppens, 2012), depressive symptoms (Brose et al., 2015), major depression (Kuppens et al., 2010), and prospective onset of depression among adolescents (Kuppens et al., 2012). Although the effect sizes tend to be stronger for negative affect (NA) dynamics than positive affect (PA) dynamics (see Houben et al., 2015), adverse health effects of inert emotion dynamics are documented for both NA and PA (Kuppens et al., 2012, 2010).

At the lower end of the emotion dynamics spectrum is erratic emotion dynamics. Erratic emotion dynamics are characterized by rapid and strong emotional changes resembling an emotional roller coaster and are also associated with maladjustment (e.g., borderline personality disorder, posttraumatic stress disorder, bulimia; Ebner-Priemer et al., 2007; Santangelo et al., 2014). Individuals with erratic emotion dynamics are likely lacking the ability to respond in situation-sensitive ways, resulting in a failure to behave or interact with others in a social-functional manner. When viewed from a dyadic perspective, erratic emotion patterns are one aspect of negative emotionality that may contribute to the negative effects found in prospective studies on relationship distress and dissolution (e.g., Karney & Bradbury, 1995).

Emotion Dynamics, Context-Sensitive Emotional Responses, and Adaptation

Emotional responses are most effective, and most likely to foster an adaptive response to situational demands, if they emerge in the specific situational contexts for which they likely evolved (context sensitivity theory; Coifman & Bonanno, 2010a). Several studies offer corroborating evidence that adaptive emotions must not only be contingent on significant events or cues, but also appropriate to the given situation and context. For example, in a study by Lerner, Dahl, Hariri and Taylor (2007), participants

engaged in a difficult stress-challenge task, which included the mental arithmetic component of the Trier Social Stress Test (TSST, Kirschbaum, Pirke, & Hellhammer, 1993). Participants were told that the task was diagnostic of their level of intelligence and that their performance would be compared with the scores of other participants. During the task, a "harassing" experimenter obstructed participants' performance goals by informing them about each error they made and urging them to work faster. The more anger and disgust participants displayed (a response considered sensitive in this context), the lower their physiological stress reactivity profile (i.e., cortisol and cardiovascular responses). These results suggest that emotional responses which may often be thought of as adverse (e.g., anger) may in fact be beneficial when expressed in an appropriate context, such as when one's goals are being blocked.

Context-sensitive emotional responses have also been linked to recovery from psychological distress. In a study with individuals who experienced bereavement, context-sensitive emotional changes from negative emotions when reminiscing about a distressing negative life event, to positive emotions when speaking about an enjoyable life event, predicted recovery from initial distress levels 18 months after bereavement (Coifman & Bonanno, 2010b). Conversely, responding in a context-insensitive manner appears to undermine psychological health, as seen when participants exhibited blunted emotional reactions to positive stimuli (measured in terms of facial expressions and heart rate reactivity) or high fear reactivity to low threatening situations (so-called freezing behavior) (see Buss, 2011; Buss, Davidson, Kalin, & Goldsmith, 2004; Rottenberg, Kasch, Gross, & Gotlib, 2002).

In summary, different situations elicit different behaviors from individuals. To serve adaptation, both the type of emotion and the magnitude of emotional responses to a particular context must match the situational demands (Nesse, 1990). Emotional responses that are *not* sensitive to the context, such as inadequate emotions, blunted emotional responses, or too strong emotional reactivity, are likely failing to fulfill their adaptive functions. Both very inert and very erratic emotion dynamics may impede context-sensitive emotional and behavioral responsiveness.

Context-Sensitive Emotional Responses and Interpersonal Adjustment

Emotions frequently emerge from intense social interactions (Butler, 2011), and as such, they represent a key factor in relationship functioning and interpersonal adjustment (e.g., Luginbuehl & Schoebi, 2018; Schoebi & Randall, 2015). Emotions convey important information about individuals' current emotional states, as well as concerns and action tendencies, thereby facilitating the coordination of social interactions (Keltner & Haidt, 2001). For example, perceiving emotions in the partner can evoke similar (e.g., shared amusement) or complementary emotional responses (e.g., criticism-stonewalling), reinforce desirable social behavior (e.g., validation, affection, enthusiasm) or signal disapproval and discourage undesirable behaviors (e.g., anger responses, disappointment) (Keltner & Haidt, 2001).

When partners try to provide support, solve a conflict, or capitalize on a positive event, emotional responses can facilitate effective interpersonal engagement (Gable et al., 2004; Laurenceau & Bolger, 2005). For example, individuals feel more understood, validated and cared for if their positive event disclosures are met with enthusiastic responses by the partner (Gable et al., 2004). Additionally, even in conflict situations, a

partner's reactions can serve affiliation or social distancing goals. Showing concern or anger when one's partner raises an issue of conflict may help partners to enter a negotiation process, whereas context-insensitive emotional reactions, such as a lack of or insufficient reactivity, or expressing amusement, may leave the disclosing partner feeling misunderstood or ignored. Thus, context-sensitive emotional responding appears to be an important element of interaction behavior that is perceived as responsive by the partner, conveying a sense of feeling understood, validated and cared for to him or her (Reis & Shaver, 1988). Importantly, the *perception* of a partner's disclosure and expression of positive and negative emotions during an interaction predicts how accepted one feels by the partner, and the degree of intimacy felt at that time (Laurenceau, Barrett, & Pietromonaco, 1998).

Because context-sensitive emotional responses serve important interpersonal functions, a lack thereof may compromise relationship functioning. Several studies suggest that relatively rigid negative emotional states (inert emotion dynamics) can undermine interpersonal adjustment. Intimate couples that persisted in negative affective states during interactions showed poorer relationship functioning (Gottman, Murray, et al., 2002). Similarly, erratic emotion dynamics have been associated with negative interpersonal outcomes. For example, individuals with borderline personality features show a highly erratic dynamic in their daily negative emotion reports, and they also report more distressed interpersonal experiences in their daily life (Tolpin, Gunthert, Cohen, & O'Neill, 2004).

Taken together, context-sensitive emotional responses appear to be important for relationship functioning, as they facilitate interactions that are appropriate to situational

demands. Highly inert or highly erratic emotion dynamics are likely to compromise sensitive responding to meaningful interpersonal events, which will consequently take a toll on individuals' responsiveness and relational functioning.

Emotional Inertia and Context-Sensitive Emotional Responses

Because the concept of emotional inertia reflects slow emotional changes over time, it has been hypothesized to involve attenuated emotional responses to external events (Kuppens et al., 2010). Other explanations that have been suggested in the literature is that an inert emotion dynamic may be the result of reduced exposure to environment variation in daily life or instead, more intense events that elicit stronger emotions which are more difficult to downregulate, resulting in increased emotional dependency over time (Koval, Brose, et al., 2015). Some recent evidence supports the latter perspective: individuals who reported more intense negative daily events tended to have higher levels of NA inertia in daily life (Koval, Brose, et al., 2015). Another study reported curvilinear associations in PA dynamics of individuals with major depressive disorder when examining their reactivity to positive events (Thompson et al., 2012). Study participants with erratic emotion dynamics, as well as those with inert levels of PA, showed blunted PA reactivity to positive events, whereas individuals with intermediate levels of PA dynamics were more susceptible to PA change as a function of positive events. No reliable association emerged between PA dynamics and PA reactivity to negative events, nor were high or low levels of NA inertia associated with NA reactivity to positive or negative events. Similarly, Koval, Brose and colleagues (2015) did not find an association between high levels of NA inertia and NA reactivity to daily positive or negative events. They did, however, find some evidence that individuals with

intermediate levels of NA inertia showed more NA recovery following positive events than their counterparts with high or low NA inertia.

Taken together, the literature does not allow for strong and specific predictions about the nature of the association between emotion dynamics in daily life and reactivity to interpersonal events. Several factors may play a role, such as the time scale used to assess emotional inertia, the valence of the emotion dynamics examined (PA inertia or NA inertia), and whether individuals are exposed to positive or negative events (Koval, Brose, et al., 2015; Thompson et al., 2012). For example, ambulatory assessment studies relating emotional inertia to event reactivity have assessed whether individuals experienced any significant event recently, and whether they experienced this event as positive or negative (Koval, Brose, et al., 2015; Thompson et al., 2012), without assessing information about what kind of events they experienced. However, such information could be relevant. Instructing individuals to report the intensity of any significant event may select reports of events where even individuals with few emotional changes in daily life (emotionally inert individuals) showed an emotional response, and this may attenuate individual differences in emotional experiences. This limitation is difficult to avoid entirely when relying on participants' subjective reports of events, which the current study also utilizes. However, we try to attenuate such a bias by avoiding a reference to the significance or importance of the event as a condition for reporting, but rather focusing on specific and relatively frequent interpersonal events (conflicts and moments of intimacy) that are considered important for relationship functioning. This focus on emotional reactivity to specific interpersonal events helps to zero in on the context-sensitivity of emotional responses.

The Current Studies

To examine the potential implications of emotion dynamics in daily life for interpersonal adjustment in intimate relationships, we present data from two studies examining short-term and long-term correlates of an inert vs. erratic emotion dynamic. We tested the hypotheses that both inert and erratic emotion dynamics would be associated with less context-sensitive responses to positive and negative events, and that individuals with inert or erratic emotion dynamics would be perceived as less responsive in daily life by their partners than those with intermediate levels of emotional inertia, and that lower levels of perceived responsiveness would in turn lead to decreases in partners' relationship satisfaction.

We used an ecological momentary assessment approach to capture moment-to-moment emotional changes. This method offers relatively high ecological validity, as it assesses human experience in its natural environment, minimizes the likelihood of recall bias, and allows capturing within-person processes over time (Bolger et al., 2003). We examined individual differences in emotional trajectories of positive affect, hard negative affect (H-NA) and soft negative affect (S-NA). We distinguished between these two types of negative emotions because they serve distinct social functions and likely have different effects on relationship outcomes (see Sanford, 2007; Sanford & Rowatt, 2004). H-NA includes selfish emotions (e.g., anger) that are often associated with power, control- oriented behaviors and assertiveness, whereas S-NA involves more pro-social emotions (e.g., sadness) signaling vulnerability or submission (Sanford, 2007; Schoebi, 2008). H-NA and S-NA may reflect two distinct social functions (Fischer & Manstead, 2016): Whereas emotions like anger may foster the social relational goal of distancing,

emotions like sadness are thought to foster affiliation goals, stimulating connection and encouraging support and cooperation (Roseman, Wiest, & Swartz, 1994). Because we operationalized emotion dynamics as the autocorrelation of repeated measures of emotional states, we henceforth refer to it with the term emotional inertia.

In Study 1, we tested associations between high or low emotional inertia and context-sensitive responses to key relationship situations, namely conflict and intimacy. In Study 2, we aimed to test the hypothesis that high or low emotional inertia undermines responsive interactions and interpersonal adaptation in intimate relationships. Specifically, the partner's emotional and behavioral responses to one's disclosures of feelings and concerns in a relationship (e.g., in the context of conflict), are thought to be an important variable in the communication process, and the absence of such responses in important relational situations may leave one feeling less validated, understood and cared for.[5] It therefore seems plausible to assume that individuals with high or low levels of emotional inertia would be perceived as less responsive by their partners during interactions. We therefore examined whether partner A's high or low levels of emotional inertia will be perceived by partner B as less responsive than their counterparts with intermediate levels of emotion inertia.

Finally, perceptions of the partner's behaviors as little responsive to one's disclosures have been shown to have lasting effects on personal well-being and interpersonal functioning (Reis & Gable, 2015), and even individuals' health (e.g., Slatcher & Selcuk, 2017). A second analytic goal of Study 2 therefore involved testing whether partner A's high or low emotional inertia, as compared to intermediated levels,

[5] note that these feelings are frequently termed *perceived partner responsiveness* (see, e.g., Laurenceau, Barrett, & Pietromonaco, 1998; Reis, 2014).

predicted decreases in partner B's relationship satisfaction over a 12-month period. Finally, we tested a mediation model to examine whether the effects of partner A's high or low emotional inertia on partner B's relationship satisfaction trajectory could be explained by partner B's lower levels of perception of partner responsiveness.

Study 1: Emotion Dynamics and Reactivity to Interpersonal Events

Study 1 was designed to address the question of whether high or low emotional inertia predicted less context-sensitive emotional responses to conflict and intimacy than intermediate levels of emotional inertia. Based on the assumption that, to be adaptive, emotions need to change in accordance with events, it is expected that conflicts or major tensions should elicit either an increase in H-NA (serving the function of asserting oneself) or an increase in S-NA (encouraging the partner to offer comforting and cooperative behavior). Intimate moments, by contrast, should involve emotions that facilitate and validate interpersonal connection, and thus be associated with increases in PA and decreases in H-NA and S-NA. Thus, we expected higher and lower levels of emotional inertia to be associated with less emotional reactivity to interpersonal events, as reflected by a lack of increase in H-NA and S-NA (and lack of decrease in PA) after conflict/tensions and a lack of increase in PA (as well as a lack of decrease in H-NA and S-NA) after intimate moments, whereas more reactivity was expected at moderate levels of emotional inertia. Because the logic behind these hypotheses implies that high or low emotional inertia fails to support interpersonal adaptation in relationships, we also examined whether high or low emotional inertia was associated with lower relationship satisfaction.

Method

Participants

Participants were recruited through mailing lists, flyer distributions and word-of-mouth advertising at the University of Fribourg, Switzerland. Participants had to meet the following criteria to participate: (1) be in a committed relationship for at least two months and (2) have sufficient fluency and German language skills to properly understand and fill out the ambulatory assessment form. The final sample consisted of 44 young adults between 20 and 27 years of age (M = 22.8; *SD* = 1.8). The majority of participants were women (38 women, 6 men). Individuals' average relationship duration was 2.3 years (*SD* = 2.0). Post-hoc power estimations for the current analyses, using a Monte Carlo procedure (see Bolger, Stadler, & Laurenceau, 2012), suggested a power of .81 for the curvilinear S-NA inertia effect on emotional reactions to conflict, a power of .75 for the curvilinear PA inertia effect on emotional reactions to conflict, and .99 for the curvilinear H-NA inertia effect on emotional reactions to conflict.

Procedure

Data collection for this study included two phases: (1) a baseline questionnaire and (2) a momentary assessment procedure over four consecutive weeks, with four measurements per day (upon awakening, 12 p.m., 6 p.m., before bed). During an introduction session, participants were provided with detailed instructions on the use of the electronic diaries (HP iPAQ rx1950), the reporting plan, the questions and items of the ambulatory assessment form and also completed and signed the informed consent form. Participants completed a practice trial to become familiar with the electronic diaries and were given the opportunity to ask questions. Participants were instructed not to

provide retrospective reports if they missed one of the scheduled times. The study was approved by the ethics committee of the host institution. Participants received course credits for their participation. In total, participants provided a total of 4666 data points (94% of the scheduled reports).

Measures

Interpersonal events. Participants indicated whether they experienced "tensions/conflicts" and/or "intimate moments" with their romantic partner (1) or not (0) since the previously completed report.

Emotional states. At each report, participants rated the degree to which they were currently feeling "angry," "depressed," "cheerful," "irritable," "lonely" and "worried/fearful" using a continuous slider on a 6-point scale ranging from 1 (*not at all*) to 6 (*extremely*). We averaged the ratings on the items "depressed," "lonely" and "worried/fearful" to form a S-NA score. The consistency for this measure was high across participants ($\Omega_{between}$= .83; cf. Geldhof, Preacher & Zyphur, 2014), and moderate across repeated reports within participants (Ω_{within} = .66). The ratings of the items "angry" and "irritable" were averaged to form a measure of H-NA, yielding a score with high consistency across participants ($\Omega_{between}$= .88) and across reports within participants (Ω_{within}= .79). We used the ratings for the item "cheerful" to reflect PA.

