Up and down, and up and down: Fluctuations in self-regulation and well-being of individuals and close relationship partners in daily life

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Abstract

Across different life stages and contexts (e.g., at school and university, at the workplace, in sports) personal accomplishment and success are heavily determined by an individual's self-regulation. Self-regulation encompasses the ability to strive for long-term goals and orchestrate one's thoughts, feelings and actions in a way that benefits those long-term goals over conflicting short-term temptations. High self-regulation on a trait level—that is, across time and contexts—is associated with numerous positive outcomes across the life span. In turn, individuals with low trait self-regulation (including but not limited to individuals with clinically relevant self-regulation problems, such as attention-deficit hyperactivity disorder) exhibit, for instance, greater learning problems and more health problems. Recently, researchers started to consider whether the developmental advantages of high trait self-regulation might come at the cost of personal well-being but were not able to confirm such an assumption. That is, for example, individuals with high vs. low trait self-regulation report to be happier and more satisfied with their lives. Furthermore, within the last two decades, research dedicated increased focus to the social consequences of high self-regulation, reporting that individuals with high vs. low trait self-regulation foster better relationships with their close relationship partners (e.g., their parents and spouses).

However, irrespective of such between-person differences (i.e., some individuals having higher trait self-control than others), each individual experiences dynamic changes in their self-regulation in everyday life. That is, while on some days a person might be particularly well able to sustain attention on their long-term goals and inhibit distracting impulses (e.g., not going out late with friends to be able to study the next day), on other days, they might be more prone to lose sight of these goals and give in to an attractive alternative promising immediate gratification (e.g., staying out late, drinking with friends, even though having to study the next day). While such state-level fluctuations in self-regulation have received some theoretical and empirical consideration in the past, research has not yet fully identified under which circumstances individuals present such ups and downs in self-regulation.

Therefore, the aim of this dissertation is to innovatively combine these current directions in self-regulation research to fill existing research gaps and broaden our understanding about the role of self-regulation for psychosocial functioning. First, this dissertation considers both, between-person differences, and daily within-person fluctuations in self-regulation. Second, across both these levels of analyses, this dissertation investigates links between self-regulation and personal

well-being (i.e., affective well-being, life satisfaction). Third, it also examines how self-regulation is related to relational well-being (i.e., interaction quality, closeness) between and within individuals or couples. To this end, the thesis refers to three empirical studies applying ambulatory assessment methodology in three independent samples (Study 1: $N = 64$ undergraduate students, Study 2: $N = 70$ parent-child dyads, and Study 3: $N = 53$ intimate relationship couples). These studies largely confirm the assumption that self-regulation is positively linked to personal well-being, while revealing more diverse result patterns regarding the association of self-regulation and relational well-being across the three studies.

In conclusion, when studying self-regulation in close relationships, this dissertation suggests the need to consider the interplay between (1) variations in self-regulation between and within individuals, (2) individual and dyadic effects of self-regulation on psychological well-being, (3) dispositional and situational determinants of self-regulation, (4) different processes related to self-regulation, and (5) different individual and relationship processes determining personal and relational well-being. This should advance the development of tailored self-regulation interventions to enhance psychosocial functioning of individuals embedded in their close relational ties, rather than in isolation of their surroundings.

Key words: Self-Regulation, Self-Regulation Fluctuations, Ambulatory Assessment, Personal Well-Being, Close Relationships, Relationship Functioning

Abstract (German)

Leistung und Erfolg einer Person wird in verschiedenen Lebensabschnitten und Kontexten (z. B. in der Schule und an der Universität, am Arbeitsplatz, im Sport) stark bestimmt von der Selbstregulation ebendieser Person. Selbstregulation beschreibt die Fähigkeit, langfristige Ziele anzustreben und die eigenen Gedanken, Gefühle und Handlungen so auszurichten, dass diese das Verfolgen langfristigen Ziele gegenüber kurzfristigen Verlockungen begünstigen. Eine hohe Selbstregulation auf *trait*-Ebene (d. h. über die Zeit und unterschiedliche Kontext hinweg) wird mit zahlreichen positiven Ergebnissen im Leben eines Menschen in Verbindung gebracht. Personen mit geringer Selbstregulation (einschließlich, aber nicht beschränkt auf Personen mit klinisch relevanten Selbstregulationsproblemen, wie beispielsweise der Aufmerksamkeitsdefizit-/ Hyperaktivitätsstörung) wiederum weisen mehr Lern- und Gesundheitsprobleme auf. In jüngster Zeit haben sich Forschende mit der Frage befasst, ob die Entwicklungsvorteile einer hohen Selbstregulation im Gegenzug mit Einbußen in Hinblick auf die Lebensfreude einer Person einhergehen, wobei diese Annahme empirisch nicht bestätigen werden konnten. Im Vergleich zu Personen mit niedriger Selbstregulation berichten Personen mit hoher Selbstregulation glücklicher und zufriedener mit ihrem Leben zu sein. Darüber hinaus hat sich die Forschung in den letzten zwei Jahrzehnten verstärkt mit den sozialen Folgen einer hohen Selbstregulation befasst und berichtet, dass Personen mit einer hohen im Vergleich zu einer niedrigen Selbstregulation bessere Beziehungen zu nahestehenden Personen (z. B. ihren Eltern oder Ehepartner) pflegen.

Unabhängig von solchen Unterschieden zwischen einzelnen Personen (d. h., einige Personen haben eine höhere Selbstregulation als andere) erlebt jede Person im Alltag dynamische Veränderungen in ihrer Selbstregulation. Das heißt, während eine Person an manchen Tagen besonders gut in der Lage sein kann, ihre Aufmerksamkeit auf ihre langfristigen Ziele zu richten und ablenkende Impulse zu unterdrücken (z. B. nicht zu lang mit Freunden auszugehen, um am nächsten Tag lernen zu können), kann sie an anderen Tag vielleicht eher dazu neigen, diese Ziele aus den Augen zu verlieren und einer attraktiven Alternative nachzugeben, die sofortige Befriedigung verspricht (z. B., lange auszugehen und mit Freunden etwas zu trinken, obwohl man am nächsten Tag lernen muss). Während solche Schwankungen in der Selbstregulation auf *state*-Ebene (d. h. zum aktuellen Zeitpunkt und im aktuellen Kontext) in der Vergangenheit bereits theoretisch berücksichtigt und empirisch untersucht wurden, hat die Forschung noch nicht vollständig aufdecken können, unter welchen Umständen diese Schwankungen im Alltag auftreten.

Ziel dieser Dissertation ist es daher, diese aktuellen Richtungen der Selbstregulationsforschung innovativ zu kombinieren, um bestehende Forschungslücken zu schließen und unser Verständnis von der Rolle, die Selbstregulation für die psychosoziale Funktionsfähigkeit spielt, zu erweitern. Hierzu werden in dieser Dissertation erstens sowohl Unterschiede zwischen Personen als auch tägliche Schwankungen in der Selbstregulation innerhalb einer Person berücksichtigt. Zweitens werden auf diesen beiden Analyseebenen Zusammenhänge zwischen Selbstregulation und persönlichem Wohlbefinden (d. h. affektives Wohlbefinden, Lebenszufriedenheit) beleuchtet. Drittens wird untersucht, wie die Selbstregulation mit dem beziehungsbezogenen Wohlbefinden (d. h. Interaktionsqualität, Nähe) zwischen und innerhalb von Einzelpersonen oder Paaren zusammenhängt. Zu diesem Zweck werden in dieser Dissertation drei empirische Studien angeführt, in denen Methoden des sog. Ambulanten Assessments in drei unabhängigen Stichproben herangezogen wurde (Studie 1: N = 64 Studierende im ersten Studiensemester, Studie 2: N = 70 Eltern-Kind-Dyaden und Studie 3: N = 53 Paare in einer romantischen Beziehung). Diese Studien bestätigen weitgehend die Annahme, dass Selbstregulation positiv mit persönlichem Wohlbefinden zusammenhängt, es zeigen sich jedoch unterschiedliche Ergebnismuster hinsichtlich des Zusammenhangs zwischen Selbstregulation und beziehungsbezogenem Wohlbefinden in den drei einzelnen Studien.

Zusammenfassend lässt sich angesichts der Ergebnisse dieser Dissertation schlussfolgern, dass es bei der Untersuchung der Rolle von Selbstregulation in engen Beziehungen notwendig ist, das Zusammenspiel von (1) Selbstregulationsunterschiedenen zwischen und innerhalb von Individuen, (2) individuellen und dyadischen Effekt von Selbstregulation auf die psychosoziale Funktionsfähigkeit, (3) dispositionellen und situativen Determinanten von Selbstregulation, (4) unterschiedlichen Selbstregulationsprozessen und (5) verschiedenen individuellen und Beziehungsprozessen, die dem persönlichen und beziehungsbezogenem Wohlbefinden zugrunde liegen, berücksichtigt werden muss. Dies sollte die Entwicklung maßgeschneiderter Interventionen zur Verbesserung der psychosozialen Funktionsfähigkeit von Personen fördern, eingebettet in deren zwischenmenschliche Verbindungen und nicht isoliert von ihrer Umgebung.

Schlüsselworte: Selbstregulation, Selbstregulationsschwankungen, Ambulantes Assessment, persönliches Wohlbefinden, enge Beziehungen, Beziehungserfolg

List of Manuscripts

The dissertation is based on the following three manuscripts:

I. Schmid, J.*, **Moschko, T**.*, Riccio, M., Snyder, K. A., Gawrilow, C., & Stadler, G. (2024). Self-control fluctuates from day to day and is linked to subjective well-being within and between persons. *Applied Psychology: Health and Well-Being, 16*(1), 254-272. https://doi.org/10.1111/aphw.12482

II. **Moschko, T.**, Stadler, G., & Gawrilow, C. (2023). Fluctuations in children's self-regulation and parent-child interaction in everyday life: An ambulatory assessment study. *Journal of Social and Personal Relationships, 40*(1), 254-276. https://doi.org/10.1177/02654075221116788

III. **Moschko, T.**, Buhr, L., Stadler, G., Schober, P., & Gawrilow, C. (2024). *A dyadic score analysis of how both romantic partners' self-regulation relates to their personal and relational well-being in daily life* [Unpublished manuscript]. Department of Psychology, University of Tübingen.

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1. General Introduction

Based on almost six decades of research, self-regulation has been identified as one key ingredient of success. Pioneering the research field, the late Walter Mischel showed that pre-school children who were able to resist the urge to secure an instantaneous gratification (i.e., one marshmallow) in favor of earning an even bigger reward (i.e., two marshmallows) some minutes later, grew up to be more successful adults (e.g., Mischel et al., 1972; Mischel et al., 1989). As of today, this so-called delay of gratification has been studied abundantly by behavioral scientists, together with other associated self-regulation processes. These studies reveal a variety of developmental benefits of high self-regulation, such as educational and vocational success, or better health (e.g., Robson et al., 2020). Consequently, over the years, several models within psychology and related research fields (e.g., cognitive science, neurology) emerged, theorizing about different aspects of self-regulation (Inzlicht et al., 2021). In this dissertation, I will be contemplating and linking three current directions in the research on self-regulation.