Relationship satisfaction. Every evening, participants indicated, how satisfied they felt about their relationship using a 6-point scale ranging from 1 *(not at all)* to 6 *(extremely)*.

Emotional inertia. To obtain a reliable assessment of individual differences in emotional inertia, we used repeated self-reports on current emotional states over the

course of 14 days (PA, H-NA, S-NA). We conducted three separate multilevel models, estimating first-order autoregressive parameters by regressing the current emotional state onto the prior emotional state (e.g., PA(t) was regressed onto PA(t-1)).

$$\text{Emotion}_{ti} = \pi_{0i} + \pi_{1i}\,(\text{emotion}_{t\text{-}1i}) + \pi_{2i}\,(\text{time}) + e_i \tag{1a}$$

Emotion_{ti} denotes person i's current emotional state at time t, which is modeled by the slope π_{1i} representing inertia, or the extent to which the current emotional state is predicted by the previous emotional state (lagged emotional state effect; $\text{emotion}_{t\text{-}1i}$), adjusted for the intercept π_{0i}, which reflects person i's mean level of affect. We adjusted for linear time trends by including time as a covariate in the model that is represented by π_{2i}. The error term e_{ti} captures the residual variance at Level-1. The Level-2 equations were unconditional:

$$\pi_{0i} = \beta_{00} + u_{0i}$$
$$\pi_{1i} = \beta_{10} + u_{1i}$$
$$\pi_{2i} = \beta_{20} + u_{2i} \tag{1b}$$

The estimate β_{00} represents the overall intercept and β_{10} represents the inertia estimate for the total sample. Intercepts and slopes were allowed to vary across participants, and the residual variance component u_{0i} captures individuals' deviation of the sample intercept, whereas u_{1i} reflects random variation in individuals' autocorrelation, and thus, individual differences in inertia. We used the empirical Bayes estimates for u_{1i} to represent individual differences in inertia, and included a z-score of this parameter as a predictor in our next model.

Data Analysis

We used a multilevel modeling approach to account for the nested structure of the data, as occasions (Level-1) are nested within persons (Level-2). Emotional inertia was modeled at the within-person level (see Equations 1a and 1b), and we estimated how inertia moderates the association between emotional reactivity and interpersonal events at the between-person level. Models were run with HLM 7.01 (Raudenbush, Bryk, & Congdon, 2011).

Emotional reactivity. We ran models for PA, H-NA and S-NA to examine within-person emotional changes after the occurrence of interpersonal events (Level-1 equation) within the last two weeks of the ambulatory assessment. The Level-1 equation can be written as follows:

$$\text{Emotion}_{ti} = \pi_{0i} + \pi_{1i}\,(\text{interpersonal event}_{ti}) + \pi_{2i}\,(\text{emotion}_{t\text{-}1i}) + e_i \quad (2a)$$

Emotion_{ti} denotes person i's current emotional state at time t and the slope π_{1i} reflects person i's magnitude of emotional change from the previous emotional state as a function of the interpersonal event (dummy coded: no interpersonal event = 0; interpersonal event = 1), controlling for the previous lagged emotional state ($\text{emotion}_{t\text{-}1i}$) and individuals' mean level of emotion $\pi_{0i,}$ because both predictors were entered person-mean centered.

Our Level-2 equation examined whether emotional inertia predicted the strength of the association between interpersonal events and emotional reactivity. We tested emotional inertia as a Level-2 moderator of the effects of interpersonal events on emotion fluctuations, adjusting for the mean and *SD* of emotions, and their main effects on emotional states. To test whether both high and low levels of emotional inertia were

associated with attenuated emotional responses to relational events, we tested curvilinear associations, including quadratic effects for all predictors in our Level-2 equation.

Level-2 equation:

$$\pi_{0i} = \beta_{00} + \beta_{01}\,(\text{frequency event}) + \beta_{02}\,(\text{inertia}) + \beta_{03}\,(\text{inertia}^2) + \beta_{04}\,(\text{emotion mean}) + \beta_{05}\,(\text{emotion mean}^2) + \beta_{06}\,(\text{emotion } SD) + \beta_{07}\,(\text{emotion } SD^2) + u_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}\,(\text{frequency event}) + \beta_{12}\,(\text{inertia}) + \beta_{13}\,(\text{inertia}^2) + \beta_{14}\,(\text{emotion mean}) + \beta_{15}\,(\text{emotion mean}^2) + \beta_{16}\,(\text{emotion } SD) + \beta_{17}\,(\text{emotion } SD^2) + u_{1i}$$
$$\pi_{2i} = \beta_{20} + u_{2i} \qquad \text{(2b)}$$

The magnitude of emotional change was controlled for each person's frequency of event occurrence (β_{11}), mean level of affect (β_{14}), *SD* (β_{16}) and their squared terms at Level-2. The quadratic inertia estimate (β_{13}) reflects curvature in the inertia slopes. Along with a non-significant or small linear component of emotional inertia (β_{12}), it reflects whether high and low emotional inertia predicted the magnitude with which emotional changes increased or decreased as a function of the specific interpersonal event. Models were run separately for PA, H-NA and S-NA and each type of event (conflict, intimacy).

Relationship satisfaction. We tested curvilinear between-person associations between emotional inertia and relationship satisfaction by including individual differences in relationship satisfaction in the inertia model, as represented by Equation 1b.

Results

Descriptive Statistics

Mean levels of emotional inertia were low to moderate, with an estimate of .23 (*SD* = .08) for PA, an estimate of .11 (*SD* = .11) for H-NA, and an estimate of .30 (*SD* = .06) for S-NA. The mean level of reactivity to conflict was -.60 (*SD* = .36) for PA, .34

(*SD* = .36) for H-NA, and .34 (*SD* = .58) for S-NA. The mean level of reactivity to intimacy was .37 (*SD* = .10) for PA, -.15 (*SD* = .11) for H-NA and -.08 (*SD* = .06) for S-NA. There was a significant correlation between PA inertia and S-NA inertia $r(43) = .40$ $p = .007$, but no significant correlations between PA and H-NA inertia $r(43) = .15$, $p = .344$ nor between S-NA inertia and H-NA inertia $r(43) = .26$, $p = .091$.

Emotional Inertia as a Predictor of Emotional Reactivity to Interpersonal Events

As shown in Table 1, we found curvilinear associations between inertia and reactivity to conflict. Both high and low emotional inertia predicted blunted emotional reactivity, whereas scores in the intermediate range predicted increased emotional reactivity to conflict. Figure 1 illustrates these associations for PA, H-NA and S-NA. We found no evidence for associations between PA or H-NA inertia and emotional reactivity to intimacy, but a significant linear effect emerged for S-NA inertia, suggesting blunted reactivity for more emotionally inert individuals.

PA inertia. Experiencing conflict with one's partner was associated with lower momentary PA ($b = -.51$, $p = .002$). We found a curvilinear association between PA inertia and reactivity to conflict ($b = .25$, $p = .025$): high and low inertia scores were associated with less PA reactivity to conflict (i.e., smaller decreases in PA), whereas scores in the intermediate range predicted stronger reactivity (i.e., larger decreases in PA). Experiencing intimacy with one's partner was associated with higher momentary PA ($b = .37$, $p < .001$). We did not find a curvilinear association between PA inertia and PA reactivity to intimacy ($b = .04$, $p = .411$).

H-NA inertia. Reports of conflict with one's partner were associated with higher H-NA ($b = .31$, $p < .001$). We found a curvilinear association between H-NA inertia and

reactivity to conflict, such that higher and lower H-NA inertia scores predicted less reactivity to conflict whereas scores in the intermediate range predicted more reactivity (b = -.27, p = .002). Intimacy was related to lower momentary H-NA (b = -.15, p < .001). We did not find a curvilinear association between H-NA inertia and H-NA reactivity to intimacy (b = .00, p = .880).

S-NA inertia. Reports of conflict were also associated with increases in S-NA (b = .35, p = .014). A curvilinear association was found between S-NA inertia and reactivity to conflict. Higher and lower S-NA inertia scores predicted less S-NA reactivity to conflict whereas scores in the intermediate range predicted more reactivity (b = -.29, p = .032). Moments of intimacy were associated with lower momentary S-NA (b = -.07, p = .002). We did not find a significant curvilinear association between S-NA inertia and reactivity to intimacy (b = .02, p = .528), but rather a linear effect, suggesting that participants with relatively inert S-NA exhibit attenuated reactivity to intimate moments (b = .09, p = .004).

Sensitivity Analysis

The study design enabled us to obtain estimates of emotional inertia based on data that did not overlap with the data used to model affective reactivity to conflict or intimate moments. The decision to use the first two weeks of momentary affect data to establish emotional inertia scores, that were used to predict affective reactions to conflict or intimate moments in the subsequent two weeks (weeks 3 and 4), was based on the expectation that sequelae of intense interpersonal events would have longer term consequences that could influence later affect reports and therefore enter into emotional inertia estimation based on data from weeks 3 and 4. Nevertheless, the available data

allows cross-validation of the results by reversing the analytic approach and using emotional inertia estimates based on reports of weeks 3 and 4 to predict affective reactivity during weeks 1 and 2. In light of the limited sample size of Study 1 and because the effects of high and low emotional inertia should not depend on specific momentary experiences, or on the particular weeks of data used for the assessment of individual differences in emotion dynamics, such sensitivity analyses seem warranted to test the reliability of the results.

As shown in Table 2 the pattern of results was confirmed for S-NA inertia in response to conflict (b = -.25, p = .002). Higher and lower S-NA inertia scores predicted less S-NA reactivity to conflict whereas scores in the intermediate range predicted more reactivity. These results confirm a reliable and strong curvilinear S-NA inertia effect on emotional reactions to conflict (a post-hoc power analysis suggested a power approaching 1). However, no curvilinear pattern emerged for PA inertia (b = -.04, p = .604), or H-NA inertia (b = .04, p = .358), and no linear effect resulted for S-NA inertia in response to intimacy (b = .07, p = .141).

Emotional Inertia's Association with Concurrent Relationship Satisfaction

Testing curvilinear associations between emotional inertia and relationship satisfaction yielded no significant results for PA inertia (b = -.01, p = .552), H-NA inertia (b = .01, p = .887), or S-NA inertia (b = .03, p = .320). Rather, we found marginal linear associations between higher negative affect inertia (H-NA and S-NA) and lower relationship satisfaction: H-NA inertia (b = - .08, p = .073; effect size r = .27) and S-NA inertia (b = -.06, p = .065; effect size r = .28).

The results of Study 1 provided consistent support for the assumption that

individuals at high and low S-NA inertia are less reactive to situations of conflict with their partners. To further examine the hypothesis that high and low emotional inertia is associated with less adaptive relationship processes, we tested a model in which S-NA inertia is a focal predictor of responsiveness (as perceived by individuals' partners) and partners' relationship satisfaction trajectories.

Study 2: Emotional Inertia, Perceptions of Responsiveness, and Relationship Satisfaction in Intimate Relationships

Being responsive to relationship partners' disclosures and constructive engagement in problem-solving is essential for relationship functioning (e.g., Kim, Sherman, & Taylor, 2008) because it fosters important relational dispositions such as secure attachment (Belsky & Fearon, 2008) as well as trust (Shallcross & Simpson, 2012) and intimacy (Reis & Shaver, 1988). In Study 2, we examined whether partner A's high or low S-NA inertia was associated with being perceived as less responsive by partner B, and with partner B's 12-month relationship satisfaction trajectory. We further tested a mediational path in which partner A's high or low emotional inertia would predict lower levels of perceptions of partner's responsiveness by partner B, which, in turn, would predict declines in partner B's reports of relationship satisfaction.

Method

Participants

Couples were recruited through flyers and advertisements placed in childcare facilities, community centers and common residential areas in Switzerland. In order to be eligible to participate in the study, couples had to meet the following criteria: living together, each partner working a typical day-time work schedule (no night shifts) of at

least 12 hours per week and at least one child under eight years old. Of the 113 couples that were interested in participating, 108 couples fulfilled the eligibility criteria. In the current analyses, we exclude data from five couples; four couples were excluded due to missing data and one couple was excluded because they were not in a heterosexual relationship (both partners were women). A sample size of 96 couples was targeted based on a power analysis, assuming linear regression effects of medium size (standardized β= .5) and a significance level of .05, for a power of greater than 1-β = .80. Because the current analyses involve moderation effects that require more power, but involve pooled estimates for men and women, we report post-hoc power analyses.

The final sample consisted of 103 couples (n = 206 individuals) between 24 to 59 years of age (M = 36.4; SD = 5.5). Eighty-seven percent of the couples were married. Couples' mean relationship duration was 10.2 years (SD = 4.4) and married couples were married for an average of 5 years and 7 months (SD = 3 years, 10 months). Couples had an average of two children (SD = .08) and children's mean age was 4.5 years (SD = 4.1). Couples in this sample were overall well educated, with 59% of men and 55% of women holding a university degree.

Procedure

Participants first completed a baseline questionnaire (t0), followed by an electronic diary study with four measurements per day over a period of 10 days (t1). A research assistant visited couples in their homes and provided instructions on the use of the electronic diaries (HP iPAQ rx 1950) and explained the items on the assessment form. The daily diary portion of the study was followed by two follow-up surveys at 6 months (t2) and 12 months (t3).

Couples completed the ambulatory assessment form four times a day over 10 consecutive days and were beeped at the same time each day: 9a.m., 5p.m., 7p.m. and 10 p.m. As in Study 1, participants were instructed not to provide retrospective reports. Overall, participants provided 7,836 data points (approximately 95% of scheduled reports). After participants completed the daily diary portion of the study, they were asked to complete a follow-up survey 6 months later (t2) and 12 months later (t3), which they received by mail. Ninety-four of the initial 103 couples sent back their questionnaires at month 6 (91%) and 95 couples provided data at month 12 (93%). The study was approved by the ethics committee of the University. Participants received compensation, equivalent to $50, after completing the daily diary and additional compensation, equivalent to $10, after delivering follow-up questionnaires.

Measures

Emotional states. At each report, participants rated how they were currently feeling on a 6-point scale ranging from 1 (*not at all*) to 6 (*extremely*). The ratings of the items "anxious" and "sad/depressed" were averaged to form a measure of S-NA, which was highly consistent across participants ($\Omega_{between}$= .86), and moderately consistent across repeated measurements (Ω_{within}= .73).

Perceptions of partner responsiveness. At each 10p.m. report, both members of each couple were asked to rate their perceptions of their partner's behaviors during their shared interactions on that day using an inventory of four items. Each item was rated on a 6-point scale ranging from 1 *(not at all)* to 6 *(very much).* We used the items "understanding," "supportive," "affectionate/caring" and "loving" to capture perceptions of the partner's responsiveness. Items were consistent within subjects across time

(Ω_{within}= .81), and between subjects ($\Omega_{between}$= .95). For each report, we computed the maximal rating across the behavioral descriptors, reflecting the extent to which participants perceived their partner as responsive. Based on these scores, we calculated a mean score across all reports for each participant.

Relationship satisfaction. We assessed relationship satisfaction using five items from the Quality of Marriage Index adapted for use of non-marital but committed long-term relationships (QMI; Norton, 1983). Participants indicated on a 6-point scale ranging from 1 (*very strong disagreement*) to 6 (*very strong agreement*) how they felt about their relationship (e.g., "we have a good relationship," "I really feel like part of a team with my partner"). Cronbach's alpha at each measurement ranged between .88 and .89.

Data Analysis

We first modeled within-person autocorrelations or, emotional inertia, adjusted for time and day trends (see Equations 1a and b in Study 1). Next, we examined whether an individual's S-NA inertia was associated with the partner's perceptions of his or her responsiveness**.** We tested curvilinear associations, given the pattern of results in Study 1. We used an adaptation of the actor-partner interdependence model (Cook & Kenny, 2005), omitting actor effects of emotional inertia (not hypothesized; exploratory analyses suggested no significant actor effects), but including linear and curvilinear effects of S-NA inertia and used the corresponding means and *SD*s (linear and curvilinear) as controls. Partners' reports of perceptions of responsiveness were allowed to be correlated across couples.

In a next step, we modeled within-person trajectories of relationship satisfaction over a period of 12 months using a linear growth model with three repeated

measurements (baseline, 6 months, 12 months) at Level-1, nested within couples at Level-2, with separate sets of parameters for each partner nested within an equation (see e.g., Laurenceau & Bolger, 2005). Relationship satisfaction trajectories were modeled at Level-1, as shown in the following equation:

$$QMI_{ti} = \pi_{0i\_woman} + \pi_{0i\_man} + \pi_{1i\_woman}(time_{ti}) + \pi_{1i\_man}(time_{ti}) + e_{i\_woman} + e_{i\_man} \quad (4a)$$

QMI_{ti} denotes person i's current marital satisfaction at time t. The time variable (slope π_{1i}) reflects men's or women's partner of couple i's linear rate of change in relationship satisfaction across the three time points.

Individual differences in the partner's emotion reports and dynamics were entered at Level-2. We included the variable reflecting individual differences in the partner's S-NA inertia (β_{11}), adjusted for partner's mean level (β_{13}), and standard deviation (β_{14}) of S-NA, and their squared terms, in the Level-2 equations (4b; for parsimony, we only display the woman's equation. An equivalent equation was tested for men). The model thus allowed us to examine whether higher and lower values of the partner's emotional inertia predicted changes in an individual's relationship satisfaction over a period of 12 months. We estimated random variation of intercepts and slopes, captured by the parameters u_{0i} and $u_{1i.}$

$$\pi_{0i\_woman} = \beta_{00} + \beta_{01}(\text{partner's inertia}) + \beta_{02}(\text{partner's inertia}^2) + \beta_{03}(\text{partner's emotion mean}) + \beta_{04}(\text{partner's emotion } SD) + \beta_{05}(\text{partner's emotion mean}^2) + \beta_{06}(\text{partner's emotion } SD^2) + u_{0i}$$

$$\pi_{1i\_woman} = \beta_{10} + \beta_{11}(\text{partner's inertia}) + \beta_{12}(\text{partner's inertia}^2) + \beta_{13}(\text{partner's emotion mean}) + \beta_{14}(\text{partner's emotion } SD) + \beta_{15}(\text{partner's emotion mean}^2) + \beta_{16}(\text{partner's emotion } SD^2) + u_{1i} \quad (4b)$$

In a final step, we combined the two models, adding perceptions of the partner's responsiveness as a predictor to Equation 4b. This model allowed us to examine whether perceptions of responsiveness, predicted relationship satisfaction levels and trajectories, as well as to test the possibility of a mediational path from the partner's higher or lower emotional inertia on relationship satisfaction trajectories, via perceptions of the partner's responsiveness. Post-hoc estimations of statistical power were conducted using a Monte Carlo procedure and the values found in the current models (see Bolger et al., 2012). All analyses were conducted using the Mplus software (Version 8; Muthen & Muthen, 2017).

Results

Descriptive Statistics

Overall, participants' affect reports showed moderate S-NA inertia across time, with average estimates of .21 (*SD* = .12) for men and .21 (*SD* = .11) for women. The correlation between partners' levels of emotional inertia was not significant (r = -.043; p = .664). The mean level of perceptions of partner's responsiveness was 4.40 for men (*SD* = .85) and 4.32 (*SD* = .88) for women. The mean level of men's relationship satisfaction was 5.15 (*SD* = .73) at t1, 4.97 (*SD* = .83) at t2 and 5.00 (*SD* = .81) at t3. The mean level of women's relationship satisfaction was 5.02 (*SD* = .81) at t1, 5.06 (*SD* = .83) at t2 and 4.94 (*SD* = .93) at t3.

Are Individuals with High or Low S-NA Inertia Perceived as Less Responsive by their Partners'?

Preliminary analyses suggested no significant gender difference in the S-NA inertia effects (Santorra-Bentler Scaled $\chi^2(2) = .38$, $p = .827$); therefore, we report the results of the model with pooled parameter estimates. We found a significant curvilinear

association between S-NA inertia and perceptions of partner's responsiveness, with a positive, but only marginally significant, linear component and a significant negative quadratic component. Results indicated a significant inclination toward more positive responsiveness ratings by partners of highly inert individuals as compared to partners of individuals low in inertia ($\beta = 1.11$, $p = .045$). However, the significant negative curvature ($\beta = -8.96$, $p < .001$) in the slope indicated that individuals with scores in the midrange of S-NA inertia were described by their partners as being more responsive compared to individuals with high or low levels of S-NA inertia (see Figure 2). Post-hoc power analyses for these effects, assuming a two-tailed significance level of .05, suggested limited power for the linear effect ($1-\beta = .64$), but high power for the curvilinear effect ($1-\beta = .99$).

Does the Partner's High or Low S-NA Inertia Predict Relationship Satisfaction Trajectories

Next, we tested whether the partner's S-NA inertia predicted changes in individual's reports of relationship satisfaction across 12 months (see Table 3). On average, relationship satisfaction decreased marginally over time ($\beta = -.04$, $p = .091$). In preliminary analyses, we tested whether the estimates for emotional inertia parameters predicting satisfaction levels and slopes differed between men and women. The comparison of a model with parameter constraints for men's and women's estimates with a model where the parameters were freely estimated suggested no significant difference (Santorra-Bentler Scaled $\chi^2(4) = 5.95$, $p = .203$). We therefore report the model with pooled results.

We found a marginally significant curvilinear association between partner's S-NA

inertia and relationship satisfaction levels (β = -2.67, *p* = .071). Individuals whose partners scored high or low in S-NA inertia tended to be somewhat less satisfied with their relationship overall, compared to those with partners at intermediate levels of S-NA inertia. We did not find an equivalent effect for linear effects of emotional inertia on relationship satisfaction levels (β = .38, *p* = .290).

Regarding relationship satisfaction trajectories, a curvilinear effect suggests that partners' higher and lower S-NA inertia predicted steeper declines in individuals' relationship satisfaction across 12 months (β = -1.67, *p* = .029) (see Figure 3). We found no linear effect for emotional inertia (β = -.22, *p* = .288). Additional analyses, including individuals' own inertia and parameters as predictors of their own relationship satisfaction (actor effects) did not result in significant effects, and the effects reported above did not change in significance or size in meaningful ways.

Post-hoc power analyses for these effects, assuming a two-tailed significance level of .05, suggested limited power for the curvilinear effect of S-NA inertia on relationship satisfaction levels (1-β= .67) and low power for the curvilinear effect of S-NA inertia on relationship satisfaction trajectories (1-β = .52).

Perceptions of Partner's Responsiveness as a Predictor of Relationship Satisfaction Trajectories

To test for the possibility of an indirect path from S-NA inertia, via perceptions of partner's responsiveness, to relationship satisfaction, we first tested whether perceptions of partner responsiveness predicted relationship satisfaction levels and trajectories. Preliminary analyses examining the effects of perceptions of partner responsiveness on satisfaction levels and slopes indicated no significant gender differences (Santorra-

Bentler Scaled χ^2 (2) = 3.47, p = .176); therefore, we report pooled results. Results indicated that individuals who perceived their partners to be more responsive reported higher relationship satisfaction overall (β =.13, p = .039), and exhibited less of a decline in relationship satisfaction over time (β = .08, p = .012). Post hoc power analyses, assuming a two-tailed significance level of .05, suggested acceptable power for effects on satisfaction levels (1-β = .84) and marginally acceptable power for effects on satisfaction trajectories (1-β = .77).

To test for mediation we combined the models reported previously, regressing perceptions of partner's responsiveness on the partner's S-NA inertia, and regressing relationship satisfaction levels and trajectories on the partner's S-NA inertia and on perceptions of partner's responsiveness. We controlled for S-NA means and *SD*s (simple and squared), along with S-NA inertia. The results are displayed in Table 4, and the indirect effects are illustrated in Figure 4. High or low S-NA inertia was no longer a significant predictor of satisfaction levels (β = -2.38, p = .121) or slopes (β = -.86, p = .331) in this model. Beyond inertia effects and controls, we found no significant association between perceptions of partner's responsiveness and relationship satisfaction levels (β = .08, p = .200). In contrast, perceptions of partner's responsiveness were associated with more stable relationship satisfaction over the subsequent 12 months (β = .08, p = .014). Based on the results of this model, we examined whether a mediational path from partner A's S-NA inertia, via partner B's perceptions of partner's responsiveness, to partner B's relationship satisfaction trajectory was significant. Following an approach proposed by Preacher, Zhang, and Zyphur (2011), results indicated a significant indirect path (β_{ab} = -.69, p = .040), suggesting mediation (see

Figure 4).

To summarize, Study 2 aimed to examine implications of high and low S-NA inertia for relationship functioning. The results suggested that individuals with high and low inertia were perceived by their partners as being less responsive, as compared to individuals with scores in the midrange of S-NA inertia. Furthermore, partners of individuals with high or low S-NA inertia not only perceived them as less responsive, but also showed greater prospective declines in relationship satisfaction. The declines in relationship satisfaction associated with having a partner high or low in emotional inertia were largely explained by perceptions of the partner as less responsive.

Discussion

The current research aimed to deepen our understanding of the role of emotion dynamics in intimate relationship processes. If a core social function of experiencing emotions is to guide individuals' behaviors during social interactions (Keltner & Haidt, 2001), emotions ought to adapt to important interpersonal events or situations (Coifman & Bonanno, 2010a; Kuppens et al., 2010). In intimate couple relationships, appropriate emotional responses can motivate and shape adaptive behaviors when a need for connection or problem-solving is present, and can signal one's willingness to respond and engage in such interactions with the partner (Keltner & Haidt, 2001). The outcomes of such interpersonal situations, whether successful or not, are likely to affect relationship functioning in the long term (Karney & Bradbury, 1995).

We tested these assumptions by first examining whether individual differences in emotional inertia were associated with immediate emotional responses to important interpersonal situations with one's partner (Study 1). Second, we tested whether people

perceived partners' high or low in emotional inertia as less responsive than partners' at intermediate levels of emotional inertia during daily interactions, and whether the partners' emotional inertia predicted stability or change in relationship satisfaction over a one-year period (Study 2). Our research thus sought to trace possible effects of individuals' emotion dynamics on their partners' longer term relationship adjustment, via partners' perceptions of these individuals' daily responsiveness. Because both high and low levels of emotional inertia can undermine adjustment (e.g., Kuppens et al., 2010; Trull et al., 2008), we tested curvilinear effects, expecting that intermediate levels of emotional inertia would be associated with more adaptive patterns of interpersonal experience.

Study 1 revealed that both individuals with high and low emotional inertia were less reactive to conflict with their partners than individuals with scores in the intermediate range. This pattern was consistent across different analytic approaches for S-NA dynamics, and only partially confirmed for PA or H-NA inertia. Additionally, S-NA inert individuals' blunted S-NA responses after intimacy was not confirmed in the sensitivity analysis. In contrast to these findings, we found only a linear cross-sectional association with relationship satisfaction, suggesting that individuals with inert H-NA or S-NA are less satisfied with their relationships.

The results of Study 2 suggest that individual differences in S-NA emotion dynamics indeed appear to translate into less adaptive relationships. Partners of individuals with high or low S-NA inertia described them as less responsive to them (e.g., less understanding, less supportive, less affectionate/caring, less loving) in their daily life, and this lower level of perceptions of responsiveness explained partners' stronger

declines in relationship satisfaction over the subsequent 12 months. Thus, both inert and erratic emotion dynamics seem to undermine individuals' capacity to engage in interpersonal interactions that convey a sense of responsiveness to the partner, which in the long-term, takes a toll on the partners' relationship satisfaction (Kane et al., 2007). The current research corroborates previous findings indicating maladaptive implications of emotional inertia (e.g., Houben et al., 2015) and extends the literature by elucidating the maladaptive impacts of emotional inertia on intimate relationships in particular.

The current study focused on emotional responses to moments of intimacy and conflict, as a correlate of intermediate vs. high or low emotional inertia. However, the data do not allow us to pinpoint the specific mechanisms that explain the effects of individual differences in emotion dynamics. The relatively wide time-scale of our repeated measures leaves open the question of whether we assessed immediate emotional responses to conflict or intimacy, or the emotional fluctuations associated with these events, including the dissipation of positive emotions and the regulation of and recovery from acute negative emotions (see, e.g., Koval, Brose, et al., 2015). In the case of negative emotions, such patterns of recovery are typical for emotional dysregulation: NA reactivity to negative events persists longer in individuals with major depressive disorder as compared to healthy participants (Peeters, Nicolson, Berkhof, Delespaul, & deVries, 2003). In future research, observational approaches and/or more fine-grained assessment approaches of experiential data (e.g., more assessments per day) would be needed to clarify the more specific mechanisms that drive the effects found in the current study.

Although results of Study 1 suggest that the hypothesized context-sensitive emotional responses are shown most clearly by individuals in the midrange of S-NA

inertia, our studies do not offer direct evidence that stronger emotional reactivity to interpersonal situations of adaptive importance contribute to perceptions of responsiveness from one's partner. Prior research has reported a link between expression of negative emotions and relationship closeness (Kashdan, Volkman, Breen, & Han, 2007), and between negative affective reactions in conflict situations and stable levels of relationship satisfaction, but those findings were based upon couples facing severe relationship problems (McNulty & Russell, 2010). Clear negative affective reactions can be understood as alert signals in situations involving threat to the self or the relationship (Fischer & Manstead, 2016) and may be adaptive to the extent that they communicate and raise awareness of the threat to couples and encourage relationship partners to deal with the issues at stake. In line with this idea, recent research based on daily diaries and laboratory data highlights the importance of mutual understanding of partners' affective states, operationalized as empathic accuracy of a partner's negative moods. This work illustrated that higher accuracy of negative moods was related to lower levels of negative feelings within the relationship (Rafaeli, Gadassi, Howland, Boussi, & Lazarus, 2017). Interestingly, elevated depressive symptoms, a correlate of emotional inertia and dysregulation, appear to be associated with low accuracy of negative emotions during conflict interactions and in daily life. This diminished accuracy may explain interpersonal difficulties of depressed individuals (Gadassi, Mor, & Rafaeli, 2011; Papp, Kouros, & Cummings, 2010). Demonstration of a mediational path from high or low levels of emotional inertia, via compromised empathic accuracy and blunted emotional reactivity to daily conflict and tensions, to proximal indicators of responsiveness in interactions, would thus be a promising goal for future studies that could clarify the immediate

maladaptive role of emotional inertia for context-sensitive responses in couple interactions.