First, I will consider self-regulation as more than just a stable personality *trait* predicting success and other positive outcomes over the life span, but also as a fluctuating *state* that changes dynamically over time. The idea of treating self-regulation as a wavering and rechargeable resource has gained growing attention in the beginning of the 21st century and became a prominently studied phenomenon in psychology (e.g., Baumeister et al., 2007). Irrespective of how self-regulated an individual is in general (i.e., across situations and time), it can be assumed that all individuals experience ups and downs in self-regulation while getting through their daily routines. Accordingly, the immediate determinants, correlates, and consequences of such fluctuations need further investigation to understand their role for success and psychosocial functioning.

Second, researchers only recently started to consider whether success might come at the cost of personal happiness and pleasure for highly self-regulated individuals. In contrast of such stereotypical beliefs, recently presented studies quite consistently show that high trait self-regulation is positively related to subjective (i.e., personal) well-being, such as more positive affect, less negative affect, and higher life satisfaction (e.g., Cheung et al., 2022; Hofmann et al., 2014; Wiese et al., 2018). While several mechanisms underlying this phenomenon are discussed in the literature, it remains rather unclear whether and how ups and downs in self-regulation within individuals translate into (un)happiness and (dis)satisfaction “in the moment”.

Third, in the past, research mainly focused on the individual benefits of self-regulation, for example, how self-regulation relates to personal well-being. However, self-regulation clearly does not only relate to the self, but also its direct surrounding, most notably close relationship partners. Over the past two decades, new evidence emerged indicating how self-regulation might benefit psychosocial functioning in close relationships (Righetti et al., 2022). The growing interest was accompanied by theoretical frameworks to understand self-regulation processes within dyads (Fitzsimons et al., 2015), and methodological advances to analyze dyadic data (Iida et al., 2018; Kenny & Ledermann, 2010), whose potential is now to be realized and further refined.

The objective of this dissertation is to integrate these recent developments in self-regulation research and provide novel evidence about the association between both trait and state self-regulation with personal well-being, but also relational well-being. To this end, I will present data from three empirical studies applying ambulatory assessment methods (Trull & Ebner-Priemer, 2013) in three independent samples. Study 1 inspects the relationship between trait and state self-regulation and personal well-being in a sample of undergraduate students over the course of three 9-day assessment periods distributed throughout the entry phase of university (Schmid et al., 2024). Furthermore, Study 2 investigates the link between children's self-regulation fluctuations and relational well-being between them and their parents across three 18-day measurement periods spread throughout roughly one year (Moschko et al., 2023). Finally, Study 3 examines the association between self-regulation, personal well-being, and relational well-being in mixed-gender intimate relationship couples from a dyadic perspective over the course of 21 days (Moschko et al., 2024). Together, those three studies innovatively combine previous research endeavors and shed light on so far un(der)studied processes within individuals, but also between two close relationship partners, related to self-regulation.

In the following, I will present the theoretical and empirical background for investigating self-regulation in association with personal and relational well-being and relationship quality (Chapter 2), summarize the resulting goals and hypotheses of this dissertation (Chapter 3), present the three above-mentioned empirical studies (Chapter 4), discuss their main findings, limitations, and implications for theory, practice and future research (Chapter 5), and provide concluding remarks (Chapter 6).

2. Theoretical and Empirical Background

2.1. Theoretical Models of Self-Regulation

Self-regulation refers to a variety of cognitive, affective, and behavioral processes by which individuals—consciously or unconsciously—exert control over and orchestrate their own internal and external experiences and actions (Vohs & Baumeister, 2004). This rather vague definition is situated in a broad and ever-growing, interdisciplinary research field that provides a multiplicity of theoretical models and empirical considerations, each highlighting unique aspects of self-regulation (Inzlicht et al., 2021). One overarching framework to conceptualize and structure the self-regulatory processes is the *Test-Operate-Test-Exit* perspective grounded in cybernetic models of self-regulation (Carver & Scheier, 1998). According to this perspective, the process of self-regulation starts with comparing whether a current state aligns with a desired end state—that is, a set goal, or standard (Test). If necessary, this is followed by goal-oriented activities to reduce the discrepancy between the current state and the desired end state (Operate). Subsequently, the results of these efforts are re-evaluated (Test), and—if the desired end state was reached—the process of goal pursuit can be terminated (Exit). Consequently, successful self-regulation requires several distinct mechanisms, such as (a) identifying and setting appropriate goals, (b) the ability to consequently align one's thoughts, feeling, and actions with these goals, (c) the motivation to put up effort to achieve these goals, and (d) closely monitoring one's progress towards these goals (Righetti et al., 2022). Within this thesis, I will mainly focus on the second mechanism, which is captured under a variety of labels in the research literature but is most referred to as self-control. Throughout this dissertation, I will follow scholars using the terms self-regulation and self-control interchangeably (Nigg, 2017). Nonetheless, I will keep in mind that "self-control represents one form of self-regulation […][defined] as the process of resolving conflict (real or anticipated) between two competing goals" (Inzlicht et al., 2021, p. 321).

Even though having a clear, desirable goal in mind, and being highly motivated to approach this goal, individuals might struggle to initiate or maintain goal-orientated behavior. For example, a student might wish to excel at their next exam at university, knowing that to achieve this goal, they need to go to each lecture, and study for some hours each day. Instead, they regularly skip lectures to meet friends or watch TV during time slots assigned to studying. One reason for this so-called intention-behavior gap (Heckhausen & Gollwitzer, 1987) is the emergence, or anticipation, of goal conflict—that is, two (or more) competing goals. Often, goals conflict with each other as

they contrast actions and experiences promising short-term reward (e.g., going out with friends, watching TV) with those that promise long-term goal achievement (e.g., passing a difficult exam) (Hall & Fong, 2007). Self-regulation involves resolving such a conflict in a way that favors approaching the long-term goal, resisting such distracting immediate temptations (Fujita, 2011). According to the *Process Model of Self-Control* (Duckworth et al., 2016), individuals can apply various self-regulation strategies to either prevent the emergence of goal conflict (e.g., choosing environments in which tempting alternatives are less likely to arise), or cope with existing goal conflict (e.g., directing attention away from an existing temptation, effortfully inhibiting the desire to endorse a temptation). To apply these strategies in a productive and flexible way comes easier to some individuals than others in general—that is, across different time points and contexts—resulting in trait-like differences in self-regulation *between* individuals. Still, depending on the circumstances, every person might struggle to bring up what it takes to exert (certain) self-regulation strategies, manifesting in state-like fluctuations in self-regulation *within* individuals.

2.2. Between-Person Differences and Within-Person Fluctuations in Self-Regulation

In the past, researchers commonly treated self-regulation as an individual trait, suggesting that certain individuals are dispositioned with higher or lower self-regulation abilities than others, and linked these between-person differences to diverging levels in, for example, accomplishment and health (e.g., Robson et al., 2020; Tangney et al., 2004). Research advocates that these differences are shaped by an interaction of genetical, neurocognitive, and societal processes, as captured in biopsychosocial models of self-regulation, as for example the *Self-Regulation Intergeneration Transmission Model* (Bridgett et al., 2015). This is also evident in developmental models of neuropsychological disorders characterized by deficient self-regulation, such as attention deficit/hyperactivity disorder (Barkley & Murphy, 2011; Döpfner et al., 2020; Sonuga-Barke, 2005). Accordingly, whether individuals develop rather high or low levels of self-regulation is determined by a combination of heritability (e.g., Willems et al., 2019), neurologically driven variations in executive functioning (e.g., Miyake et al., 2000), and environmental influences—most importantly, parenting practices (e.g., Karreman et al., 2006; Morris et al., 2017). However, although self-regulation is closely related to certain personality traits (i.e., consciousness, agreeableness) (Tangney et al., 2004), which are considered quite permanent and stationary attributes of the self, it has also been found to be quite malleable and volatile within short periods of time.

On the one side, various studies provide evidence for positive intervention effects on individuals' self-regulation through pharmaceutical (e.g., Pietras et al., 2003), neurological (e.g., Mayer et al., 2016), and psychological interventions (e.g., Gollwitzer et al., 2010). The latter commonly encompass planning strategies as means to initiate goal-orientated behavior, as well as to overcome potential adversities during goal pursuit, which can lead to considerable improvement in the self-regulation of children/adolescents (e.g., Duckworth et al., 2011; Wieber et al., 2011) and adults (e.g., Gollwitzer & Sheeran, 2006). On the other side, the ability to modulate one's thoughts, feeling, and actions in a way that favors long-term goal pursuit also fluctuates quite naturally and transiently within individuals. The most prominent theoretical model that considers such fluctuations is self-regulation is the S*trength Model of Self-Control* (Baumeister et al., 2007). This model conceives of self-regulation as a depletable resource (also referred to as self-control strength), that—just as some sort of battery—wanes over time and needs to be re-charged. That is, after continuously exerting high self-regulation at one time point (e.g., when effortfully concentrating on a boring lecture), self-control strength is supposed to deplete, which can lead to a lack of self-regulation at a later time point (e.g., skipping the next lecture to have coffee with friends). Even though this so-called ego depletion effect received considerable empirical support (e.g., Baumeister et al., 1998; Blain et al., 2016; Freeman & Muraven, 2010; Hagger et al., 2010), more recent meta-analytical approaches drastically challenge its validity (Carter et al., 2015; Friese et al., 2019; Hagger et al., 2016). Still, fluctuations in self-regulation are well-documented across different research settings—for example, laboratory studies (Kofler et al., 2013; VanDellen & Hoyle, 2010) and field studies (Baumeister et al., 2019; Hofmann et al., 2012; Schmid et al., 2020)—and age groups—for example, children and adolescents (Berg et al., 2014; Blume et al., 2022; Leonard et al., 2022; Ludwig et al., 2016; McCoy et al., 2022; Schmid et al., 2020) and adults (Baumeister et al., 2019; Clinton et al., 2020; Hofmann et al., 2012; Schöndube et al., 2017), proving that individuals can exhibit pronounced self-regulation in some moments and under some circumstances while lacking self-regulation in others.

Consequently, researchers need to account for both, between-person differences, as well as within-person fluctuations (Curran & Bauer, 2011) in self-regulation to fully understand the role of self-regulation for success and psychosocial functioning. One approach that provides a methodological framework to study self-regulation on both these levels is ambulatory assessment (e.g., Trull & Ebner-Priemer, 2013). Ambulatory assessment encompasses manifold measurement approaches to assess participants' everyday experiences in "real-time" (i.e., across several

measurement occasions), and "real-life" (i.e., across different contexts in everyday life) (Mehl & Conner, 2011). Thus, it can provide researchers with data that is less likely to be influenced by recall bias and is more ecologically valid than lab studies or the use of single questionnaires (Trull & Ebner-Priemer, 2013). Nowadays, ambulatory assessment is preliminarily supported by technological devices, such as smartphones and wearables. Most commonly, study participants use smartphone applications to repeatedly report their everyday experiences (e.g., the current level of self-regulation on a certain day) through self-report questionnaires, which enables researchers to disentangle between-person differences (i.e., Which individuals, in general, have higher self-regulation than others?) and within-person fluctuations (i.e., How does self-regulation change in time?). To omit its commonly known issues such as social desirability bias (Reis, 2012; Schwarz, 2012), researchers can also complement self-reports with other observer-reports (e.g., assessments of self-regulation by close others, such as parents or intimate relationship partners) (e.g., Berg et al., 2014; Buhr, 2023; Van Voorhees et al., 2011), and objective measures of self-control (e.g., tasks that capture executive functions) (Eppinger-Ruiz de Zarate et al., 2024; Miyake et al., 2000; Schmiedek et al., 2014). Thus, ambulatory assessment can be applied in various ways to study volatility in self-regulation in everyday life. Furthermore, it can be used to detect antecedents, correlates, and consequences of high or low self-regulation both on the between-person, as well as the within-person level.