The results of Study 2, suggesting that individuals high or low in emotional inertia are perceived by their partners as being less responsive, points to the possibility that these individuals either show less specific positive responses when the partner expects them, or that their responses fail to convey the kind of benevolent concern that would be context-sensitive and perceived as such by the partner. It seems unlikely that individuals high or low in S-NA inertia were simply more distressed or emotionally dysregulated during these daily interactions given that we adjusted for mean levels of and variability in negative affect. In the context of an interaction, emotions assume the function to inform, guide and adjust partners' behavioral responses to each other's demands or concerns (Luginbuehl & Schoebi, 2018). However, it is plausible that if a person's emotion dynamics fail to afford them this guidance, interaction behaviors and affective expressions will be less attuned to a partner's needs and, consequently, contribute to the person being perceived as less responsive (Reis & Gable, 2015). The importance of recognizing and emotionally responding in a context-sensitive manner may be particularly important when it comes to soft emotions such as sadness, worry or anxiety. These types of emotions tend to promote affiliation and connection (Fischer & Manstead, 2016), and thus act as a beneficial factor in couple interactions where sensitivity to a partner's needs and concerns is required. Indeed, along with happiness, soft emotions are reported more often in the context of close interactions and in interactions described as intimate than more distant or less intimate interactions in daily reports (Barrett, Robin, Pietromonaco, & Eyssell, 1998).

Emotional responses, which change contingent on the social context, may serve an important disclosure function in couple interactions. Perceptions of the partner's disclosure of positive and negative emotions, for example, significantly predicted the degree to which married spouses felt understood, cared for, and validated by their partners, independent of their own disclosures (Laurenceau, Barrett, & Rovine, 2005). Social appraisal theory would suggest that interaction partners' emotional responses in particular situations help people derive meaning from those situations (e.g., Parkinson, 2001). A lack of an emotional response to a situation that one considers important for the relationship may lead to perceiving the partner as unresponsive. Individuals may be particularly attuned to their partners' affective responses when affiliation and mutual understanding are pivotal to fulfilling relational goals, such as conflict resolution, provision or receipt of support, or capitalization interactions (e.g., Graber, Laurenceau, Miga, Chango, & Coan, 2011).

Future research may benefit from considering the role of culture in interpersonal emotion dynamics. Culture is a crucial factor that typically shapes the kind of emotional information individuals attend to and whether a particular emotional expression is perceived to be appropriate or not (e.g., Grossmann, Ellsworth, & Hong, 2012). For instance, the perceptions of the acceptability of expressions of anger vary by culture. In cultures that emphasize more independent or individualistic values, such as the United States or Western Europe, expressions of anger are perceived to be acceptable in situations where assertiveness is considered adaptive, whereas in more interdependent cultures such as Japan, the same anger expressions would be perceived as a threat to group harmony (Kitayama, Mesquita, & Karasawa, 2006; Markus & Kitayama, 1991).

Thus, culture may likely be an important moderator of the processes examined in the current study. However, we do not believe that the consideration of culture may necessarily alter the basic importance of emotion dynamics and emotional responses; rather it would likely influence which emotional tones and intensity levels would be considered context sensitive.

Strengths and Limitations

The current research has several strengths. Study 1 involved four weeks of momentary assessments, which allowed us to use separate data to assess emotional inertia while still affording a solid database of repeated measures for examining reactivity to interpersonal events. Study 2 involved both partners of couples with young children and allowed longitudinal predictions of relationship satisfaction. Despite these strengths, several limitations challenge the validity of the current findings. First, our sample in Study 1 is small and included mostly college students, limiting the generalizability of our results to a broader range of individuals and relationships. Study 2 increased the generalizability through the recruitment of a more diverse community sample, but the sample was also not representative of individuals with lower levels of education, severe individual or interpersonal distress, or as discussed in the previous section, individuals from varied cultural contexts.

Another important limitation is that of statistical power. In Study 1, although the effects we found were quite strong and therefore sufficiently powered, effects with more moderate effect sizes may have gone unnoticed. In Study 2, the power to detect for the distal effects of S-NA inertia on relationship satisfaction trajectories was weak. Additionally, as discussed previously, the time lags between repeated measurements in

Study 1 were relatively long and the design to assess reactivity to specific events was relatively crude. Further, we had no information on which partner brought up conflict issues or initiated interactions that gave rise to feelings of intimacy. Without this information, we were restricted in our ability to assess actual emotional reactivity to relational events. It is possible that immediate emotional reactions to conflict dissipated or were downregulated before participants reported relationship tensions or conflict at the next measurement time. Finally, our analyses of relationship satisfaction trajectories in Study 2 were based on only three measurements. Thus, any single measurement of a potentially temporary high or low level of relationship satisfaction may have had a strong influence on the results, possibly limiting the reliability of long-term trends.

Conclusion

Emotional flexibility is essential for both intrapersonal and interpersonal functioning (Houben et al., 2015; Kuppens et al., 2010). Tracking individuals' emotional changes across contextual demands can provide insight into their adaptive or maladaptive response patterns to a variety of situations. The findings reported here suggest that not only high, but also low, emotional inertia may shape individuals' adjustment in their couple relationships. A critical aspect of the interpersonal costs of having high or low emotional inertia is that partners of these individuals perceive them to be less responsive. High or low emotional inertia may therefore compromise individuals' adjustment capacities in critical relational situations, possibly impairing important processes such as providing effective spousal support and processes involved in relationship maintenance. All in all, a lack of context-sensitive emotional responding reflects a key vulnerability factor for relationships under stress.

Table 1. *Prediction of Emotional Reactivity as a Function of Emotional Inertia*

	PA Inertia			S-NA Inertia			H-NA Inertia		
	β	*SE*	95% CI	β	*SE*	95% CI	β	*SE*	95% CI
Conflict partner	-.513**	.155	[-.817,-.209]	.353**	.136	[.085,.620]	.306***	.081	[.146,.465]
Inertia	-.101	.119	[-.336,.133]	-.018	.139	[-.290,.255]	.079	.105	[-.128,.285]
Inertia squared	**.250***	**.107**	**[.040,.461]**	**-.285***	**.128**	**[-.536,-.034]**	**-.266****	**.081**	**[-.425,-.106]**
Variability	1.690	2.513	[-3.465,6.626]	4.331*	1.823	[.751,7.910]	2.159*	1.059	[.079,4.239]
Variability squared	-1.062	1.271	[-3.558,1.434]	-1.527	.974	[-3.441,.387]	-1.592*	.761	[-3.086,-.098]
Mean	-1.069*	.413	[-1.881,-.258]	-1.265	.887	[-3.007,.477]	-1.204	1.037	[-3.241,.833]
Mean squared	.145*	.070	[.008,.282]	.111	.296	[-.472,.693]	2.011*	.959	[.127,3.895]
Frequency	-1.335	1.056	[-3.409,.739]	-1.179	1.214	[-3.563,1.205]	1.830	1.283	[-.689,4.350]
Intimacy partner	.365***	.047	[.272,.458]	-.068**	.020	[-.108,-.134]	-.147***	.027	[-.199,-.095]
Inertia	.052	.045	[-.036,.139]	.093**	.030	[.034,.151]	.017	.021	[-.023,.058]
Inertia squared	.035	.042	[-.048,.118]	.017	.027	[-.036,.070]	.003	.022	[-.040,.047]
Variability	-1.341	.939	[-3.184,.503]	.157	.303	[-.438,.753]	.283	.354	[-.411,.978]
Variability squared	.796†	.394	[.021,1.570]	-.548†	.281	[-1.099,.004]	-.203	.275	[-.744,.338]
Mean	-.231	.228	[-.679,.217]	-.040	.271	[-.572,.492]	-.608	.454	[-1.500,.284]
Mean squared	.023	.031	[-.038,.085]	.061	.094	[-.124,.246]	.204	.467	[-.713,1.121]
Frequency	.006	.267	[-.518,.530]	-.087	.110	[-.303,.128]	-.332	.271	[-.863,.200]

Note. $N = 44$ participants. PA = positive affect; S-NA = soft negative affect; H-NA = hard negative affect; CI = confidence interval. †$p < .10$ * $p < .05$. **$p < .01$. *** $p < .001$.

Table 2. *Sensitivity Analysis*

	PA Inertia			S-NA Inertia			H-NA Inertia		
	β	*SE*	95%CI	β	*SE*	95%CI	β	*SE*	95%CI
Conflict partner	-.448*	.178	[-.798,-.099]	.225***	.058	[.110,.339]	.452***	.088	[.279,.624]
Inertia	-.087	.199	[-.479,.304]	.063	.071	[-.076,.203]	-.079	.167	[-.406,.248]
Inertia squared	-.043	.082	[-.204,.118]	**-.246****	**.073**	**[-.390,-.102]**	.041	.044	[-.046,.128]
Variability	-1.223	2.727	[-6.578,4.132]	.391	.459	[-.511,1.293]	.740	1.114	[-1.449,2.928]
Variability squared	.537	.974	[-1.375,2.450]	-.651**	.262	[-1.165,-.138]	-.325	.714	[-1.727,1.078]
Mean	-.100	.889	[-1.846,1.646]	1.130**	.351	[.442,1.819]	-.379	1.629	[-3.578,2.821]
Mean squared	.022	.121	[-.215,.259]	-.427**	.126	[-.673,-.180]	.215	.647	[-1.057,1.486]
Frequency	.885	2.119	[-3.278,5.048]	-.711	.628	[-1.943,.522]	2.524†	1.310	[-.050,5.097]
Intimacy partner	.453***	.074	[.307,.599]	-.107***	.026	[-.159,-.056]	-.201***	.030	[-.260,-.142]
Inertia	.073	.086	[-.096,.243]	.068	.045	[-.021,.157]	.026	.075	[-.121,.173]
Inertia squared	-.029	.036	[-.100,.042]	-.055**	.019	[-.091,-.018]	-.029†	.017	[-.063,.005]
Variability	3.379**	1.267	[.890,5.869]	-.004	.347	[-.686,.678]	.650†	.341	[-.020,1.321]
Variability squared	-1.317*	.523	[-2.345,-.289]	-.258	.186	[-.623,.107]	.031	.226	[-.413,.475]
Mean	.378	.318	[-.246,1.002]	-.266	.270	[-.797,.264]	-1.691**	.611	[-2.891,-.491]
Mean squared	-.065	.044	[-.152,.021]	.180†	.103	[-.022,.382]	.793**	.256	[.290,1.297]
Frequency	.750	.469	[-.170,1.670]	.186	.165	[-.138,.510]	-.173	.199	[-.563,.218]

Note. $N = 44$ participants. PA = positive affect; S-NA = soft negative affect; H-NA = hard negative affect; CI = confidence interval. †$p < .10$ * $p < .05$. **$p < .01$. *** $p < .001$.

Table 3. *Prediction of Relationship Satisfaction Levels and Trajectories as a Function of Partner S-NA Inertia*

Predictor	β	*SE*	*p*	95% CI *LL*	95% CI *UL*
Relationship satisfaction levels (main effects)					
Partners‘ S-NA inertia	.378	.357	.290	-.322	1.077
Partners’ S-NA inertia squared	-2.674†	1.479	.071	-5.574	.226
Relationship satisfaction trajectories (time slopes)					
Partners‘ S-NA inertia	-.223	.210	.288	-.635	.189
Partners’ S-NA inertia squared	**-1.666***	**.762**	**.029**	**-3.160**	**-.173**
Control variables					
Men’s relationship satisfaction levels (main effects)					
Women’s S-NA variability	-.714†	.407	.079	-1.512	.083
Women’s S-NA variability squared	1.893**	.567	.001	.782	3.004
Women’s S-NA mean	.752†	.389	.053	-.010	1.514
Women’s S-NA mean squared	-.948**	.307	.002	-1.550	-.346
Men’s relationship satisfaction trajectories (time slopes)					
Women’s S-NA variability	.155	.266	.561	-.367	.676
Women’s S-NA variability squared	.371	.447	.407	-.505	1.247
Women’s S-NA mean	-.002	.214	.994	-.420	.417
Women’s S-NA mean squared	-.122	.193	.528	-.501	.257
Women’s relationship satisfaction levels (main effects)					
Men’s S-NA variability	-.158	.391	.687	-.925	.610
Men’s S-NA variability squared	.460	.720	.523	-.952	1.872
Men’s S-NA mean	.106	.293	.718	-.469	.681
Men’s S-NA mean squared	-.300	.211	.155	-.714	.113
Women’s relationship satisfaction trajectories (time slopes)					
Men’s S-NA variability	-.206	.263	.433	-.721	.309
Men’s S-NA variability squared	.331	.523	.526	-.693	1.356
Men’s S-NA mean	.321	.203	.114	-.077	.718
Men’s S-NA mean squared	-.221	.146	.130	-.507	.065

Note. $N = 103$ couples. CI = confidence interval; *LL* = lower limit; *UL* = upper limit.
†$p < .10$ * $p < .05$. **$p < .01$.

Table 4. *Prediction of Relationship Satisfaction Levels and Trajectories as a Function of Partner S-NA Inertia and Perceptions of Partner Responsiveness*

Predictor	β	*SE*	*p*	95% CI *LL*	95% CI *UL*
Relationship satisfaction levels (main effects)					
Partners' S-NA inertia	.423	.390	.278	-.341	1.187
Partners' S-NA inertia squared	-2.380	1.533	.121	-5.385	.625
Perceptions of partner responsiveness	.083	.065	.200	-.044	.211
Relationship satisfaction trajectories (time slopes)					
Partners' S-NA inertia	-.350	.228	.124	-.796	.096
Partners' S-NA inertia squared	-.863	.888	.331	-2.603	.877
Perceptions of partner responsiveness	**.077****	**.031**	**.014**	**.016**	**.139**
Perceptions of partner responsiveness					
Partners' S-NA inertia	1.111*	.555	.045	.024	2.198
Partners' S-NA inertia squared	**-8.959*****	**2.345**	**.000**	**-13.555**	**-4.362**
Control variables					
Men's relationship satisfaction levels (main effects)					
Women's S-NA variability	-.596	.408	.144	-1.396	.204
Women's S-NA variability squared	1.810**	.592	.002	.650	2.971
Women's S-NA mean	.563	.373	.131	-.167	1.293
Women's S-NA mean squared	-.762**	.302	.012	-1.355	-0.169
Men's relationship satisfaction trajectories (time slopes)					
Women's S-NA variability	.179	.253	.478	-.316	.675
Women's S-NA variability squared	.188	.442	.671	-.678	1.054
Women's S-NA mean	-.097	.205	.637	-.500	.306
Women's S-NA mean squared	-.005	.183	.977	-.364	.354
Men's perceptions of partner responsiveness					
Women's S-NA variability	-.089	.673	.894	-1.408	1.229
Women's S-NA variability squared	1.887*	.952	.047	.022	3.752
Women's S-NA mean	1.109†	.609	.069	-.085	2.302
Women's S-NA mean squared	-1.474**	.513	.004	-2.479	-.469
Women's relationship satisfaction levels (main effects)					
Men's S-NA variability	.047	.399	.906	-.735	.830
Men's S-NA variability squared	.224	.676	.741	-1.102	1.549
Men's S-NA mean	-.071	.297	.810	-.654	.511
Men's S-NA mean squared	-.150	.219	.494	-.578	.279
Women's relationship satisfaction trajectories (time slopes)					
Men's S-NA variability	-.240	.259	.354	-.747	.267
Men's S-NA variability squared	.404	.509	.427	-.594	1.402
Men's S-NA mean	.323	.199	.104	-.067	.714
Men's S-NA mean squared	-.183	.139	.190	-.455	.090
Women's perceptions of partner responsiveness					
Men's S-NA variability	-.262	.732	.721	-1.696	1.173
Men's S-NA variability squared	-.331	1.080	.759	-2.447	1.785
Men's S-NA mean	.515	.573	.369	-.608	1.638
Men's S-NA mean squared	-.820†	.422	.052	-1.648	.008

Note. $N = 103$ couples. CI = confidence interval; *LL* = lower limit; *UL* = upper limit.
†$p < .10$ * $p < .05$. **$p < .01$. *** $p < .001$.