2.3. Antecedents, Correlates, and Consequences of High or Low Self-Regulation

The enormous research interest in self-regulation over the past six decades resulted in a vast body of evidence constituting manifold benefits of high trait self-regulation for the individual. For example, individuals reporting higher trait self-regulation usually fare better at school (e.g., higher grade point average, lower rates of learning disabilities) and at work (e.g., higher salary, lower rates of unemployment) (de Ridder et al., 2012; Robson et al., 2020; Tangney et al., 2004). Moreover, they exhibit better psychological adjustment, mirrored, for example, in lower rates of mental health problems, less alcoholism, and higher self-esteem (Robson et al., 2020; Tangney et al., 2004). Furthermore, high trait self-regulation can have a positive effect on physical health, as individuals with high (vs. low) self-regulation are more likely to enact healthy behaviors (e.g., fruit and vegetable consumption, physical activity) and inhibit unhealthy behaviors (e.g., alcohol consumption) (Hagger et al., 2019). Such correlational evidence is also complemented by longitudinal research. For example, in one population-representative study of over 1.000 New Zealanders, low trait self-regulation in children predicted poorer physical health and more

substance dependence (e.g., tobacco smoking), and less financial resources at age 32 (Moffitt et al., 2011). This, in turn, can result in a higher socio-economic burden due to, for example, receiving more social welfare benefits, having more hospital stays, and requiring more injury insurance claims (Caspi et al., 2016). Notably, the study indicated that low trait self-regulation poses a unique developmental risk of similar, or even greater effect size than established risk factors such as low socioeconomic status, child maltreatment, and low intelligence. This aligns with studies that identified self-regulation as a noncognitive determinant of success, which predicts children's grades at school above and beyond intelligence (Duckworth et al., 2019).

Compared to the abundance of studies documenting positive effects of trait self-regulation, far less is known about how within-person fluctuations in self-regulation are related to different psychological, behavioral, and environmental processes in everyday life. Initial studies applying ambulatory assessment protocols provide evidence that situational factors can influence self-regulation efforts, such as self-regulation being diminished under the influence of alcohol (Hofmann et al., 2012). Moreover, fluctuations in self-regulation are linked to daily stress: On days of high self-regulation individuals report to experience less stressors (Buck & Neff, 2012; Park et al., 2016). Furthermore, state self-regulation relates to health behaviors such as physical activity above and beyond trait self-regulation. For example, one study reports that individuals exercise more on days they experience higher (vs. lower) self-regulation than usual (Schöndube et al., 2017). While this effect was stronger in individuals with low trait self-regulation, it was also evident in generally highly self-regulated individuals. Taken together, self-regulation capacity partially accounts for between-person, and—as indicated by some initial studies—within-person variations in personal accomplishment, goal-striving, and, ultimately, success.

2.4. Self-Regulation and Personal Well-Being

While high self-regulation appears to be largely adaptive and beneficial in terms of goal achievement, at the same time, the success might come at the cost of other amenities and comforts for the individual. For example, as self-regulation is characterized by resolving goal conflict in favor of long-term goals, and thus regularly denying oneself the pleasure of an immediate, attractive alternative (e.g., not staying out late with friends to be able to study for an exam the next day), one might suppose that highly self-regulated individuals are, in general, "unhappier". Researchers started testing this assumption within the last decade, mostly considering whether and how trait self-regulation is associated with "happiness", or rather, personal well-being. Personal

well-being—usually referred to as subjective well-being (Diener, 2009)—constitutes a multifaceted construct, which encompasses several related, yet empirically distinct components, and can be decomposes into affective and cognitive components (Luhmann et al., 2012). That is, high subjective well-being is characterized by (1) a hedonic balance of positive and negative affect (i.e., many positive affective experiences relatively to few negative affective experiences), and (2) a positive (cognitive) appraisal of the quality of one's life (i.e., life satisfaction). In contrast to the stereotypical belief that highly self-regulated individuals are unhappier, empirical studies quite consistently report that high trait self-regulation is related to more positive affect, less negative affect, and more life satisfaction (Cheung et al., 2014; Grund et al., 2015; Hofmann et al., 2014; Nielsen et al., 2019; Wiese et al., 2018). Notably, however, the positive effects of high self-regulation might only occur as an aggregate of many self-regulatory efforts in everyday life. For example, a person aiming to pass a difficult exam supposedly feels better about themselves after succeeding and preserved against all odds, although they had to cut back on some other pleasant experiences, such as going out with friends on weekend, for several weeks. However, this does not preclude that they experienced the frustrating dilemma of repeatedly inhibiting occurring distractions (i.e., saying no to their friends), accompanied by unhappiness or dissatisfaction "in the moment" of exerting self-regulation (Grund & Carstens, 2019; Inzlicht et al., 2015). This would result in a positive link between self-regulation and personal well-being on a trait-level (i.e., between individuals), but a negative link between self-regulation and personal well-being on a state-level (i.e., within individuals). Surprisingly, relatively few studies consider such within-person processes. However, the existing body of literature cannot uniformly confirm such a pattern, showing for example that momentary self-regulation success is also linked to increased positive affect (Wenzel et al., 2016; Wenzel et al., 2021; Wiese et al., 2018). Moreover, in one study, fluctuations in self-regulation measured in a biweekly cycle were related to personal well-being with participants reporting elevated affect and life satisfaction when also reporting high self-regulation (Buyukcan-Tetik et al., 2018). To the best of my knowledge, though, preceding research endeavors have not yet tried to link daily fluctuations in self-regulation to personal well-being.

Therefore, in the first study introduced in this dissertation (Study 1: Fluctuations in self-regulation and personal well-being), I will present and discuss results from a research project investigating the association between self-regulation (referred to as self-control in the manuscript) and personal well-being (referred to as subjective well-being in the manuscript) (Schmid et al., 2024). In this study, I analyzed data collected via daily self-report from 63 undergraduate students

over the course of 27 study days across three measurement bursts during the entry phase of university (i.e., beginning of the first semester, end of the first semester, and beginning of the second semester). The study extends previous research by considering how daily fluctuations in self-regulation in the everyday life of undergraduate students relate to personal well-being, as well as by examining a variety of affective experiences (i.e., negative affect, vigor, serenity), and life satisfaction, providing a more nuanced view on the link between self-regulation and personal well-being.

2.5. Self-Regulation and Well-Being in Close Relationships

Given its eponymous focus on the "self", for a long time, self-regulation has mainly been studied regarding its role in personal outcomes, such as one's own accomplishments, or one's own health and well-being. However, the way individuals solve (goal) conflicts within themselves is also significantly related to the way they solve (goal) conflicts with close relationship partners (i.e., family members, intimate relationship partners). This is reflected in newly emerging efforts in theory-building, methodology, and empirical research, documenting a variety of social and relational antecedents, correlates, and consequences of high and low self-regulation.

Throughout development, research suggest a bidirectional link between a person's self-regulation, and their social environment. On the one side, the family environment has a fundamental role in the development of self-regulation (Bridgett et al., 2015). Parenting practices that encompass a combination of encouraging the child's autonomy, while giving guidance by setting clear and consistent boundaries, are associated with elevated trait self-regulation in children (e.g., Karreman et al., 2006; Morawska et al., 2019; Morris et al., 2017; Piotrowski et al., 2013). In contrast, exerting too much or too little parental control is linked to the development of self-regulation deficits in children. On the other side, already at a very young age, self-regulation is predictive of social functioning later in life. For example, children with higher self-regulation in early childhood (around age 3) are less likely to report interpersonal difficulties later in life (Ayduk et al., 2000), while children with lower self-regulation express more antisocial behavior, conflict and elevated levels of distrust in (early) adulthood (Caspi, 2000). Thus, enhanced self-regulation is considered to be an indispensable ingredient of becoming a well-adjusted, socially integrated person throughout development, helping children and adolescents to build and maintain harmonious and fulfilling relationships (Herd et al., 2018). Accordingly, later in life, adults with high trait self-regulation are more likely to display secure rather than avoidant or anxious

attachment, more family cohesion, and less interpersonal anger and conflict (Tangney et al., 2004). In a recently published systemic review, Righetti et al. (2022) give a rigorous overview of how self-regulation is related to relationship processes, and conclude that, largely, individuals with high (vs. low) trait self-regulation fare substantially better in social relationships.

One reason for the link between self-regulation and psychosocial functioning is that individuals with high trait self-regulation dispose a variety of relationship behaviors that facilitate interactions and communication with others. For example, individuals with high (vs. low) trait self-regulation are more likely to exhibit polite and constructive (i.e., forgiving, accommodating), rather than unmannered and disruptive (i.e., aggressive, criticizing, deceiving, or avoidant) communication and problem-solving behavior (Baker et al., 2018; Bornstein et al., 2017; Guilfoyle et al., 2019; Tan et al., 2017). In addition, low (vs. high) trait self-regulation is associated with an increased likelihood of breaking promises towards relationship partners (Peetz & Kammrath, 2011), as well as with being tempted by attractive alternatives to the current relationship partner (Brady et al., 2020; Pronk et al., 2011). Accordingly, individuals with high (vs. low) trait self-regulation are more likely to be trusted (Righetti & Finkenauer, 2011), and should they occasionally exhibit destructive relationship behavior, to be forgiven (Gomillion et al., 2014) by close relationship partners. Above and beyond between-person differences in trait self-regulation, initial studies also link within-person changes in state self-regulation to psychosocial functioning in close relationships. They show, for example, that on days on which intimate relationship partners report lower self-regulation than usual (following, for example, increased stress), they are more likely to exhibit poorer relationship behavior and more anger towards their partners, and consequently experience less relationship satisfaction (Buck & Neff, 2012; Crane et al., 2014; Testa et al., 2020). This implies that even in generally well-functioning couples, momentary lows in self-regulation of one or both partners can be accompanied by maladaptive relationship processes and result in significant challenges that need to be overcome for the relationship to thrive in the long term. Notably, previous studies predominantly considered how such fluctuations in self-regulation relate to relationship functioning in adults' intimate relationships. Given the importance of the family environment for the development and maintenance of self-regulation skills and social functioning in children (Eisenberg et al., 2014; Willems et al., 2018), whether and how fluctuations in children's self-regulation relate to relationship functioning in parent-child relationships is yet to be determined.

To this end, in the second study introduced in this dissertation (Study 2: Fluctuations in self-regulation and parent-child interactions), I will present and discuss novel evidence on the between-person and within-person associations between children's self-regulation (referred to as self-regulation skills in the study) and relational well-being indicated by the quality of everyday interactions between children and one of their parents (Moschko et al., 2023). The data was collected via daily self-reports, and parent-reports, for 70 schoolchildren over the course of 54 study days across three measurement bursts within one year (i.e., beginning of Grade 5 until beginning of Grade 6). The study complements previous research mainly focusing on intimate relationship partners, extending their findings by considering how daily fluctuations in children's self-regulation in the everyday life of families are linked to relational well-being, as well as by taking into account children's and parents' perspective on their daily interactions.

Another strand of the literature on self-regulation and close relationships focusses on how everyday interactions between close relationship partners relate to both their individual and mutual goal pursuit. Close relationship partners can facilitate each other's self-regulatory efforts, or, in turn, sidetrack each other from steering into the direction of their personal goals. In one daily diary study, participants reported to be less likely to act on short term desires in the presence of others, especially those desires that were experienced to conflict highly with a long-term goal (Hofmann et al., 2012). Thus, the mere presence of others turned out to be helpful to resist an occurring temptation. This, however, does not necessarily indicate that the resisting person increases their self-regulation efforts. On the one side, individuals might indeed engage in enhanced self-regulation in the presence of others that make them happy, as they feel more "in control" of a situation, focused, supported, and generally better in their presence (Hofmann et al., 2015). Also, a present partner might be helpful in increasing one's own self-regulation by monitoring the progress of the activities related to a set goal (e.g., Berli et al., 2016; Riccio et al., 2019). On the other side, however, anticipating support from a close relationship partner can also lead to a reduction of self-regulation efforts, relying on the partner to regulate one's own experiences and actions (Fitzsimons & Finkel, 2011). While such a transaction can be beneficial for the one person that is "out-sourcing" the processes of self-regulation to their partner, this might, in turn, interfere with the latter's own goal pursuit, and consequently, have derogative effects on the relationship (Orehek & Forest, 2016).

Accordingly, in close relationships, personal goal progress is not only dependent on one's own self-regulation. To add even more complexity, within such relationships, individuals usually do not only hold goals that target themselves personally ("I want to excel at my next exam"), but also goals that target the partner ("I want my partner to eat healthier"), or both ("I want us to spend more time together"). This creates an intricate net of interdependency in which all relationship partners become, to some extent, responsible of each other's goal outcomes. To date, the most prominent theoretical model that takes these interdependencies into account is the *Transactive Goal Dynamics* framework (Fitzsimons et al., 2015). It conceives of relationship partners as "interdependent subparts of one self-regulation system" (Fitzsimons et al., 2015, p. 648), and psychosocial functioning in relationships as a function of how well those subparts can coordinate their individual and shared goals.

One implication that can be derived from this is that it does not suffice to consider the contributions of each partner's individual self-regulatory efforts when studying psychosocial functioning of two or more individuals in a close relationship. Such analyses were usually conducted in the past, applying traditional models of dyadic data analyses, as for example the *Actor-Partner Interdependence Model* (Kenny & Ledermann, 2010). That way, studies commonly report associations between one's own self-regulation and one's psychosocial outcomes (i.e., actor effects), as for example feeling less burnt-out in life and experiencing more relationship satisfaction (Boiman-Meshita & Littman-Ovadia, 2022; Dyrenforth et al., 2010; Zuo et al., 2020). Rarely, these studies also find effects of one's own self-regulation on the partners psychosocial outcomes (i.e., partner effects) (Tan et al., 2017; Zuo et al., 2020). However, it can be assumed that transactive gain or loss, and thus, psychosocial functioning in relationships is catalyzed by an (un)favorable combination of both partners' self-regulation levels (Fitzsimons et al., 2015; Orehek & Forest, 2016).

Given the many positive effect of high trait self-regulation, one might expect higher psychosocial functioning in dyads consisting of two partners with high self-regulation abilities, respectively. Several empirical studies present evidence in favor of such a *totality* account, showing, for example, that relationship satisfaction in couples is highest when both partners exhibit high trait self-regulation, and, in turn, interpersonal aggression is most likely when both (rather than just one) partners exhibits low (trait) self-regulation (Crane et al., 2014; Quigley et al., 2018; Vohs et al., 2011). Other studies, however, draw a somewhat different picture, suggesting that

instead of high self-regulation in both partners, psychosocial functioning in dyads mainly depends on *similarity* in the self-regulation of the individuals. That is, they show that couple partners get along best when both partners exert similar—be it similarly high or similarly low—levels of self-regulation (Cheung et al., 2022; Derrick et al., 2016). Also, some scholars also hypothesized that not similar, but divergent and therefore complementing levels of self-regulation are most likely to benefit the relationships. However, such a *complementarity* account hardly received empirical support in the past (Cheung et al., 2022; Derrick et al., 2016; Vohs et al., 2011). Thus, while initial studies started to consider such dyadic effects of self-regulation beyond individual effects, their results are rather inconclusive. One shortcoming of these previous studies is that they failed to consider that each couple partner's self-regulation fluctuates in time, which can lead to two partners being more (dis)similar on some occasion than others. I argue that considering these two levels of analysis (i.e., between-couple differences and within-couple fluctuations) might explain the diverging patterns in previous studies. For example, while a totaling high level in self-regulation might be beneficial in the long run—that is, when aggregating multiple interactions and experiences of a couple—being *either* similarly high *or* low, or exerting complementing levels in self-regulation, might just as much benefit the relationship in daily life. Yet, to the best of my knowledge, no previous study tried to simultaneously link overall levels and fluctuations in the self-regulation of two relationship partners to psychosocial functioning in everyday life.

Therefore, by applying a multilevel dyadic score analysis (Iida et al., 2018; Stadler, Scholz, et al., 2023), in the third study presented in this dissertation (Study 3: Couple and daily-level relations of self-regulation and well-being), I attempt to link partner averages and partner differences of intimate relationship partners' self-regulation to personal and relational well-being on a between-couple and within-couple level (Moschko et al., 2024). In this study, both partners in 53 intimate relationship couples separately provided self-reports on their daily self-regulation, affect, and life satisfaction (i.e., personal well-being), as well as closeness and overall quality of interactions with their partner (i.e., relational well-being), over the course of 21 consecutive days. Thus, the study mainly extends previous research by disentangling how between-couple differences and within-couple fluctuations in self-regulation relate to personal and relational well-being, regarding self-regulation from a dyadic perspective (i.e., looking at partner averages and partner differences) to assess whether totality, similarity and complementarity in couples' self-regulation best predicts psychosocial functioning.

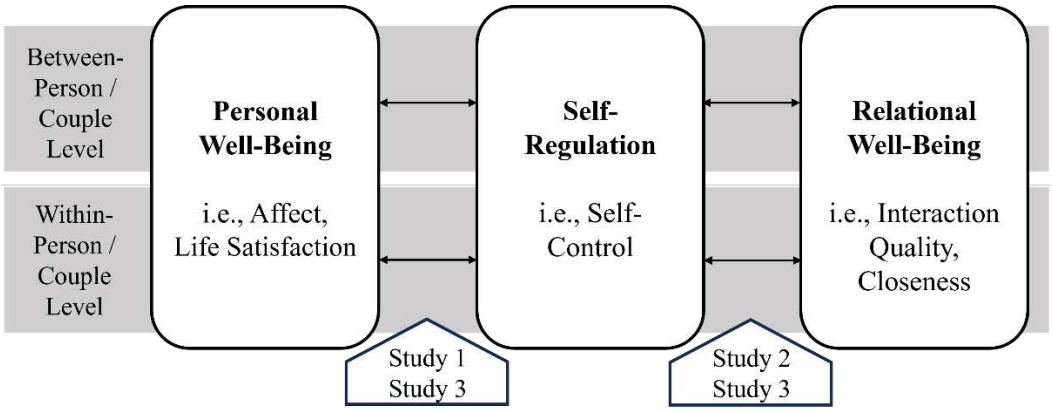
3. Summary of Research Aims and Hypotheses

Self-regulation appears to be a key ingredient of individual success and happiness, as well as thriving and fulfilling relationships. However, to fully understand the role of self-regulation for psychosocial functioning, it does not suffice to clarify whether, why, and with which consequences self-regulation is elevated in certain individuals relative to others—that is, asking questions that relate to differences *between* individuals (e.g., "*For whom* is self-regulation higher or lower?"). Instead, we also need to get a better picture of whether, why, and with which consequences self-regulation fluctuates in everyday life *within* individuals (i.e., "*When* is self-regulation capacity higher or lower?"). To date, there is a scarcity of research investigating into the situational correlates of momentary ups and downs in self-regulation. Identifying such within-person correlates, however, can be useful to inform interventions promoting self-regulation to enhance psychosocial functioning, which are adapted to *both* an individual or a couple *and* the right moments. Consequently, this dissertation follows the overarching research question of how overall levels, but also fluctuations in self-regulation relate to individual and relational well-being in daily life.

More precisely, this dissertation builds on three studies aiming to link between-person (or between-couple) differences, and daily within-person (or within-couple) fluctuations in self-regulation to psychosocial functioning—that is, personal and relational well-being. The conceptual framework of this dissertation is summarized in Figure 1, also showing how each study contributes to the presented research aims. Study 1 concerns the between-person and within-person associations between self-regulation and personal well-being (i.e., affect, life satisfaction) in undergraduate students. Study 2 takes into consideration how schoolchildren's self-regulation is linked to relational well-being (i.e., overall quality of daily interactions) between and within parent-child dyads. Finally, Study 3 respects between- and within-couple associations of two partners' average levels and differences in self-regulation with personal well-being (i.e., affect, life satisfaction), as well as relation well-being (i.e., closeness, overall quality of daily interaction). With this, I attempt to make further contributions to our understanding about which individual and relationship processes go along with ups and downs in self-regulation in the everyday lives of individuals and couples.

Figure 1

Conceptual Framework of this Dissertation



To answer my research question, I propose the following three hypotheses:

(1) Relative to between-person differences, daily within-person fluctuations account for a considerable share in the total variance of self-regulation, which applies to both…
   a. … children (*only Study 2*), and…
   b. … adults (*only Study 1 and 3*).

(2) *Tested only in Study 1 and 3:* Self-regulation is positively associated with personal well-being both on the between-person (or between-couple), and within-person (or within-couple) level—that is, personal well-being is higher…
   a. …. in individuals or couples with higher self-regulation in general, and…
   b. … on days individuals or couples report higher self-regulation than usual.

(3) *Tested only in Study 2 and 3:* Self-regulation is positively associated with relational well-being both on the between-person (or between-couple), and within-person (or within-couple) level—that is, relational well-being is higher…
   a. …. in individuals or couples with higher self-regulation in general, and…
   b. … on days individuals or couples report higher self-regulation than usual.

The following chapter gives a summary of the empirical studies on which this dissertation is built upon (see Appendices A-C). This work is presented in two peer-reviewed and published manuscripts, as well as one unpublished manuscript in preparation for peer-review. The studies constitute three separately readable manuscripts, which results in overlapping contents to the introduction of this dissertation.