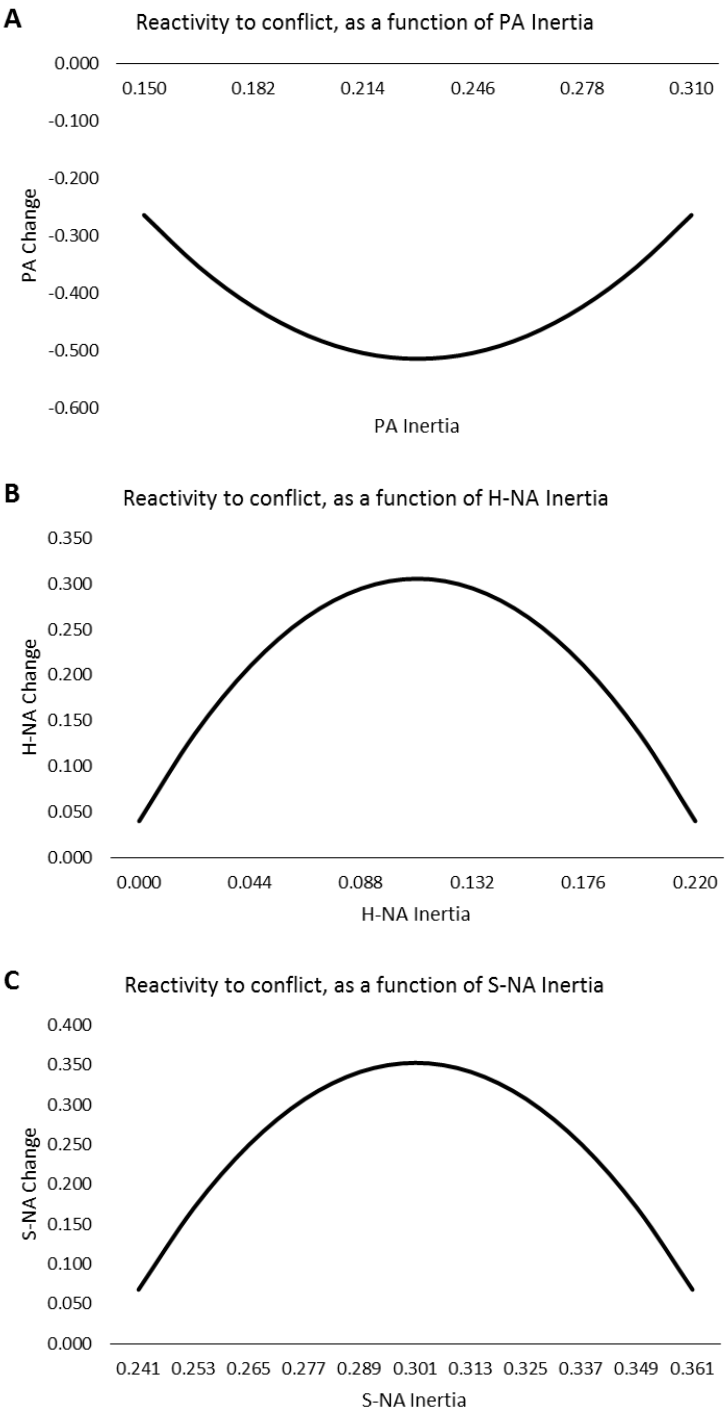

Figure 1. Curvilinear associations between emotional inertia and emotional reactivity to conflict. The x-axis reflects the mean +/- 1*SD* of emotional inertia.

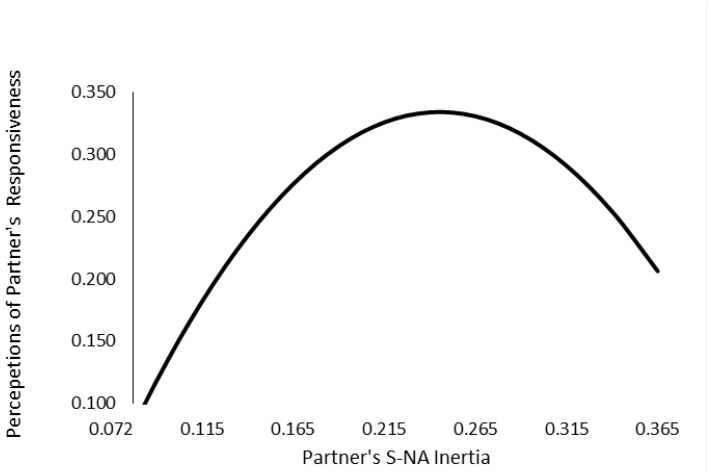

Figure 2. Partner's soft negative affect (S-NA) inertia as predictor of perceptions of partner's responsiveness. The x-axis reflects the mean +/- 1*SD* of emotional inertia.

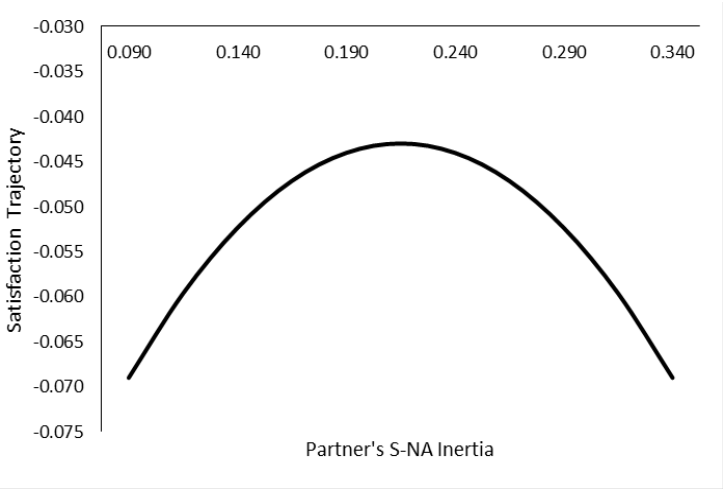

Figure 3. Satisfaction trajectories as a function of partner's soft negative affect (S-NA) inertia. The x-axis reflects the mean +/- 1*SD* of emotional inertia.

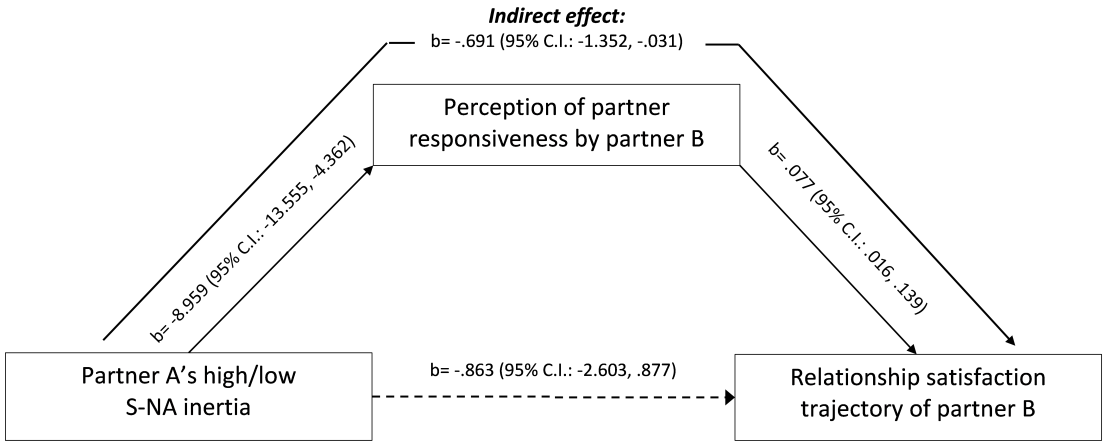

Figure 4. Partner A's high or low soft negative affect (S-NA) inertia predicting partner B's relationship satisfaction trajectory via partner B's perceptions of partner responsiveness.

8. Study III: Emotional Inertia in Daily Life and Reciprocity of Facial Expressions of Emotions in Couple Interactions[6]

Abstract

Emotional inertia, defined as the degree to which emotions are resistant to change (Kuppens, Allen, & Sheeber, 2010) can affect individual and relational functioning. The current study aimed to explore whether emotional inertia is associated with emotional response patterns in couple support interactions that are predictive of relationship dysfunction. Individual differences in emotional inertia of 134 individuals (n=67 couples) were captured using a smartphone-based ambulatory assessment with four daily emotional self-reports across two weeks. Emotions in couple interactions were operationalized through reciprocity of facial expressions of emotions during videotaped social support interactions in the laboratory. Facial expressions of emotions were analyzed with the facial expression recognition and analysis software FACET (iMotions, 2015). The results suggested that men helpers with extreme levels of emotional inertia, either high or low, displayed less reciprocity of facial expressions of positive affect but greater reciprocity of hard negative affect when they were offering support to their female partners. Women helpers with high levels of emotional inertia displayed greater facial expression reciprocity of hard negative affect. Men and women helpers with high levels of emotional inertia displayed less reciprocity of facial expressions of soft negative affect. Taken together, emotional inertia seems to be associated with higher susceptibility to non-affiliative emotional expressions (hard negative affect), but lower susceptibility to affiliative emotional expressions (positive affect, soft negative affect).

[6] Citation: Luginbuehl, T., Goh, P. H., Meuwly, N., Randall, A.K, & Schoebi, D. (submitted). Emotion dynamics in daily life and reciprocity of facial expressions of emotions in couple interactions.

Emotional inertia in daily life and reciprocity of facial expressions of emotions in couple interactions

The emotions we feel are akin to an inner compass that guides our behavior in response to opportunities and challenges in our environment (Ekman, 1992; Planalp, Fitness, & Fehr, 2006). Emotions also help us to navigate our social world (Frith, 2009; Luginbuehl & Schoebi, 2018), which is probably one of the reasons why they are expressed on our faces (Van Kleef, Van Doorn, Heerdink, & Koning, 2011). Not only do facial expressions of emotions convey our subjective feelings (Horstmann, 2003), these expressions have an important communicative function (Schmidt & Cohn, 2001) as suggested by studies demonstrating that in social contexts people show more intense smiles (Gehricke & Shapiro, 2000), and expressions of disgust (Jäncke & Kaufmann, 1994) than when alone. As Hess and Fischer (2013) posit, individuals do not merely see the contractions of their interaction partners' facial muscles but perceive and interpret these movements as emotional signals in the specific context. These perceptions activate behavioral tendencies (Keltner & Haidt, 2001). For example, facial expressions of sadness increase prosocial behaviors in perceivers (e.g., support, cooperation, appeasement) and thus serve affiliation goals, whereas anger stands for resistance and opposition, and generates distance between interaction partners (e.g., withdrawal, moving back) (Fischer & Manstead, 2016; Marsh, Ambady, & Kleck, 2005; Roseman, Wiest, & Swartz, 1994; Sanford, 2007; Schoebi, 2008). How individuals respond to each other's facial expressions of emotions has been found to be associated with the quality of their relationships (e.g., Burgeois & Hess, 2008; Stel & Vonk, 2010). For example,

experimental research has demonstrated that reciprocating facial expressions of joy promotes feelings of liking and closeness in both interaction partners (Stel & Vonk, 2010).

In the current research, we examined the dynamic patterns of couples' facial expressions of emotions in the context of a social support interaction. In this study we use the term *reciprocity of facial expressions of emotions* to describe helper's equivalent facial expressions of emotions in response to the helpee's facial expressions of emotions. Because of the behavior-guiding function of emotions (e.g., Keltner & Haidt, 2001; Planalp et al., 2006), the degree to which one's *subjective* experiences of emotions fluctuate over time may shape how an individual responds to his interaction partner facial expressions of emotions. Previous studies have demonstrated the maladaptive implications of an inert emotion dynamics for individual and relationship functioning (e.g., Houben, Van den Noortgate, & Kuppens, 2015; Kuppens et al., 2010; Luginbuehl & Schoebi, in press). The current study examined whether high or low levels of emotional inertia are associated with lower reciprocity of facial expressions of affiliative emotions (such as joy, sadness or fear) but greater reciprocity of non-affiliative emotions (such as anger or contempt) during social support interactions between romantic partners.

In the remainder of the introduction we first discuss the functionality of facial expressions of emotions in interpersonal interactions. We then give examples of adaptive and maladaptive emotion dynamics within couples, focusing on social support interactions in particular, and then introduce the concept of emotional inertia along with empirical findings regarding its significance for individual and interpersonal adjustment.

Emotion Reciprocity in Intimate Relationships

Intimate partners are likely to share both positive and negative experiences with their partner. Research on social capitalization has found that the expression of positive emotions in response to a partner sharing a positive event, has beneficial intrapersonal and interpersonal effects such as higher well-being, self-esteem, relationship quality, and intimacy (Gable, Gonzaga, & Strachman, 2006; Gable, Reis, Impett, & Asher, 2004). However, the current literature does not provide conclusive evidence on whether or not fear and sadness -- emotions also considered to serve an affiliation function (Fischer & Manstead, 2016) -- tend to be reciprocated in interactions (Hess & Fischer, 2013, 2014). Scholars examining the social role of facial expressions of emotions suggest that smiles are very likely to be reciprocated because they do not require any action from the perceiver, whereas facial expressions of sadness and fear are less likely to be reciprocated because they may be costly for the perceiver, involving requests for support from the discloser (Hess & Fischer, 2013, 2014). Reciprocation of facial expressions of sadness communicates a shared emotional perspective of the interaction partner's disclosure and may thus convey that one is available as source of support (Burgeois & Hess, 2008; Cutrona & Russel, 2017; Hess & Fischer, 2013). However, requests for support may not be considered as costly in relationships where individuals feel a sense of obligation for the other's needs and desires, such as in intimate relationships (Clark, Fitness, & Brisette, 2001). In the realm of intimate relationships the emotions of sadness and fear are often referred to as soft negative affect (S-NA), because they signal vulnerability and are thought to foster supportive and cooperative behavior from the intimate partner (e.g., Sanford, 2007; Schoebi, 2008). An intimate partner's facial expressions of S-NA

therefore create opportunities for one to respond or tend to the needs of the partner. A certain degree of reciprocity from the partner may thus be necessary to convey understanding of the discloser's need or concern. However, another possible perspective would be that synchronous emotional responses of *lower* magnitude, in other words, less facial expressions of sadness (or fear) are necessary to downregulate the interaction partner's expressions of sadness (or fear) (Luginbuehl & Schoebi, 2018), and to provide an emotional safety net for the disclosing partner. If partner A expresses sadness and partner B responds showing his vulnerability by displaying the same level of sadness, he may not convey to partner A that he or she is in an emotional state to provide sufficient or effective social support.

Emotions of anger and contempt are often referred to as hard negative affect (H-NA) because they signal resistance and opposition, and are associated with power and control-oriented behaviors (e.g., Fischer & Manstead, 2016; Sanford, 2007; Schoebi, 2008). Anger tends to be expressed to coerce change in another person's behavior (Fischer & Roseman, 2007) and signals to the perceiver that he or she may be subject to confrontative behaviors (Horstmann, 2003). Reciprocation of facial expressions of anger bears the risk of ending up in a pattern of negative affect reciprocity (Gottman, 1979). Dissatisfied couples and couples heading toward divorce are especially prone to experience escalations in negative affect in response to each other's negative affect displays (Gottman, Coan, Carrere, & Swanson, 1998; Gottman & Notarius, 2002; Gottman & Levenson, 1986).