4. Summary of Manuscripts

4.1. Fluctuations in Self-Regulation and Personal Well-Being (Study 1)

The psychological trait of [self-regulation] has been linked to [between-person] differences in [personal] well-being: Individuals with higher [self-regulation] report less negative affect, more positive affect, and higher life satisfaction. However, less is known about how much [self-regulation] fluctuates from day to day and how these fluctuations are related to [personal] well-being. This intensive longitudinal study describes day to day fluctuations in [self-regulation] and investigates whether and how they are related to [personal] well-being in an intensive longitudinal study. A sample of 64 undergraduate students at the entry phase of university (*M* = 22.55 years, *SD* = 6.51, range = 18-53, 97% female) provided 1459 reports of their [self-regulation] and [personal] well-being, collected every evening across three 9-day measurement bursts over six months. Participants' [self-regulation] fluctuated substantially from day to day with less than 40% [sic] of the variability in daily [self-regulation] being attributable to [between-person] differences in [self-regulation]. On days with higher [self-regulation], participants reported less negative affect, more serenity, and higher life satisfaction. We found no relationship between [self-regulation] and vigor. The findings suggests that researchers need to go beyond current assessment practices and theories treating [self-regulation] as a stable trait to help develop tailored well-being interventions for everyday life.

This abstract was adapted from the original publication. For reasons of continuity, some terminology was adjusted to fit into the framework of this dissertation (e.g., using self-regulation instead of self-control). Those adjustments are indicated by square brackets. The original abstract, as well as the full version of the manuscript, can be retrieved from:

Schmid, J.*, **Moschko, T**.*, Riccio, M., Snyder, K. A., Gawrilow, C., & Stadler, G. (2024). Self-control fluctuates from day to day and is linked to subjective well-being within and between persons. *Applied Psychology: Health and Well-Being, 16*(1), 254-272. https://doi.org/10.1111/aphw.12482

* Shared first authorship

4.2. Fluctuations in Self-Regulation and Parent-Child Interactions (Study 2)

Self-regulation has mostly been studied as an intrapersonal trait which fluctuates across time and impacts everyday behavior related to individual goal pursuit and achievement. Although it is plausible that self-regulation affects not only individuals but also their social network, there is less research on how self-regulation levels and fluctuations are linked to social processes in daily life, such as interactions between children and their parents. To this end, this study tracked children's (9 to 11 years; $N = 70$) self-regulation, and their daily interaction quality with parents, across 54 days, using child and parental self-reports. Participants reported higher interaction quality in dyads in which children showed higher self-regulation levels in comparison to others, as well as on days on which children showed higher self-regulation compared to their typical levels. The extent of this association varied between dyads, which needs to be addressed in future studies. As self-regulation and parent-child interaction quality fluctuate in parallel, this study suggests that researchers should aim to understand the underlying mechanisms in order to develop dynamic self-regulation interventions in family contexts and improve family well-being.

This abstract, as well as the full version of the manuscript, can be retrieved from:

Moschko, T., Stadler, G., & Gawrilow, C. (2023). Fluctuations in children's self-regulation and parent-child interaction in everyday life: An ambulatory assessment study. *Journal of Social and Personal Relationships, 40*(1), 254-276. https://doi.org/10.1177/02654075221116788

4.3. Couple and Daily-Level Relations of Self-Regulation and Well-Being (Study 3)

Self-regulation is a key determinant of success and well-being in individuals. It is plausible that self-regulation plays an important role in close relationships, yet few studies investigate self-regulation in dyads so far. Adapting a framework of transactive goal dynamics between two close relationship partners, we aim to better understand how average levels and differences in two partners' self-regulation are related to their personal and relational well-being in everyday life. We hypothesized that well-being in couples is higher when both partners exhibit (1) overall higher levels (higher partner averages), (2) complementing levels (greater partner differences), or (3) similar (smaller partner differences) levels in self-regulation. To evaluate these hypotheses, 53 mixed-gender couples (M_{age} = 24.29 years) individually completed daily diaries across 21 study days. Multilevel dyadic score modeling largely showed evidence for Hypothesis 1 (totality): High partner averages in self-regulation were related to more positive affect between and within couples, less negative affect and higher overall relationship quality between couples, and more life satisfaction within couples. However, similarity (i.e., Hypothesis 3) in self-regulation was related to more closeness on the within-couple level. Together, our findings underline the importance of considering different levels of analyses (i.e., individual vs. dyad, between-couple vs. within-couple, and global vs. specific assessments of relationship functioning) when studying the role of self-regulation in close relationships.

This abstract, as well as the full version of the manuscript, can be retrieved from:

Moschko, T., Buhr, L., Stadler, G., Schober, P., & Gawrilow, C. (2024). *A dyadic score analysis of how both romantic partners' self-regulation relates to their personal and relational well-being in daily life* [Unpublished manuscript]. Department of Psychology, University of Tübingen.

5. General Discussion

Self-regulation has been in the focus of behavioral science for over six decades now. This provides us with ample evidence that different processes involved in self-regulation are beneficial for an adaptive psychosocial development. However, in some areas of the research field, previous research endeavors yielded insight that appears quite incomplete, or ambiguous at best. For example, one currently debated aspect in the self-regulation literature is the distinction between dispositional self-regulation (or: *trait* self-regulation), and self-regulation applied in the moment (or: *state* self-regulation) (Kotabe & Hofmann, 2015). While the former is assumed to be a relatively stable characteristic of an individual, the latter is supposed to fluctuate across situations and time. However, compared to the abundance of studies investigating trait self-regulation (e.g., de Ridder et al., 2012; Robson et al., 2020; Tangney et al., 2004), research on the situational antecedents, correlates, and consequences of state self-regulation is far more limited. This leaves some key questions largely unanswered, as for example: When does self-regulation rise or falter in everyday life? Under which circumstances are self-regulation efforts of individuals enhanced or diminished? What happens in moments of increased or diminished self-regulation within individuals, but also their direct surroundings? Given the importance of self-regulation for psychosocial functioning, answering those questions can have direct implications for the development of interventions to increase psychosocial functioning in everyday life.

Guided by the overarching research question of how not only overall levels in trait self-regulation, but also fluctuations in state self-regulation relate to psychosocial functioning in daily life, this dissertation aimed at advancing our understanding about the situational correlates of self-regulation. To this end, I investigated the correlations between self-regulation, personal well-being, and relational well-being in three intensive longitudinal studies referring to three independent study samples. While the first study presented in this dissertation tracked individual everyday life experiences of undergraduate students (Study 1), the second and third study followed the daily experiences of dyads, namely parent-child dyads (Study 2), and intimate relationship couples (Study 3). In the following, I will summarize and discuss the main results of those three studies regarding the three research hypotheses guiding this dissertation, explain notable limitations of my research approaches, and elaborate their implications for theory, practice, and future research.

5.1. Summary and Discussion of Main Results

This dissertation is guided by the overarching research question of how overall levels and fluctuations in self-regulation relate to personal and relational well-being in daily life. I provided three hypotheses to answer this research question, which I will now sequentially address in more detail regarding the three empirical studies building this dissertation.

5.1.1. Daily Fluctuations in Self-Regulation of Children and Adults (Hypothesis 1)

First, I assumed that self-regulation fluctuates on a day-to-day level in samples of different age groups, namely children (*Hypothesis 1a*), and adults (*Hypothesis 1b*). Thus, relative to between-person differences (i.e., some persons have higher self-regulation than others), daily within-person fluctuations (i.e., higher self-regulation on some days than on others) should account for a considerable share in the total variance in self-regulation observed in each of the three studies. To capture both these components, all three studies referred to in this dissertation applied repeated measurement of participant's daily experiences via ambulatory assessment methodology (Trull & Ebner-Priemer, 2013).

In each study, I calculated the so-called *intraclass correlation coefficient* (ICC) for the repeated reports on participants self-regulation, provided daily by themselves (Study 1 to 3) or their parents (Study 2). The ICC is a descriptive statistic to determine to which degree the observed variance is attributable to between-person differences on the one side, or within-person fluctuations and residual error on the other side. In the context of repeated measurement across time, higher ICC values (max. 1) indicate more similarity (= less variation) within the reports of each participant as compared to the variation among all participants, implying high temporal stability of between-person differences (Gelman & Hill, 2007). In contrast, lower ICC values (min. 0) indicate that observation within certain participants are no more similar than observations from different participants, implying no temporal stability of between-person differences. To meaningfully analyze psychological constructs as dispositional traits with state-like components that fluctuate across time, we seek for a balance in variation between and within individuals, commonly operationalized as ICC values between .10 and .60. Table 1 gives an overview of the ICCs obtained for the repeated measures of self-regulation in the three presented studies, and reveals that, across all three studies, this balance was sufficiently met in each study, allowing to meaningfully analyze between-person differences, as well as within-person fluctuations in self-regulation.

Table 1

Intraclass Correlation Coefficients (ICCs) for the Repeated Measurement of Self-Regulation in each Empirical Study of this Dissertation

	N	*k*	ICC[a]
Study 1			
Self-Report (Adults)	64	3 × 9 = 27	.29
Study 2			
Self-Report (Children)	70	3 × 18 = 54	.43
Parental Report	70	3 × 18 = 54	.48
Study 3			
Self-Report (Adults)	106	1 × 21 = 21	.54

Note. *N* = number of individuals in the study, *k* = total number of study days, as computed by the number of measurement bursts × the number of study days per measurement burst, ICC = intraclass correlation coefficient.

[a] The ICC values for Studies 1 and 2 depicted in this table deviate from the values reported in the original manuscripts due to minor computing errors in those manuscripts noticed by hindsight, which, however, do not change the general conclusions derived from these studies.

To begin with Study 2 (*Hypothesis 1a*), which assessed self-regulation in a sample of 70 children aged 9 to 11 years using a brief self-report measure over 54 study days, 43% of variability was attributable to differences in self-regulation between children. In comparison, I also assessed children's daily self-regulation with a brief parent-report measure in this study, for which 48% of variability was attributable to differences in self-regulation between children. Regarding the two adult samples in Study 1 and Study 3 (*Hypothesis 1b*), I observed somewhat diverging patterns. In Study 1, 29% of variability in self-regulation, as assessed with a brief self-report measure by 64 undergraduate students over 27 study days, were attributable to between-person differences in self-regulation. In Study 3, in which 106 intimate relationship partners (i.e., 53 dyads) reported their self-regulation via self-report over the course of 21 study days, 54% of variability in self-regulation were attributable to between-person differences. Thus, in each of the three studies, about half of the observed variability in self-regulation was attributable to within-person fluctuations and residual error individual reports.

Notably, the ICC values differ considerably between the three studies. The difference is especially noticeable between Study 1 and Study 3, although the participants in both studies were of similar age (young adults). Still, several distinctive factors in the respective study designs might be responsible for this difference. First, both studies applied somewhat different measures of self-regulation, with Study 1 drawing on a measure originally designed to study trait self-regulation (Tangney et al., 2004), and Study 3 using items from a measure specifically designed to assesses state self-regulation (Bertrams et al., 2011). However, in this case, one would expect smaller ICC values in Study 3 than Study 1, given the measure applied in Study 3 should be more prone to capture within-person variance. Second, Study 1 solely recruited undergraduate students at the start of university, while Study 3 recruited young adults across different occupational settings. Moreover, the sample in Study 1 mainly consisted of female participants, whereas the sample in Study 3 was balanced regarding female and male participants. Overall, this resulted in a more heterogenous sample in terms of education, occupation and gender in Study 3 compared to Study 1, with participants presumably also displaying more between-person variance in self-regulation (= higher ICC values). Third, the study design in Study 1 contained a measurement burst design, where the 27 study days were separated across three measurement bursts of equal length distributed throughout approximately 6 months (9 days in the beginning of participant's first semester at university, 9 days towards the end of the first semester, and 9 days and the beginning of the second semester). In contrast, in Study 3, participants completed the study on 21 consecutive study designs. Thus, individual reports across time were probably more similar in Study 3 than in Study 1, which, in turn, resulted in a higher ICC.

Overall, based on these three studies, I conclude that my hypothesis regarding the daily fluctuations in children's and adults' self-regulation can be confirmed. Therefore, I interpret the results of the three studies as evidence in favor of accounts proposing that above and beyond dispositional differences in trait self-regulation, state self-regulation is quite malleable and volatile, changing transiently from time point to time point (i.e., day to day). One such account is the *Strength Model of Self-Control* (Baumeister et al., 2007), which prominently introduced the idea that, irrespective of dispositional differences in self-regulation between individuals, self-regulation is a limited and depletable resource that wanes over time within each individual and needs regular "recharging". Associated with this notion is the so-called ego depletion effect, suggesting that self-regulation mainly runs out with use—that is, if a person exerts a lot of self-regulation at one time point, they might lack self-regulation later in time (Blain et al., 2016). Today, this effect is

controversially discussed (Carter et al., 2015; Friese et al., 2019; Hagger et al., 2016). Still, the main idea of the model, which is that self-regulation fluctuates in time within individuals, is empirically well-documented (e.g., Baumeister et al., 2019; Berg et al., 2014; Clinton et al., 2020; Crane et al., 2014; Hofmann et al., 2012; Leonard et al., 2022; Ludwig et al., 2016; McCoy et al., 2022; Schmid et al., 2020; Schöndube et al., 2017), and my findings align with such documents.

Nonetheless, research must still resolve associated ambiguities and respond to some unanswered questions around these findings. One remaining question is how trait-level differences between individuals and state-level fluctuations within individuals compare to one another. Personally, I conceived of trait self-regulation as the accumulation of state self-regulation (Fleeson, 2001) in each of the three presented studies. That is, if study participants reported to exert high state self-regulation across many study days, I assumed them to have high trait self-regulation, and else, if they reported to exert low state self-regulation for several study days, I identified them as having low trait self-regulation. This implicitly assumes that self-regulation underlies comparable processes on the trait and state level and thus, both levels can be represented as part of one common self-regulation system. However, this approach is challenged by more recent suggestions that individuals with high trait self-regulation do not necessarily exert a lot of state self-regulation, for the simple fact that, mostly, they do not really need to (Grund & Carstens, 2019; Hill et al., 2014; Hofmann et al., 2012). For example, a person that is very well organized, plans out every single day including all their meals and activities, and follows those plans conscientiously, might be less likely to get into a tempting, conflicting situation that would require them to apply (additional) self-regulation efforts in the moment. Presumably, such a person might even be more likely to fail at resisting an occurring temptation, lacking the necessary strategies to react to imminent goal conflict. Such a pattern would imply that the two level of analysis (trait vs. state) reflect qualitatively distinguishable processes. As suggested by Inzlicht et al. (2021, p. 331), who “do not feel there is sufficient information in the empirical data to know which one of these [two] perspectives in more correct”, more research is needed to shed light on this issue in the future. Furthermore, tying in with this issue is another mostly unanswered question referring to when and why self-regulation fluctuates in everyday life. With the idea of self-regulation simply running out with use getting more and more dismissed, it remains open under which circumstances state self-regulation is enhanced or reduced in everyday life. Initial research suggests a variety of situational correlates of state self-regulation, such as alcohol intoxication, the presence of others, and stress (Hofmann et al., 2012; Park et al., 2016), providing important information for intervention

research, which yet needs to be further expanded. Moreover, conducting research that examines whether the positive associations of trait self-control with several psychosocial outcomes also apply on the state level can contribute to establish whether comparable mechanisms underlie variations in trait and state self-control. Thus, one aim of this dissertation was also to test whether and how self-regulation is associated with personal and relational well-being both between and within individuals and couples, which I will outline in the next two sections.

5.1.2. Association of Self-Regulation and Personal Well-Being (Hypothesis 2)

Second, I hypothesized that self-control is positively associated with personal well-being on the between-person (or between-couple) and within-person (or within-couple) level—that is, personal well-being is higher in individuals or couples with higher self-regulation in general (*Hypothesis 2a*) and on days individuals or couples report higher self-regulation than usual (*Hypothesis 2b*). I tested these hypotheses in two of the three presented studies (Studies 1 and 3).

In Study 1, I investigated the association between self-regulation and personal well-being in a sample of undergraduate students at the entry phase of university. To account for approaches that conceive of personal well-being as a multi-facetted construct, I considered different affective experiences, as well as life satisfaction as a rather cognitive component of personal well-being (Diener, 2009). On the between-person level (*Hypothesis 2a*), I found that individuals with higher self-regulation in general typically experienced (1) more positive affect in terms of serenity (i.e., pleasantly deactivated), but not necessarily more or less vigor (i.e., pleasantly activated), (2) less negative affect across both, more deactivated (i.e., sadness), and activated (i.e., anger, anxiety) unpleasant affective experiences, and (3) higher life satisfaction. Above and beyond between-person differences in self-regulation, the same patterns were also evident on the within-person level (*Hypothesis 2b*): On days individuals reported higher self-regulation than usual, they also experienced (1) more serenity, but not necessarily more or less vigor, (2) less negative affect (i.e., sadness, anger, and anxiety), and (3) higher life satisfaction.

Similarly, in Study 3, I assessed the association between self-regulation and personal well-being in a sample of young adults in intimate relationships, changing my perspective from individuals to couples. To this end, I calculated partner averages in self-regulation (i.e., mean of both partners' individual self-regulation) and attempted to link them to partner averages in positive affect, negative affect, and life satisfaction (Iida et al., 2018). On the between-couple level (*Hypothesis 2a*), I found that couples with higher self-regulation typically experienced (1) more

positive affect, (2) less negative affect, but (3) not necessarily higher or lower life satisfaction. In turn, on the within-couple level (*Hypothesis 2b*), I found that on days couples reported higher self-regulation than usual, they experienced (1) more positive affect, (2) not necessarily more or less negative affect, but (3) higher life satisfaction. In addition, in terms of a more dyadic approach, I also tested how (dis)similarity in self-regulation relates to personal well-being by analyzing partner differences in each couple report. These analyses yielded some interesting new insights, revealing that, for example, when partners within a couple reported more similar self-regulation in general (i.e., between-couple level), as well as on days when partners reported more similarity in self-regulation than usual (i.e., within-couple level), they also experienced more similarity in positive affect, thus "synchronizing" in terms of both, self-regulation, and positive affect.

Thus, this dissertation substantially replicates previous research endeavors postulating a positive link between trait self-regulation and personal well-being (Cheung et al., 2014; Grund et al., 2015; Hofmann et al., 2014; Nielsen et al., 2019; Wiese et al., 2018) and further extends those findings to the level of state self-regulation. Notably, just as most of previous studies, I evaluated the link between trait self-regulation and personal well-being using linear methods, thus, implicitly assuming that higher trait self-regulation should be unilaterally either "good" (positive linear link), or "bad" (negative linear link). However, this relation might not simply be linear, but instead take more of a curvilinear form—that is, high trait self-regulation might be positively linked to increased personal well-being up to a certain level but have detrimental effect beyond this point. For example, high self-regulation is related to increased intake of fruits and vegetables instead of high fat food (Wills, 2007), which is considered to promote health up to a certain point, but can manifest in unhealthy eating habits (i.e., obsessive food restriction) beyond this point. Wiese et al. (2018) tested such a U-shaped relationship between self-regulation and well-being across multiple studies and were not able to find evidence for this assumption. However, by mainly relying on community samples, previous studies—just as much as the studies presented in this dissertation—might have systematically overlooked subgroups in which excessive self-regulation contributes to pathological processes, such as for example individuals with obsessive compulsive personality disorder (Pinto et al., 2014) or anorexia nervosa (Steinglass et al., 2012). Therefore, future research should also consider such forms of potentially detrimental "overregulation" in community and clinical samples to allow for more general conclusions. Nonetheless, considering the current state of investigation, I conclude that persons with higher trait self-control, are, indeed happier both in the long run, but also temporarily—that is, on days of elevated self-control.

But why is that? On the between-person level, previous studies suggest a variety of mechanisms underlying this relation. One proposed mechanism refers to regulatory focus. According to *Regulatory Focus Theory* (Higgins et al., 1997), people's goal-striving behavior is marked by one of two motivational orientations: While some people take a promotion focus, concentrating on growth and accomplishment, others focus on prevention, aiming to avoid failure. These differences in mindset might also influence the way that people experience and resolve goal conflict. For example, when challenged with the temptation of going out with friends rather than studying for the next exam, a student aiming to excel at their next exam (i.e., high promotion focus) might happily decline the offer and endorse a goal-approaching behavior (e.g., studying), while a student aiming not to fail their next exam (i.e., high prevention focus) might solely decline out of fear or a restrictive feeling of duty. Accordingly, it has been proposed that the link between trait self-regulation and personal well-being is partially mediated by regulatory focus, as individuals with higher trait self-regulation are more promotion-focused and less prevention-focused, which, in turn, favors happiness (Cheung et al., 2014). Other studies suggest that individuals with higher trait self-regulation are better at managing goal conflict by avoiding frequent goal conflict and balancing conflicting goals (Hofmann et al., 2014), as well as using a variety of self-control strategies to resolve goal conflict, including strategies that positively relate to personal well-being (e.g., attentional deployment, reappraisal), rather than just inhibition, which negatively relates to personal well-being (Nielsen et al., 2019). Ultimately, individuals with high trait self-regulation are more likely to experience goal accomplishment, which, in turn, can explain higher levels of personal well-being due to a sense of achievement (Galla & Duckworth, 2015).

What remains unclear is how these processes translate to state self-regulation. While there is some research indicating that applying self-regulation in the moment and thus denying oneself an immediate, attractive reward is a distressing experience associated with negative affect (Grund & Carstens, 2019; Inzlicht et al., 2015), the results of this dissertation contradict such accounts and align with study results that support a positive correlation. For example, Wenzel et al. (2021) illustrate that both, higher trait, and state self-regulation, are associated with increased affective well-being. They could, however, not show that the within-person link between self-regulation and affective well-being can be attributed to a more effective, adaptive, preventive, or variable use of (emotion) regulation strategies. Thus, future studies need to further address which mechanisms can explain the association between state self-regulation and personal well-being.