Taken together, previous studies suggest that the reciprocation of facial expressions of positive emotions may be beneficial to relationships (Gable et al., 2004,

2006), whereas the reciprocation of H-NA is detrimental (e.g., Gottman et al., 1998). However, current research does not allow for clear conclusions about the implications of S-NA reciprocation for relationship functioning. Because emotional experiences affect an individual's behavior (e.g., Ekman, 1992; Planalp et al., 2006), the way one responds to the partner's emotional signals when he discloses a personal problem may thus be driven by one's level of emotional inertia.

Emotion Dynamics and Facial Expressions of Emotions

Emotions are dynamic; they change in intensity and valence as a function of time. *Emotional inertia*, reflects the degree to which emotions are resistant to change over time (Kuppens et al., 2010) and tends to be operationalized using autocorrelations of repeated emotion reports over time (e.g., Koval & Kuppens, 2012; Kuppens et al., 2010; Suls, Green, & Hillis, 1998). High levels of emotional inertia (or strong autocorrelations) reflect a tendency of one's emotions to be more predictable from one moment to the next, a pattern associated with poor psychological adjustment (e.g., depressive symptoms, neuroticism, low self-esteem, fear of negative evaluation; Brose, Schmiedeck, Koval, & Kuppens, 2015; Kuppens et al., 2010; Suls et al., 1998). Conversely, low levels of emotional inertia (or weak autocorrelations) reflect quickly fluctuating emotions with weak temporal dependence, an emotion pattern that has also been associated with psychological maladjustment (e.g., borderline personality disorder, attention deficit hyperactivity disorder, posttraumatic stress disorder, and bulimia; Ebner-Priemer et al., 2007; Philipsen, 2006; Santangelo et al., 2014; Skirrow & Asherson, 2013).

A previous study found individuals high or low in emotional inertia to report reduced context-sensitive responses in daily life, defined by a lack of increase in H-NA

(emotions that serve to assert oneself) and S-NA (emotions encouraging the partner to offer comforting and cooperative behavior) and lack of decrease in PA after conflict, whereas individuals with scores in the intermediate range reported increased emotional reactivity to conflict (Luginbuehl & Schoebi, in press). Furthermore, compared to partners of individuals with intermediate levels of emotional inertia, partners of individuals with high or low levels of emotional inertia were perceived as behaving in less responsive ways during their daily interactions together (e.g., as less understanding, less supportive, less affectionate/caring, and less loving), and these perceptions of the partner's responsiveness foreshadowed declines in relationship satisfaction over the subsequent 12 months.

Taken together, recent evidence suggests that high and possibly low emotional inertia may interfere with the social functional approach of emotional expressions (Keltner & Gross, 1999; Keltner & Haidt, 2001), impeding its function of shaping one's behaviors in adaptive ways, and probably undermining relationship satisfaction in the long term.

Social Support Interactions and Relationship Functioning

Individuals tend to disclose negative emotional experiences (e.g., sadness, shame) to people to whom they feel emotionally close (Rimé, Philippot, Boca, & Mesquita, 1992). Intimate partners are an important resource for coping with stressors and the related negative feelings (for a review see Luginbuehl & Schoebi, 2018). How romantic partners' support each other is associated with couples' level of intimacy (Manne & Badr, 2008) and marital functioning (Dehle, Larsen, & Landers, 2001; Pasch & Bradbury, 1998; Sullivan, Pasch, Eldridge, & Bradbury, 1998). Responsive behavior, defined as

behaviors that convey to the partner that he is understood, validated, and cared for, favors affiliation between intimate partners' (Laurenceau, Barrett, & Pietromonaco, 1998; Laurenceau, Barrett, & Rovine, 2005; Manne et al., 2004; Reis, 2014; Reis & Gable, 2015; Reis & Shaver, 1988). This probably requires the helper to react to the helpee's problem disclosure with facial expressions of emotions that foster affiliation between romantic partners such as PA or S-NA. Facial expressions of non-affiliative emotions, such as H-NA may undermine affiliation, and create distance between romantic partners.

Taken together, responsive behaviors are especially important when a partner is in need of help, thus social support interactions fulfill a central role in intimate relationships, which may be in danger by extreme emotion dynamics such as high and low levels of emotional inertia.

Overview of the Current Study

The current study examined whether an individual's level of emotional inertia moderates the degree of reciprocity of facial expressions of emotions during a social support interaction in the laboratory. Based upon prior work (Luginbuehl & Schoebi, in press) that implies that high and low levels of emotional inertia are associated with behaviors during couple interactions that fail to convey to the partner a sense of being understood, validated, and cared for (perceived responsiveness; Laurenceau, Barrett, & Pietromonaco, 1998; Reis, 2014), we expected helpers with high and low levels of emotional inertia to display less reciprocity of the helpee's affiliative facial expressions of emotions but greater reciprocity of the helpee's non-affiliative facial expressions of emotions. Thus we hypothesized that helpers with high and low levels of emotional inertia would display (1) less reciprocity of facial expressions of (1) PA and (2) S-NA,

while individuals with moderate levels of emotional inertia would show greater reciprocity, and (3) greater reciprocity of H-NA, while individuals with moderate levels of emotional inertia would show less reciprocity.

Method

Participants

Participants were recruited as couples in a committed relationship through mailing lists of all academic disciplines from a University in Switzerland, flyer distributions and word-of-mouth advertising. The study included a sample of 67 heterosexual couples (N = 134 individuals). The age of female partners ranged from 18 to 57 years (M = 23.50, SD = 7.00), while male partners were aged between 19 to 58 years (M = 25.90, SD = 7.40). Couples' average relationship duration was 2.7 years (SD = 2.1).

Procedure

The data for this study was collected in three parts. (1) Participants first completed a baseline questionnaire followed by (2) a smartphone-based ambulatory assessment (Samsung Galaxy Note II GT-N7100) with four assessments per day (upon awakening, 12pm, 6pm, before bed) over the course of two weeks. During an introduction session, the participants completed a trial run to get used to the smartphones and could ask clarification questions. Participants were instructed not to provide retrospective reports if they missed a time point. After the two-week ambulatory assessment period, participants were (3) invited to participate in a videotaped interaction task. The task consisted of a slightly modified version of the social support paradigm (Bradbury & Pasch, 1994). Each partner was asked to identify three things he or she wanted to change about himself or herself (e.g., personality, appearance, career) and to rank them according to personal

relevance. Participants were then randomly assigned to take on the roles of a "helpee" and a "helper". The "helpee" disclosed and discussed the topic that was most important to him or her. The "helper" was asked to be involved in the interaction and respond to the partner as he or she would under normal circumstances. Couples were asked to continue discussing the helpee's second and third topic (1) if they had nothing more to discuss on the first topic or (2) if couples noticed that the topic under discussion was not a personal issue but rather a source of conflict in their relationship. It was left to the participants to decide whether they wanted to talk only about the most relevant personal issue or about all of the topics. After seven minutes, participants switched roles (i.e., "helper" became the "helpee" and vice versa) and engaged in another seven-minute interaction. Common topics that intimate partners' chose included losing weight, exercise more, eating healthier, dealing with stress, and defining professional goals and options. Upon completion of the study, participants either received a small monetary compensation equivalent to $50 or course credit for their participation.

Measures

Emotional inertia in daily life. Emotional inertia was assessed by participants ratings of the degree to which they were currently feeling "depressed", "lonely", and "worried/fearful", using a continuous slider on a 6-point scale ranging from 1 (*not at all*) to 6 (*extremely*) in the daily diaries. We averaged these items to form a S-NA inertia score[7]. Emotional inertia was calculated as first order autocorrelation of S-NA across time using multilevel regression analyses (see below).

[7] For the sake of parsimony and because in a previous study we found the most consistent results for SNA-inertia (Luginbuehl & Schoebi, in press) we focused on inertia in SNA.

Facial expressions of emotions in the support interaction. Facial expressions are produced by contractions of single or combinations of facial muscles, termed action units (AUs). Anger, for example, is computed as the combination of action units 4 (brow lowerer) and 5 (upper lid raiser) and 7 (lid tightener) and 23 (lip tightener). We imported the video recordings of each social support interaction into FACET 2.1 SDK, an automated facial coding software that detects and analyzes facial expressions in real time. FACET compares the subject's current facial expression of emotion (e.g., joy) with the "ideal" facial expression of that emotion, using large picture and video repositories and databases (iMotions, 2015; Fasel & Luettin, 2003). It has been shown that FACET codings are equally reliable as human raters using the Facial Action Coding System (FACS) (Terzis, Moridis, & Economides, 2010), with the advantage of being less time consuming. We controlled for the subject's baseline facial expression of emotion because an individual's physiognomy can have features that slightly resemble one of the emotional categories (Olderbak, Hildebrandt, Pinkpank, Sommer, & Wilhelm, 2014).

PA was based facial expressions of joy. We averaged the facial expressions of sadness and fear to form expressions of S-NA. The facial expressions of anger and contempt were averaged to form a measure of H-NA. We discriminated between these forms of negative affect because as mentioned above these emotions assume very different social functions (e.g., Sanford, 2007; Schoebi, 2008).

We then aggregated the data into sequences of three seconds using a maximum score. FACET analyzes 30 frames per second, thus the maximum score within a three-second segment captures the highest value of a facial expression of emotions within 90 frames. Facial expression reciprocity was then operationalized as the helper (or support

provider) responding with equivalent facial expressions of emotions as the helpee (or support receiver, e.g., helpee's intensity of joy is followed by a helper's joy expressions of similar intensity; see equation 2a).

Data Analysis

Emotional inertia in daily life. To create a composite score of emotional inertia, we first examined within-person autocorrelations by regressing the current emotional state onto the prior emotional state in a multilevel framework using HLM 7.01 (Raudenbush, Bryk, & Congdon, 2011). The Level-1 equation was as follows:

$$SNA_{ti} = \pi_{0i} + \pi_{1i}(SNA_{t\text{-}1i}) + \pi_{2i}(\text{time}) + e_{ti} \quad (1a)$$

SNA_{ti} denotes person *i*'s current emotional state at time *t,* which is modeled by the slope π_{1i} representing inertia or the extent to which the current emotional state is predicted by the same emotional state at the previous time point ($SNA_{t\text{-}1i}$), adjusted for the intercept π_{0i}, that reflects person *i*'s mean level of emotion. We included time π_{2i} as a covariate in the model, to adjust for linear time trends. The error term e_{ti} captures the residual variance at Level-1. The Level-2 equations were unconditional:

$$\pi_{0i} = \beta_{00} + u_{0i}$$

$$\pi_{1i} = \beta_{10} + u_{1i}$$

$$\pi_{2i} = \beta_{20} + u_{2i} \quad (1b)$$

The estimate β_{00} represents the overall intercept and β_{10} the emotional inertia estimate for the total sample. Intercepts and slopes were allowed to vary across participants, and the residual variance component u_{0i} captures individuals' deviation of

the sample intercept, whereas u_{1i} reflects random variation in individuals' autocorrelation, and thus, individual differences in inertia.

Reciprocity of facial expressions of emotions. We then set up another model that would allow us to examine the link between emotional inertia, measured in the daily diaries, and reciprocity of facial expressions of emotions during the laboratory task. Repeated measurements were specified at Level-1, with each of the partner obtaining a separate set of parameters. The Level-1 equation examined helpers' change in facial expressions of emotions in response to helpees' facial expressions of emotions. We then included the emotional inertia estimates of the helper in Level-2 to model its between person effect, respectively to examine whether helpers with high or low levels of emotional inertia display more or less reciprocity of helpees' facial expressions of emotions. The Level-1 equation was as follows[8]:

$$\text{PAhelper}_{ti} = \pi_{1i}(\text{female\_helper}_{ti}) + \pi_{2i}(\text{male\_helper}_{ti}) + \pi_{3i}(\text{femalePAhelpee}_{t\text{-}1i}) + \pi_{4i}(\text{malePAhelpee}_{t\text{-}1i}) + \pi_{5i}(\text{femaleS-NAhelpee}_{t\text{-}1i}) + \pi_{6i}(\text{maleS-NAhelpee}_{t\text{-}1i}) + \pi_{7i}(\text{femaleH-NAhelpee}_{t\text{-}1i}) + \pi_{8i}(\text{maleH-NAhelpee}_{t\text{-}1i}) + \pi_{9i}(\text{femalePAhelper}_{t\text{-}1i}) + \pi_{10i}(\text{malePAhelper}_{t\text{-}1i}) + e_{ti} \quad (2a)$$

PAhelper_{ti} denotes a particular female or male helpers i's PA expression at time t. Intercepts are estimated for the female (π_{1i}) and male helpers (π_{2i}), capturing female or male helpers' average PA expressions. The estimate π_{3i} reflects the extent to which female helpees' PA expression at the previous moment covaried with the male helpers' current PA expression. More specifically, it indicates whether helpees' most intense facial expression of PA within a 3-s segment (maximum value) predicts helpers' intensity

8 an equivalent model was run for S-NA and H-NA.

of PA expressions within 6 seconds (maximum value)[9].

Similarly, the estimate π_{4i} reflects the extent to which female helpees' previous PA expression covaried with male helpers' current PA expression. In the model, we controlled for female and male helpees' facial expression of S-NA (π_{5i} respectively π_{6i}) and H-NA (π_{7i} respectively π_{8i}) at the previous moment. To ensure that we captured helper's change in PA expressions based on his or her partner's PA expression, we further controlled for helper's own PA expression at the previous moment as reflected in the estimates π_{9i} and π_{10i}. At Level-2 we tested whether helper's reciprocity of facial expression of emotion varied as a function of helper's emotional inertia. The equation modeling the between-person effect of emotional inertia was as follows:

$$\pi_{3i}\,(\text{femalePAhelpee}_{t\text{-}1i}) = \beta_{30} + \beta_{31}\,(\text{maleS-NAmean}) + \beta_{32}\,(\text{maleS-NAsd}) + \beta_{33}\,(\text{maleS-NAinertia}) + \beta_{34}\,(\text{maleS-NAmean}^2) + \beta_{35}\,(\text{maleS-NAsd}^2) + \beta_{36}\,(\text{maleS-NAinertia}^2) + u_{3i} \quad (2b)$$

For the sake of parsimony, we present only female's helpees' PA equation at Level-2[10]; an equivalent equation was tested for men. The estimate β_{36} reflects squared

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9 using the mean value instead of the maximum value of emotional expression within the segment led to similar results and also using prospective effects of 3-sec segments led to similar results

10 Full Level-2 equation: $\pi_{1i} = \beta_{10} + \beta_{11}\,(\text{maleS-NAmean}) + \beta_{12}\,(\text{maleS-NAsd}) + \beta_{13}\,(\text{maleS-NAinertia}) + \beta_{14}\,(\text{maleS-NAmean}^2) + \beta_{15}\,(\text{maleS-NAsd}^2) + \beta_{16}\,(\text{maleS-NAinertia}^2) + u_{1i}$

$\pi_{2i} = \beta_{20} + \beta_{21}\,(\text{femaleS-NAmean}) + \beta_{22}\,(\text{femaleS-NAsd}) + \beta_{23}\,(\text{femaleS-NAinertia}) + \beta_{24}\,(\text{femaleS-NAmean}^2) + \beta_{25}\,(\text{femaleS-NAsd}^2) + \beta_{26}\,(\text{femaleS-NAinertia}^2) + u_{2i}$

$\pi_{3i} = \beta_{30} + \beta_{31}\,(\text{maleS-NAmean}) + \beta_{32}\,(\text{maleS-NAsd}) + \beta_{33}\,(\text{maleS-NAinertia}) + \beta_{34}\,(\text{maleS-NAmean}^2) + \beta_{35}\,(\text{maleS-NAsd}^2) + \beta_{36}\,(\text{maleS-NAinertia}^2) + u_{3i}$