Taken together, the results of Study 1 and Study 3 mostly align with my hypotheses regarding the association between self-regulation and personal well-being, as summarized in Table 2. Nonetheless, there are some considerable exceptions. On the one hand, in Study 3, I could not confirm a link between self-regulation and negative affect on the within-couple level, and between self-regulation and life satisfaction on the within-couple level. I mainly attribute this pattern to methodological issues, as for instance boundary effects of the respective scales (i.e., little within-couple variation in negative affect, and overall high level of life satisfaction in this study sample). On the other side, in Study 1, I could not confirm a link between self-regulation and vigor both between and within individuals. This suggests seeking more nuanced assessments of affective experiences corresponding to daily fluctuations in self-regulation, for example following theoretical accounts that do not only differentiate affect in terms of valence (i.e., positive vs. negative), but also in terms of different levels of activation (e.g., Posner et al., 2005). Notably, other authors conceptualize a person's psychological well-being in an even more nuanced way, stressing, for example, the role of positive relations with others (Ryff, 1989). Therefore, as well as considering increasingly emerging research on the role of self-regulation in close relationships, another focus of this dissertation was in examining the relationship between self-regulation and relational aspects of psychosocial functioning, which I will present in the next section.

Table 2

Findings of the Three Empirical Studies in this Dissertation Referring to the Question: Did the Study's Results Support the Hypotheses Regarding the Association Between Self-Regulation and the Respective Outcome?

	Study 1		Study 2		Study 3	
	Between-Person	Within-Person	Between-Person	Within-Person	Between-Couple	Within-Couple
Personal Well-Being						
Positive Affect	Partially	Partially	-	-	Yes	Yes
Negative Affect [b]	Yes	Yes	-	-	Yes	No
Life Satisfaction	Yes	Yes	-	-	No	Yes
Relational Well-Being						
Closeness	-	-	-	-	No	Partially
Overall Interaction Quality	-	-	Yes	Yes	Yes	No

5.1.3. Association of Self-Regulation and Relational Well-Being (Hypothesis 3)

Third, I hypothesized that self-regulation is positively associated with relational well-being both on the between-person (or between-couple), and within-person (or within-couple) level—that is, relational well-being is higher in individuals or couples with higher self-regulation in general (*Hypothesis 3a*), and on days individuals or couples report higher self-regulation than usual (*Hypothesis 3b*). I tested these hypotheses in two of the presented studies of this dissertation (Studies 2 and 3).

In Study 2, I investigated the association between children's self-regulation and relational well-being in a sample of parent-child dyads. In this study, I assessed relational well-being in terms of an overall evaluation of the parent-child interactions at the end of each study day provided by both the child themselves ("Today, I got along well with my parents"), and one of their parents ("Today, I got along well with my child"). Also, children themselves, as well as one of their parents, provided daily reports on the child's self-regulation. I found that higher self-regulation in children was associated with more positive parent-child interactions on the between-person (*Hypothesis 3a*) and the within-person level (*Hypothesis 3b*), according to children's self-reports, as well as parental reports. That is, (1) children with higher self-regulation in general (i.e., across situations and time) had more positive interactions with their parents, and (2) above and beyond these between-person differences, children experienced more positive interactions with their parents on days they reported higher self-regulation than usual.

In Study 3, I added complexity to the analyses by adopting a dyadic approach and changing the perspective from individuals to couple. Thus, I assessed the association between partner averages and partner differences in self-regulation and relational well-being in a sample of young adults in intimate relationships. In this sample, I evaluated relational well-being by looking at one specific relationship process—closeness—as well as a more global index of overall relationship quality which cumulated a variety of relational processes (e.g., relationship satisfaction, commitment, etc.) in daily life (Totenhagen et al., 2012). Regarding the partner averages, we found that on the between-couple level (*Hypothesis 3a*), couples with higher self-regulation in general (1) did not typically experience more closeness, but (2) they did experience higher overall relationship quality. In contrast, on the within-couple level (*Hypothesis 3b*), on days with higher self-regulation than usual, couples (1) neither experienced more closeness, (2) nor higher overall relationship quality. On the within-couple level, however, looking at partner differences in self-

regulation revealed one interesting finding: On days more similarity in self-regulation than usual, couples experienced more closeness.

Generally, these results align with the robust body of literature which documents that high trait self-regulation is related to positive relationship outcomes (see,Righetti et al., 2022, for an overwiew). Most importantly, however, these results also extend previous research findings regarding the association of state self-regulation and relational well-being in several ways. To begin with, Study 2 shows that exerting more self-regulation than usual is accompanied by more positive interactions not only between intimate relationship partners (Crane et al., 2014), but also between children and parents. Thus, the study gives preliminary evidence that previously reported within-dyad links between self-regulation and psychosocial functioning might generalize across different relationship constellations. Furthermore, by zooming into daily life, these results extend previous developmental research showing longitudinal links between parent-child interactions and children's self-regulation (Karreman et al., 2006; Lifford et al., 2009; Morris et al., 2017), giving initial insight into how everyday life dynamics in the family might contribute to the manifestation and maintenance of (dys)functional interaction patterns (Feldman, 2015).

One explanation for the observed result patterns can, for example, be obtained from *Transactive Goal Dynamics* theory (Fitzsimons et al., 2015). As it conceptualizes two (or more) individuals in a close relationship (e.g., a child and their parents, or two intimate relationship partners) as interdependent units of one self-regulation system, it suggests exerting sometimes more and sometimes less self-regulation throughout daily life should have consequences not only for oneself, but also one's relationships. Thus, we can assume that fluctuations in children's self-regulation translate into both, the child's relational experiences, as well as the relational experiences of their parents. For example, on days of high self-regulation, children might rely less on parental support to finish tedious tasks (i.e., their homework), which, in turn, might make it easier for parents to pursue their own daily goals, thus decrease parental stress and parent-child conflict. Unfortunately, in Study 2, we did not assess parental self-regulation to more closely investigate the interdependencies between concurrent self-regulation levels of children and their parents. It can be assumed that psychosocial functioning in dyads depends on whether the combination in the self-regulatory efforts on both dyadic partners, individually, is rather well- or ill-fitting. For example, a recently published longitudinal study of married or cohabitating couples reports that the risk for relationship aggression between relationship partners is highest when both

partner exhibit low self-regulation, compared to when just one or both partners exhibit low self-regulation (Quigley et al., 2018). In the context of parent-child interactions in everyday life, this could mean that impairments in children's self-regulation only escalate in relational disruptions (and, at worst, verbal, or physical aggression) on days parents themselves also lack self-regulation. In the long run, it can be expected that such a parent-child dynamic imposes enormous levels of stress on the child, negatively affecting their self-regulation and promoting the development of disruptive interpersonal behavior. Thus, for example according to the *Self-Control Strength Model of Family Violence* (Finkenauer et al., 2015), strengthening the self-regulation of family members, especially those exposed to family violence, is crucial to escape such vicious cycles and enhance psychosocial functioning. Therefore, future studies should address how both children's *and* parents' self-regulation interact in everyday life to predict (dys)functional parent-child interactions, establishing the groundwork for the development of effective family interventions.

In Study 3, I had the opportunity to directly address such dyadic effects in the self-regulation of two relationship partners on psychosocial functioning in everyday life in the context of intimate relationships. The study extends previous research by not only considering between-couple differences (e.g., Cheung et al., 2022; Derrick et al., 2016; Quigley et al., 2018; Vohs et al., 2011), but also within-couple fluctuations. Supporting one crucial tenet of *Transactive Goal Dynamic* theory (Fitzsimons et al., 2015), the study showed that not only individual scores, but also partner averages and partner differences in self-regulation, are related to individual and relational well-being. The emerging relationship patterns largely favor accounts proposing that relational well-being is highest when both partners exhibit high self-regulation in sum (e.g., Crane et al., 2014; Quigley et al., 2018; Vohs et al., 2011), which appears unsurprising given the wide range of beneficial effects of self-regulation for psychosocial adjustment. Against my hypotheses, and in contrast to previous findings (e.g., Crane et al., 2014) as well as the results of Study 2, daily fluctuations in self-regulation were not related to relational well-being. That is, while in Study 2 parents and children got along better on days children were better capable of keeping their thoughts, feelings, and actions regulated, in Study 3 such fluctuations in self-regulation levels were not related to closeness and overall relationship quality in adults' intimate relationships. Obviously, both studies cannot be compared directly, given their focus on different levels of analyses: Individuals in dyadic relationships in Study 2, and dyads in Study 3 (Iida et al., 2018). Indeed, taking a closer look at the dyadic scores in Study 3, they reveal that instead of fluctuations in overall self-regulation (i.e., partner averages), fluctuations in the similarity of self-regulation (i.e., partner

differences) were associated to relational well-being. More precisely, on days both relationship partners experienced more similar levels of self-regulation—be it similarly high or low levels—they felt more connected to each other. This result also suggests that in everyday life, there might be circumstances in which low self-regulation can just as much benefit the relationship as high self-regulation. Think, for example, of a couple where one partner attempts to exercise more, while the other one aims to excel at their next exam at university. To this end, the first partner intends to go to the gym every other night, while the second wants to study in the meantime. At the end of the day, these partners might feel closer as they watch each other apply high levels of self-regulation to pursue their individual goals. However, they might also experience such closeness if, instead, they mutually give in to the tempting idea of spending the evening on the couch and watching a TV series together. Thus, as both fail to initiate a goal-directed behavior, they engage in a conflicting, yet shared interaction, which might temporarily benefit relational well-being (Pauly et al., 2023; Rohrbaugh et al., 2002; Shoham et al., 2007). However, this does not necessarily have to translate into increased personal well-being in the moment, and to behavior that benefits personal and relational well-being in the long run. For, example, one or both partners might directly feel bad about themselves for not sticking to their plan, or, at some point, one or both partners might feel bitter about the relationship baffling their own ambitions. Such dynamics, are potentially mirrored in the results of Study 3, given that similarity in self-regulation does not predict closeness on the between-couple level, and instead, totality rather than similarity in self-regulation predicts positive affect and life satisfaction on the within-couple level, and overall relationship quality on the between-couple level.

These result patterns might also be indicative of an asymmetry between personal and relational needs, as, for example, someone who exerts high self-regulation to achieve personal success might have to some degree sacrifice the need for relational closeness. However, as couples with higher self-regulation reported higher overall relationship quality in Study 3, high trait self-regulation appears to not only be beneficial for the self, but also for the relationship. For example, although they might not necessarily always feel close to their relationship partner as they autonomously strive for personal growth, partners with high trait self-regulation appear to successfully keep a healthy balance between both individual and relational concerns (Visserman et al., 2017). Thus, they appear to be able to focus on themselves as much as possible, while putting in the necessary work to maintain a fulfilling and affectionate relationship when needed. Overall, future studies should address such mechanisms in more detail, examining trade-offs between

personal and relational needs in the long run, as well as immediate consequences for relationships in everyday life.