$\pi_{4i} = \beta_{40} + \beta_{41}\,(\text{femaleS-NAmean}) + \beta_{42}\,(\text{femaleS-NAsd}) + \beta_{43}\,(\text{femaleS-NAinertia}) + \beta_{44}\,(\text{femaleS-NAmean}^2) + \beta_{45}\,(\text{femaleS-NAsd}^2) + \beta_{46}\,(\text{femaleS-NAinertia}^2) + u_{4i}$

$\pi_{5i} = \beta_{50} + \beta_{51}\,(\text{maleS-NAmean}) + \beta_{52}\,(\text{maleS-NAsd}) + \beta_{53}\,(\text{maleS-NAinertia}) + \beta_{54}\,(\text{maleS-NAmean}^2) + \beta_{55}\,(\text{maleS-NAsd}^2) + \beta_{56}\,(\text{maleS-NAinertia}^2) + u_{5i}$

$\pi_{6i} = \beta_{60} + \beta_{61}\,(\text{femaleS-NAmean}) + \beta_{62}\,(\text{femaleS-NAsd}) + \beta_{63}\,(\text{femaleS-NAinertia}) + \beta_{64}\,(\text{femaleS-NAmean}^2) + \beta_{65}\,(\text{femaleS-NAsd}^2) + \beta_{66}\,(\text{femaleS-NAinertia}^2) + u_{6i}$

$\pi_{7i} = \beta_{70} + \beta_{71}\,(\text{maleS-NAmean}) + \beta_{72}\,(\text{maleS-NAsd}) + \beta_{73}\,(\text{maleS-NAinertia}) + \beta_{74}\,(\text{maleS-NAmean}^2) + \beta_{75}\,(\text{maleS-NAsd}^2) + \beta_{76}\,(\text{maleS-NAinertia}^2) + u_{7i}$

$\pi_{8i} = \beta_{80} + \beta_{81}\,(\text{femaleS-NAmean}) + \beta_{82}\,(\text{femaleS-NAsd}) + \beta_{83}\,(\text{femaleS-NAinertia}) + \beta_{84}\,(\text{femaleS-NAmean}^2) + \beta_{85}\,(\text{femaleS-NAsd}^2) + \beta_{86}\,(\text{femaleS-NAinertia}^2) + u_{8i}$

$\pi_{9i} = \beta_{90} + u_{9i}$

$\pi_{10i} = \beta_{100} + u_{10i}$

emotional inertia and indicates whether the emotional inertia of male helpers predicts the extent to which his facial expressions increase or decrease as a function of the helpee's facial expression of emotions (a curvilinear relationship). We also included the estimate β_{33}, reflecting the linear component of S-NA inertia. The magnitude of emotional change was controlled for males mean level of soft negative affect (β_{31}), *SD* (β_{32}) and their squared terms (β_{34} respectively β_{35}). All predictors were entered person-mean centered.

Results

Less reciprocity of helpees' facial expressions of PA was found among men helpers with high and low levels of emotional inertia; however, this pattern was not significant for woman helpers (see Table 1). Women and men helpers with high levels of emotional inertia displayed low facial expression reciprocity of helpees' S-NA. There was greater reciprocity of facial expressions of helpees' H-NA in men helpers with high and low levels of emotional inertia, and for woman helpers with high levels of emotional inertia (positive linear effect).

Facial expression reciprocity of PA. Women helpees' facial expressions of PA predicted increases in men helpers' facial expressions of PA (b = .043, p = .002). A negative curvilinear association revealed that men helpers' with higher and lower levels of S-NA inertia displayed less reciprocity of helpees' PA, whereas helpers with moderate levels of inertia displayed greater facial expression reciprocity of helpees' PA (b = -.013, p = .027). Men helpees' facial expressions of PA predicted increases in women helpers' facial expressions of PA (b = .048, p = <.001). No curvilinear association was found between women helpers' S-NA inertia and reciprocity of facial expressions of helpees' PA (b = -.009, p = .159).

Facial expression reciprocity of S-NA. Neither women helpees' facial expressions of S-NA (b =. -.014, p = .116) nor men helpees' facial expressions of S-NA (b = .007, p = .647) was predictive of helpers' facial expression of S-NA. Because preliminary analyses did not suggest significant gender differences in the linear effect of S-NA inertia (Chi^2 (1) = 3.580, p > .05), we report the results of the model with pooled parameter estimates. High levels of emotional inertia were associated with less reciprocity of helpees' facial expressions of S-NA in men and women helpers (b = -.019, p = .024), compared to men and woman helpers with low levels of emotional inertia. However, there was also a significant positive curvature (b = .026, p =.005) in the women slope suggesting that women helpers with scores in the midrange of S-NA inertia displayed even less facial expression reciprocity of helpees' S-NA compared to women helpers with high or low levels of emotional inertia.

Facial expression reciprocity of H-NA. Women helpees' facial expressions of H-NA did not predict men helpers' facial expressions of H-NA (b = .002, p = .829) but helpers with higher and lower levels of S-NA inertia displayed more reciprocity of helpees' facial expressions of H-NA, whereas scores in the intermediate range predicted less reciprocity of helpees' facial expressions of H-NA (b = .009, p = .006). Men helpees' H-NA expressions did not predict women helpers' H-NA (b = .002, p = .839). A linear effect was found, revealing that women helpers' with high levels of S-NA inertia displayed more facial expression reciprocity of helpees' H-NA (b = .048, p <.001).

Discussion

The current study examined whether emotional inertia was associated with helpers reciprocity of helpees' facial expressions of emotions during a social support interaction task. Based on prior literature suggesting that both inert and erratic emotion dynamics are associated with greater psychological dysfunction (e.g., Kashdan & Rottenberg, 2010; Koval & Kuppens, 2012; Kuppens et al., 2010), it was hypothesized that high and low levels of emotional inertia would be associated with less reciprocity of emotions that foster interpersonal connection (i.e., PA, S-NA), but greater reciprocity of emotions that are associated with a distancing function (i.e., H-NA). There is relatively little research on reciprocity of facial expressions of emotions in interactions and its significance for relationship processes (but see for example Carrere & Gottman, 1999). Although we refer to relevant literature that examined the link between emotions and relationship functioning (e.g., Gable et al., 2004, 2006; Gottman et al., 1998), we would like to draw attention to the fact that our study focused on the behavioral component of emotions, and some of the specific ideas discussed below are thus rather speculative and remain to be tested.

Reciprocity of Facial Expressions of Affiliative Emotions

Results from our study revealed that high and low levels of emotional inertia were associated with less reciprocity of helpees' facial expressions of PA during support interactions, but only for men helpers. Longitudinal studies found higher levels of PA in couple interactions (e.g., humor, affection) to be predictive of relationship satisfaction and stability (Gottman et al., 1998). Moreover, the beneficial interpersonal effects of PA exchanges have been shown in different types of couple interactions such as in

discussions of conflict-related issues (Gottman et al., 1998), personal problems (Pasch & Bradbury, 1998; Sullivan et al., 1998), and when good news are shared (Gable et al., 2006). Insufficient reciprocation of PA may undermine the maintenance of shared positive emotions (Gable et al., 2004) and relationship satisfaction over time (Kashdan et al., 2013). Some studies reveal gender differences in support provision, indicating that women may be better support providers than men (e.g., Cutrona, 1996), thus it is tempting to suggest that when offering support women are less affected by their level of emotional inertia because they generally have a larger portion of support skills. However, this suggestion is purely speculative, as some research has failed to find gender differences regarding the proportion of positive and negative helper behaviors (vocal and paravocal indices) exhibited during a social support interaction (e.g., Pasch, Bradbury, & Davila, 1997). Another study found gender differences to be moderated by the support provider's levels of stress (Bodenmann et al., 2015). When under stress, women were more supportive toward their partner than men, leading to the conclusion that stressed women may to be more effective in regulating their own and their partners' distress as compared to stressed men.

Regarding S-NA we expected high and low levels of emotional inertia to be associated with less reciprocity of facial expressions of S-NA. We found a linear effect. Women and men helpers with high levels of emotional inertia displayed less facial expression reciprocity of helpees' S-NA. Reciprocity of S-NA may serve to signal empathy (Burgeois & Hess, 2008). However, too strong reciprocity may convey to one's partner that their partner is not able to provide adequate support, which over time may cause the partner to be less open about their stressful experiences (e.g., "I am not sure if

my partner can handle this without reacting strongly.").

Reciprocity of Facial Expressions of Non-Affiliative Emotions

Our results further suggest that emotional inertia is linked to greater reciprocity of distancing emotions (i.e., H-NA). Given the significant curvilinear effect for men, and the linear effect for women, these findings are consistent with the assumption that high levels of emotional inertia may increase the risk of partners experiencing cycles of negative affect reciprocity (Gottman & Levenson, 1992). Anger expressions may be downregulated through reciprocation of anger in a controlled way and with low magnitude and arousal (Luginbuehl & Schoebi, 2018). However, another perspective could be that greater reciprocity merely reflects strong involvement and openness to engage in a discussion, whereas none or low reciprocity may reflect little involvement or even indifference.

Prior findings on emotional inertia and emotional responses found individuals with high and low levels of emotional inertia to report less increases in H-NA following conflict as compared to individuals with intermediate levels of emotional inertia (Luginbuehl & Schoebi, in press). Conversely, our findings -- greater reciprocity of facial expressions of H-NA -- may be due to the different components of emotion (subjective vs. behavioral component) and the time scales to which the emotional outcome was assessed (timescale of hours in daily life vs. seconds in the lab). Facial expressions of emotions and emotional experiences do not necessarily correspond. Individuals may mask, intensify or de-intensify their facial expressions to meet the social expectations (Matsumoto, Yoo, Hirayama, & Petrova, 2005). Facial expressions of emotions may also serve to regulate the interaction partner's facial expressions of emotions. An individual

may for example try to downregulate his partner's facial expressions of emotions by reacting with fewer expressions, if he considers the partner's reaction as too exaggerated for the given context (Hess & Fischer, 2014). Moreover, partners may for example not express their subjective feelings but rather exhibit emotions that clearly communicate to the partner what is expected from him, as facial expressions of emotion communicate to the interaction partner whether approaching or withdrawing behavior is expected (Hess & Fischer, 2014). For example an individual may feel sadness or disappointment but express anger in order to keep someone away or he may smile if he doesn't want to be consoled by the interaction partner.

Limitations and Future Directions

In a social support context, an adaptive response to the disclosure of the intimate partner is a behavior that matches the interactional moment, respectively a response that meets the needs of the distressed individual (Kim, Sherman, & Taylor, 2008). Given that we did not assess the needs of the helpee (e.g., what type of support the helpee was hoping to get from his partner during the disclosure), we can not draw any conclusions about which response might be the most appropriate. Therefore, future research should examine the link between reciprocity of facial expressions of emotions and the quality of the support received as perceived by the helpee, for example by assessing after the social support interaction whether the helpee partner has felt understood, validated, and cared for by the helper partner. Under certain circumstances reciprocity of facial expressions of anger may have an affiliative function, for example if anger is not directed inward but against someone outside the relationship (Burgeois & Hess, 2008; Hess & Fischer, 2013). We merely focused on facial expressions, thus we cannot rule out that certain sequences

of anger were rather meant to be directed towards the event that occurred outside the relationship. It would thus be interesting to consider other emotional channels, because other channels may communicate additional information. An individual may for example regulate his facial expressions of sadness (e.g., de-intensify them) but express his sadness vocally or paravocally. In this case reciprocity would not be expressed facially but verbally. Moreover, the operationalization of facial expression reciprocity, respectively the optimal window of time to examine facial expressions of emotions and reciprocity (which may vary depending on the type of expression), needs to be further elucidated in future studies.

Conclusion

How individuals respond when their intimate partners disclose a problem in support interactions can foster or undermine affiliation within couples. Emotional inertia seems to be associated with lower susceptibility to facial expressions of emotions that foster affiliation, and higher susceptibility to facial expressions of emotions that tend to foster distance between intimate partners. Thus, emotional inertia may increase the risk of ending up in maladaptive patterns of emotion dynamics within intimate relationships.

Table 1. *Helper's Reciprocity of Helpee's Facial Expressions of Emotions as a Function of S-NA Inertia*

Predictor	β	*SE*	*p*	95% CI *LL*	95% CI *UL*
Women helpee's PA					
Men helper's PA reciprocity	**.043**	**.013**	**.002**	**.016**	**.069**
Inertia	-.000	.011	.984	-.022	.022
Inertia squared	**-.013**	**.006**	**.027**	**-.024**	**-.002**
Mean	.009	.110	.932	-.207	.226
Mean squared	.009	.050	.855	-.089	.107
Variability	.108	.110	.328	-.108	325
Variability squared	-.040	.060	.505	-.157	.077
Men helpee's PA					
Women helper's PA reciprocity	**.048**	**.012**	**<0.001**	**.025**	**.071**
Inertia	-.003	.010	.791	-.023	.018
Inertia squared	-.009	.007	.159	-.023	.004
Mean	-.133	.083	.116	-.297	.031
Mean squared	.032	.029	.275	-.025	.090
Variability	.136	.118	.255	-.096	.367
Variability squared	-.046	.069	.507	-.183	.090
Women helpee's H-NA					
Men helper's H-NA reciprocity	.002	.009	.829	-.016	.020
Inertia	**.016**	**.007**	**.02**	**.003**	**.029**
Inertia squared	**.009**	**.003**	**.006**	**.003**	**.015**
Mean	.081	.087	.351	-.089	.251
Mean squared	-.012	.030	.693	-.070	.046
Variability	.038	.095	.694	-.149	.225
Variability squared	-.064	.044	.150	-.150	.022
Men helpee's H-NA					
Women helper's H-NA reciprocity	.002	.011	.839	-.020	.002
Inertia	**.048**	**.013**	**<0.001**	**.023**	**.073**
Inertia squared	.000	.006	.932	-.010	.010
Mean	-.035	.084	.677	-.218	.118
Mean squared	.026	.023	.269	-.019	.071
Variability	.260	.128	.046	.010	.511
Variability squared	-.215	.062	<.001	-.337	-.093
Women helpee's S-NA					
Men helper's S-NA reciprocity	-.014	.009	.116	-.031	.003
Inertia	**-.019**	**.008**	**.024**	**-.035**	**-.003**
Inertia squared	.000	.005	.974	-.009	.010
Mean	.075	.075	.320	-.072	.222
Mean squared	-.026	.030	.395	-.085	.034
Variability	.108	.075	.156	-.040	.257
Variability squared	-.051	.038	.179	-.125	.023
Men helpee's S-NA					
Women helper's S-NA reciprocity	.007	.016	.647	-.025	.038
Inertia	**-.019**	**.008**	**.024**	**-.035**	**-003**
Inertia squared	**.026**	**.009**	**.005**	**.009**	**.044**
Mean	.093	.123	.451	-.148	.334
Mean squared	-.040	.037	.281	-.112	.032
Variability	-.023	.178	.896	-.372	.326
Variability squared	-.013	.090	.884	-.189	.163

Note. N = 67 couples. CI = confidence Interval; *LL* = lower limit; *UL* = upper limit.

9. General Discussion and Conclusions

Previous research has demonstrated the maladaptive implications of emotional inertia on an intrapersonal level (e.g., Kuppens et al., 2010). The studies included in this thesis aimed to extend the existing literature by investigating the implications of emotional inertia on an interpersonal level, and in intimate relationships in particular. Emotions ought to inform, guide and adjust intimate partner's emotions and behaviors in response to each other's emotional signals and needs (Luginbuehl & Schoebi, 2018). In the present work it was assumed that emotion dynamics characterized by high levels of emotional inertia, reflecting restricted emotional flexibility (Kuppens et al., 2010; Suls et al., 1998) or low levels of emotional inertia, reflecting frequent, rapid, and strong emotional changes would undermine providing this guidance to an individual, and thus be associated with emotional responses and behaviors that fail to convey to the partner a sense of responsiveness (Reis & Gable, 2015), undermining relationship functioning. Different methodologies were used to test these assumptions. Study I and Study II were based on an ambulatory assessment approach. This approach relies on subjective reports and is indicated when everyday life processes are studied over long periods of time such as assessments of momentary emotions over several weeks. Study III additionally relied on systematic observation. This approach allows examining micro-processes such as facial expressions of emotions during a rather short period of time. In the following I will summarize the main results of the studies.

9.1 Summary of the Main Results and Contributions of the Studies

Study I examined whether accuracy in perceiving partner's emotions varied as a function of emotional inertia. The dyadic data revealed that both fathers and mothers were accurate in predicting their partner's emotions in daily life. Emotional inertia, as defined by stronger autocorrelations across emotion reports, moderated this effect in mothers, but not fathers: mothers with high levels of emotional inertia were particularly accurate in tracking their spouse's emotional changes, a pattern that did not emerge for father's perceptions of mother's emotions. A study by Marsh and Ambady (2007) found that the more accurately one perceives another individual's facial expressions of fear, the stronger the sympathy and desire to help the expresser. Thus accurate perceptions of an intimate partner's emotions are a prerequisite to respond sensitively to his needs, desires, and feelings, and to convey to him that he is understood (a component of responsiveness; Reis, 2014; Reis & Gable, 2015). Study I merely assessed individual's reports on the perceived or assumed emotional state of their intimate partner on six occasions throughout the day. It was not assessed on what kind of indicators individuals based their assumptions (for example whether they were based on their face-to face conversations, on facial, vocal or para-vocal expressions, on their last telephone contact, or the day's schedule of the partner etc.). However, the study findings suggest that individuals with high levels of emotional inertia seem to be able to accurately report on their partner's emotions and that inert women are particularly accurate.

In Study II we examined immediate (Study 1) and long-term effects (Study 2) of emotional inertia on interpersonal functioning. Study 1 hypothesized that individuals with high and low levels of emotional inertia, as compared to individuals with moderate levels

of emotional inertia, would be less reactive to moments of conflict and intimacy. This hypothesis was partially supported. Individuals with high and low levels of emotional inertia reported less context-sensitive emotional responses to conflict, as reflected in a lack of increase in H-NA (emotions that serve to assert oneself) and S-NA (emotions that encourage the partner to offer comforting and cooperative behavior) and a lack of decrease in PA after conflict, whereas individuals with scores in the intermediate range reported increased emotional reactivity to conflict. This finding was especially robust for S-NA inertia, as the same curvilinear pattern emerged independently of whether individual differences in emotional inertia were based on the first two weeks and used to predict reactivity in the last two weeks or vice versa. Moreover, a significant linear effect of emotional inertia in response to intimacy was found, indicating that individuals with high levels of S-NA inertia did not benefit from a decrease in S-NA after having experienced intimate moments with their partners. However, this pattern could not be replicated when emotional inertia was based on the last two weeks of emotional self-reports and used to predict reactivity in the first two weeks. Although at first glance, it may appear adaptive to stay "cool" in the face of conflict, emotions signal the personal significance of an event (social appraisal theory; e.g., Parkinson, 2001) and blunted emotional reactivity to conflict may communicate to the partner a lack of interest or even disregard for the issues at stake, and give rise to problematic dyadic interaction patterns such as the demand-withdraw pattern (Christensen & Heavey, 1990). Moreover, previous studies have found that in certain circumstances, such as when facing severe relationship problems, negative emotional behaviors can be beneficial, as they may signal to the couples the necessity of a change and thus encourage them to resolve their relationship

problems (Cohan & Bradbury, 1997; Karney & Bradbury, 1997). In the present work it was assumed that an individual's lack of emotional reactivity might take its toll on the romantic partners of these individuals. In accordance with Reis and Shaver's intimacy process model (1988), we expected that if partner A's disclosures in the course of a conflict were met by reduced emotional responses by partner B and A perceives them as non or low responsive, this would undermine A's relationship satisfaction in the long term. In the second study, we thus examined whether an individual's high or low levels of emotional inertia affect perceptions of partners responsiveness during their daily interactions, and whether high and low levels of emotional inertia predict changes in partners relationship satisfaction across 12 months. The results revealed that partners of individuals with high or low levels of emotional inertia described them as being less responsive to them (e.g., as less understanding, less supportive, less affectionate/caring, and less loving) in daily life, as compared to individuals with scores in the midrange of S-NA inertia, and that this lower level of perception of responsiveness explained partners stronger declines in relationship satisfaction over the subsequent 12 months. Thus, according to their partner's reports, individuals with high and low levels of emotional inertia engage in less responsive behavior, which undermines their partner's relationship satisfaction in the long term. However, the study results do not allow any conclusions regarding the association between emotional inertia and actual behavior in couple interactions, as the reports were based on the partners perceptions of responsiveness and not on the objective observation of their behavior.

Study III thus aimed to further examine whether individuals with high and low levels of emotional inertia would exhibit different emotional behavior when offering

support to their partners as compared to individuals with intermediate levels of emotional inertia. Helpers with high and low levels of emotional inertia were expected to display less reciprocity of helpee's facial expressions of affiliative emotions (joy, sadness, and fear) but greater reciprocity of helpee's non-affiliative emotions (anger and contempt). Facial expressions were analyzed with the FACET 2.1 SDK software (iMotions, 2015) which detects and analyzes facial expressions in real time. Results revealed that male helpers with high and low levels of emotional inertia displayed less reciprocity of facial expressions of PA but stronger reciprocity of H-NA (anger and contempt). For female helpers we found a linear effect: female helpers with high levels of emotional inertia displayed greater facial expression reciprocity of hard negative affect. Regarding S-NA we found women and men helpers with high levels of emotional inertia to display less facial expression reciprocity of S-NA. Thus emotional inertia is linked to higher susceptibility to facial expressions of emotions that foster distance between intimate partners (i.e., H-NA), and lower susceptibility to emotions that foster interpersonal connection (i.e., PA, S-NA). Thus, emotional inertia seems to be associated with maladaptive patterns of emotions such as less enthusiasm (as expressed facially) in response to positive affect expressions (Gable et al., 2004, 2006), but greater facial expressions of emotions of H-NA in response to partners H-NA expressions, probably increasing the risk of ending up in patterns of negative affect reciprocity (Gottman, 1979; 1998). The results of Study II and Study III further acknowledge the presumption that there can be too much flexibility or "too much of this good thing" (Kashdan & Rottenberg, 2010; Kogan et al., 2013) as the findings regarding low levels of emotional inertia suggest.

Taken together, the findings of this work suggest that high and also low levels of emotional inertia seem to impede the social function of emotions, that is to shape an individual's behavior in adaptive ways (Keltner & Gross, 1999; Keltner & Haidt, 2001), which also affects partners outcomes.

9.2 Limitations and Future Directions

Despite of the contributions of these studies, they are also subject to several limitations. The specific limitations pertaining to each study are acknowledged and discussed in each article. In the following I will discuss the limitations of the studies in a more general manner.

The subjects of the studies consisted of young and healthy couples with above-average education and rather high levels of relationship satisfaction, which limits the generalizability of the results to the broader population. Including participants with lower levels of education, and individuals with severe individual or relationship distress would increase the generalizability of the findings.

Another issue concerns the timescales used to assess emotional reactivity. The timescale used in Study II to capture reactivity processes was not optimal, because it was relatively wide, with long intervals between each measurement (upon awakening, 12 p.m., 6 p.m., before bed). Immediate emotional reactions to conflict may have been downregulated before participants were asked to report their current emotions at the next time point. As a consequence our measure may not have exclusively assessed reactivity following conflict but also other driving forces of emotional inertia, such as slow recovery from negative events (see e.g., Koval, Brose, et al., 2015). Future research could benefit from a more fine-tuned assessment of momentary experiences to examine

reactivity (e.g., shorter timeframes). Finding the right balance between having as many time points as possible to get an accurate picture of an individual's patterns of change and at the same time not overburden the participant is a particularly challenging task. Another possibility would be to include an experimental approach, by exposing all the participants to the same kind of stressor (i.e., as in Koval & Kuppens, 2012), and examine whether reactivity to the specific stressor varies as a function of an individual's level of emotional inertia.

Most studies, also my own contributions in this thesis, have treated emotional inertia as a character trait. However, emotional inertia may also feature within-subject variance as suggested by a study of Koval and Kuppens (2012). The authors compared participants emotional inertia levels before and after anticipating a forthcoming Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993). Individuals with high sensitivity to social-evaluative threat experienced higher levels of emotional inertia in daily life but had a large drop in their inertia levels after the stress anticipation, attenuating the temporal dependency of emotional states and leading temporarily to a more erratic emotion dynamic pattern. According to the authors this change in emotion dynamics may reflect short-lived, ineffective attempts to regulate their emotions following the anticipation of a stressor in the near future. Thus future studies should go beyond examining associations at the trait level and also consider within-person variability of emotional inertia.

Further, including physiological measures in daily life and relating them to subjective experiences, as measured with daily diaries could also be a promising approach. This would allow for example, examining the degree of coherence between

reports of conflict and physiological arousal, and specifically whether emotional inertia is also associated with a lack of physiological arousal in response to key relationship events. Physiological measures could further be implemented in the lab, during the social support interaction, to further examine the link between partners facial expressions of emotions during the interaction and their physiology in the interaction. This would allow examining whether certain patterns of emotion dynamics within a couple interaction (i.e., greater facial expression reciprocation of hard negative affect) are linked to heightened cardiovascular reactivity, affecting individuals also on a biological level. Moreover, considering additional emotional components would provide a more nuanced picture of the dynamics occurring between romantic partners during their interactions. An individual may react to the intimate partner's facial expressions of emotions with few facial reactions but still experience strong emotional changes during the interaction. Facial expressions of emotions and emotional experiences do not necessarily correspond: individuals mask the emotions they feel if they don't want others to read their "true" emotions in a given context (Matsumoto, Yoo, Hirayama, & Petrova, 2005). As such, some emotions may not be visible on the face, but may be expressed vocally, para-vocally or not at all. Thus verbal and subjective indices of emotions during the interaction would merit further attention. Verbal emotional indices could be measured with established tools of observational coding such as for example the Specific Affect Coding System (SPAFF; Gottman et al., 1996), the Social Support Interaction Coding System (SSICS; Bradbury & Pasch, 1994) or the Rapid Couples Interaction Scoring System (RCISS; Krokoff, Gottman, & Hass, 1989). Subjective indices of emotions could for example be assessed by means of a rating dial (e.g., Gottman & Levenson, 1985).

Thereby, partners watch the videotape of their interaction on their own and continuously report with a rating dial (ranging from very negative to very positive affect) the emotions that they were feeling throughout the interaction. Similarly a rating dial could be used to measure how supported an individual has felt throughout the interaction in order to examine what kinds of emotional behaviors or suggestions from the helper met the needs of the distressed partner (Kim, Sherman, & Taylor, 2008). Thus, combining the various existing methodological approaches may advance research of emotions in relational situations in significant ways.

Finally, future work should consider taking the role of culture into account by examining a more diverse cultural sample. Culturally prescribed rules, so-called display rules, determine the kind of facial expressions of emotions and degree of intensity that individuals consider to be appropriate in interpersonal relationships (Ekman et al., 1987). For example, the display rules of more interdependent cultures like Japan discourage the facial expression of emotions that threaten group harmony, such as anger, contempt or disgust, whereas these expressions are more accepted by individuals from more individualistic cultures like US Americans or Canadians (Safdar et al., 2009). Switzerland is a rather individualistic society, occupying the 14th rank on the Individualism-Collectivism dimension among 53 countries (Hofstede, 2001). Thus testing emotional inertia and its implications for couples in a more culturally diverse sample is another important issue that should be addressed in future research, because culture may shape the type and intensity of emotion expressions that couples consider to be appropriate within their interactions together.

9.3 Practical Implications

Intimate partners have frequent interactions together, affecting each other's emotional experiences and behavior (Kelley, 1983; Rusbult & VanLange, 2003). An individual's degree of emotional inertia has implications for the intimate partners, as the findings of this work reveal. Several studies have demonstrated that partners of individuals suffering from depression, a correlate of emotional inertia, experience greater psychological and marital distress (Benazon & Coyne, 2000; Coyne, Thompson, & Palmer, 2002; Fincham & Beach, 2009). The mood of the depressed individual has been found to be predictive of the partner's mood (Benazon & Coyne, 2000). By the same token, the partner also affects the depressed individual's mood and may thus also influence the individual's depressive symptomatology up to a certain extent. A study by Randall and Schoebi (2015) found women and men who were more susceptible to their partner's positive affect in daily life (subjective component) to experience decreases in depressive symptoms over 12 months. These findings point to the importance of including both partners in the treatment (Bodenmann & Randall, 2013) as partners play a fundamental role in regulating each other's emotions (e.g., Luginbuehl & Schoebi, 2018). A treatment for depression that combines a cognitive behavioral approach, which targets to reduce the depressed individual's symptoms, with a couple-based approach that also considers the non-depressed partner's psychological health, and aims at improving both partners relationship satisfaction, has been found to be particularly promising (Cohen, O'Leary, & Foran, 2010). Couple based interventions teach couples skills to increase positive affective behavior, and decrease dysfunctional interaction patterns (Cohen et al., 2010; Fincham & Beach, 2009; Whisman & Beach, 2012). Thus these interventions aim

at increasing partners perceptions of responsiveness, by helping partners to build and maintain behaviors that show to the partner that he is valued and cared for (Beach, Fincham, & Katz, 1998). Importantly, how individuals perceive to be supported by others can increase or reduce the risk of suffering from psychopathology, physical health problems (Moak & Agrawal, 2009), and relationship distress (Pasch & Bradbury, 1998; Sullivan et al., 1998).

Taken together, although the partner is an important protective factor (Whisman & Baucom, 2012), spouses share the burden of depression and it has therefore been suggested to take a „we-disease“ perspective and include both partners in treatment (Bodenmann & Randall, 2013) since relationship distress is closely linked to negative physical and psychological health outcomes, and may thus aggravate depressive symptoms. The findings of this work demonstrate that the detrimental effects of emotional inertia can cumulate and undermine one partner's relationship satisfaction lastingly.

9.4 Final Conclusions

To convey feelings of responsiveness individuals need to be reactive when their intimate partners express positive or negative emotions, seek support, disclose concerns, expectations, or good news. Emotions ought to shape an individual's behavior in adaptive ways (Keltner & Gross, 1999; Keltner & Haidt, 2001). The findings reported in this work suggest that compared to intermediate levels of emotional inertia, both high and low levels of emotional inertia may interfere with the social function of emotions, that is to guide an individual's behavior in adaptive ways within relational situations (Keltner & Gross, 1999; Keltner & Haidt, 2001). The implications seem to be more pronounced for

the partners of these individuals, as reflected in their decreases in relationship satisfaction. Taken as a whole, individuals with high and low levels of emotional inertia seem to exhibit less emotional behaviors that foster interpersonal connection. Under these conditions, it may be difficult to maintain and protect strong social bonds in the long-term.

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