To summarize, both Study 2 and 3 provide evidence in favor of my hypotheses regarding the association between self-regulation and relational well-being to some degree, with some considerable inconsistencies that I described above (see Table 2). Overall, I could, however, display evidence that across different stages in life, individuals with higher trait self-regulation capacity fare better at everyday interactions with close relationship partners.

5.2. General Limitations and Future Directions

Overall, I believe that the results of this dissertation provide novel insights to the research community broadening our understanding of the situational and social correlates of self-regulation. At the same time, in this section, I want to allude to several aspects which limit the generalizability of my findings and thus generate open questions for future investigation.

To begin with, this thesis is embedded in a research field that still lacks sufficiently clear-cut definitions of its constructs. Ever since Walter Mischel's pioneering studies on the delay of gratification in children (Mischel et al., 1972), diverse approaches to theory and research about self-regulation emerged, with studies varying massively regarding their terminology, conceptual frameworks assessment strategies, massively impeding the progress of the research field (Inzlicht et al., 2021). For example, scholars commonly use different terms, such as self-regulation, self-control, executive functioning, or effortful control, interchangeably, which others highlight to be distinguishable components and processes (Nigg, 2017). Across the three studies presented in this dissertation, we used scales that are supposed to capture what some researchers call "self-control"—that is, the ability to align one's thoughts, feeling, and actions with one (long-term) goal against another, competing (short-term) goal (Inzlicht et al., 2021). Hence, self-control can be conceived of as one of many "ingredients" in the self-regulatory process. Other ingredients encompass the setting of appropriate goals (i.e., regulatory focus), the motivation to pursue these goals (i.e., goal commitment), as well as closely monitoring goal progress, all of which might uniquely relate to personal and relational well-being (Heckhausen & Gollwitzer, 1987; Righetti et al., 2022). In the past, self-control received comparably more attention in the research of individual's psychosocial functioning. Therefore, to be able to imbed my research into previous theoretical assumptions, methodological approaches, and empirical findings, as well as to receive an even more fine-grained understanding of how self-control relates to personal and relational well-

being in everyday life, I chose to solely focus on self-control in this dissertation. However, as I will further explain in the Implications section (Chapter 6), the role of other self-regulation processes for psychosocial functioning should be addressed in future studies, following more integrative models of self-regulation to fill the existing gaps in the literature.

Furthermore, I can only draw correlational conclusions based on the three studies presented in this dissertation. Although the intensive longitudinal studies presented in this dissertation, to some extent, provide a stronger claim for causal mechanisms as they study dynamic within-person person processes while naturally controlling for stable third-variable explanations (Bolger & Laurenceau, 2013), they certainly do not allow definite judgment about causality and the direction of effects. One analytical approach to get insight into causal mechanisms from intensive longitudinal data is modelling lagged relationships, for instance, analyzing how self-regulation on one day relates to well-being the other day (Hamaker et al., 2015). However, the use of such models to infer causality is widely discussed (e.g., Lüdtke & Robitzsch, 2021), which is why I decided against conducting and reporting such analyses in the presented studies. Nonetheless, I am aware that my interpretation of the research presented in this dissertation might primarily suggests that self-regulation influences personal and relational well-being, not vice versa. This direction of effects is commonly considered in theoretical and empirical approaches (e.g., Cheung et al., 2014; Fitzsimons et al., 2015; Hofmann et al., 2014) and is supported by prospective studies suggesting that increased self-regulation in childhood predicts more adaptive developmental trajectories (Ayduk et al., 2000; Caspi, 2000; Moffitt et al., 2011). However, enhanced personal and relational well-being is also likely to influence self-regulation. For example, “feeling good” can contribute to enhanced self-regulation by more carefully processing goal-relevant information when facing goal conflict (Aspinwall, 1998), and facilitating the use of self-regulation strategies such as distracting attention away from goal-conflicting impulses (Wenzel et al., 2016). Likewise, increased relationship satisfaction in everyday life can lead to individuals to increase self-regulatory efforts through a combination of cognitive and affective processes, such as perceiving greater control over one’s goals, focusing more on goal pursuit, feeling more supported, and experiencing more positive affect (Hofmann et al., 2015). Thus, research suggests a bidirectional relation between self-regulation and psychosocial functioning: Being happy and having fulfilling relationships presumably positively impacts self-regulatory efforts, which, in turn, helps to maintain enhanced personal and relational well-being. Likewise, emotional distress and hardship can be assumed to promote the manifestation and maintenance of self-regulation problems, which,

in turn, provoke even more personal and relational distress (e.g., Finkenauer et al., 2015). Therefore, future studies should carefully disentangle these causal pathways to understand how to best foster psychosocial functioning and help individuals escape from such vicious cycles. The gold standard to reach robust causal conclusions are experiments and randomized controlled trails. In the future, these can also be integrated in intensive longitudinal designs (Loeffler et al., 2019; Reis, 2012) to better understand the timing of effects (Scholz, 2019). For example, future studies could implement planning interventions to foster self-regulation (Duckworth et al., 2011; Gollwitzer & Sheeran, 2006), and making use of ambulatory assessment protocols comparable to this studies presented in this dissertation to track whether and when changes in psychosocial functioning occur.

Moreover, the three presented studies in this dissertation rely on relatively small sample sizes, limiting the robustness of their findings. In all three studies, I aimed to reach adequate power to replicate previously reported effect sizes on the between-subject level. Given the scarcity of research on within-subject associations between self-regulation and psychosocial functioning, I was not able to derived meaningful starting values for a-priori sample size calculations to power the hypothesized within-subject effects (Bolger & Laurenceau, 2013). In turn, the studies presented in this dissertation provide the necessary estimates to calculate the sample size for future studies. Moreover, due to the small sample sizes, I also largely restrained from performing further analyses that might provide insight into processes that potentially underlie the observed associations, or factors that moderate the strength of those associations. For example, the link between self-regulation and psychosocial functioning could increase in parallel to increased interdependence between relationship partners (Fitzsimons et al., 2015), and thus be stronger in couples sharing more responsibilities regarding housekeeping or care work (e.g., cohabitating couples, parents). Future studies should therefore disentangle how the findings presented in this dissertation are influenced by sociodemographic characteristics (e.g., cohabitating partners vs. partners that live apart), psychological function (e.g., couple partners that are particularly close, such as romantic partners and parent-child dyads vs. less close relationships, such as neighbors or co-workers), and situational aspects (e.g., during transitioning periods that are more or less challenging, for example when moving housings or jobs, transitioning to parenthood or retirement, etc.) of the sample (see Implications). This will also require gathering data from more diverse samples. Unfortunately, the studies presented in this dissertation align with most empirical research relying on WEIRD (white, educated, industrialized, rich, democratic) individuals (Henrich et al., 2010) and mixed-gender

(one male, one female) coupes. Nonetheless, the research I presented in this thesis not only replicates prior findings, but also provides novel insights to the literature on self-regulation and psychosocial functioning, that now should be further extended in future studies targeting bigger and more diverse samples.

Additionally, while the use of ambulatory assessment (Trull & Ebner-Priemer, 2013) is a major methodological strength in this dissertation, the common weakness in all three presented studies is that the assessment mainly relied on self-report measures. While the intensive longitudinal designs of all three studies resolve some of the known limitations of self-report measures (e.g., memory bias), other issues may remain or be even enhanced (e.g., reliance on participants introspective abilities, susceptibility to social desirability and self-presentation), impeding data accuracy. For example, self-presentation bias might even more likely in such studies, as reporters might feel more uncomfortable to repeatedly report problematic behaviors, and due to high frequency of reports, previously rated experiences might still be accessible and serve as comparison standard influencing consequent ratings (Schwarz, 2012). Expecting that children might be less introspective, and more susceptible to self-presentation bias than adults, we complemented their self-reports by parental reports in Study 2. Although children's self-reports and parental reports were only moderately correlated, we were able to show that children's self-regulation was associated with the quality of parent-child interactions according to both, children themselves, as well as their parents, suggesting that both parties provide unique and meaningful perspectives to understanding relationship dynamics. Even though certain aspects of human experience can inevitably be assessed only through self-report measures (i.e., personal well-being), future studies should aim to replicate our finding adding more objective assessment strategies. For example, executive functioning as neurocognitive determinant of self-regulation (Miyake et al., 2000) can be assessed through a variety of mobile cognitive tasks (e.g., Buhr, 2023; Eppinger-Ruiz de Zarate et al., 2024; Schmiedek et al., 2014) and accelerometers can be used to track participants motor control (e.g., Gawrilow et al., 2014). Likewise, more objective measures can also be applied to study relationship processes in everyday life. One commonly used approach is to record short audio snippets of social interactions in everyday life (Mehl, 2017). Such recordings are considered too be more naturalistic and objective than self-reports, as they are less biased by individual recall and perception of social interactions. Due to its non-invasive character, this approach also makes it more feasible to implement flexible sampling plans during data collection. In the three studies presented in this dissertation, we applied time-congruent sampling plans with assessments always

scheduled at pre-defined time periods (e.g., each day in the evening). Choosing such fixed time frames ensures that data is better comparable between study participants and makes it possible to use statistical models treating time as a fixed and continuous covarying variable (de Haan-Rietdijk et al., 2017). However, since certain self-regulatory efforts might rely on specific situational cues (i.e., another person being present) that might not necessarily occur within these time frames, future studies should also supplement time-based sampling strategies by event-based sampling plans (Trull & Ebner-Priemer, 2013). Such sampling approach can involve asking a person's self-report after each social interaction with a close other—which relies on participants actively noticing and following the situational cue—or, activating an audio recording of the social interaction via a wearable recording device as soon as this person wearing the same device in proximity. Due to data security legislation, the application of such passive, electronically activated assessments of social interactions is currently heavily limited in Germany. However, the use of such approaches could be considered acceptable after carefully consulting, for example, how to store collected data only for research purposes, and limit recordings only to individuals consenting to participate in the study (Mehl, 2017). Considering the promising new results regarding the daily fluctuating social dynamics presented in dissertation, I encourage researchers and policy makers to develop guidelines to make broader use of such technological advances internationally.

Finally, one challenge concerning the implementation of intensive longitudinal designs is their enormous burden imposed on research participants. Researchers always must balance their scientific interests with issues concerning participant engagement. For example, on the one side, applying extensive, nuanced measures enhances the reliability and validity of findings and increasing the number of assessments might be more adequate to match theoretical assumption of how certain variables change over time, as well as increase statistical power (Calamia, 2019; van Roekel et al., 2019). On the other hand, having to repeatedly fill-out lengthy questionnaires might impede participants' willingness to complete a study, resulting in lower compliance and skewed samples (Hasselhorn et al., 2022). In the currently presented research, I managed participant burden by using rather brief measures of the examined processes. To this end, I selected adequate items from existing self-report scales that validly and reliably capture between-person differences in self-regulation (e.g., Tangney et al., 2004). Notably, such measures are typically developed for single measurement, and thus, are usually not evaluated regarding their psychometric properties in repeated measurement designs (Shrout & Lane, 2012). Therefore, in the future, scholars should attempt to develop and evaluate scales that are suitable to use in the context of intensive

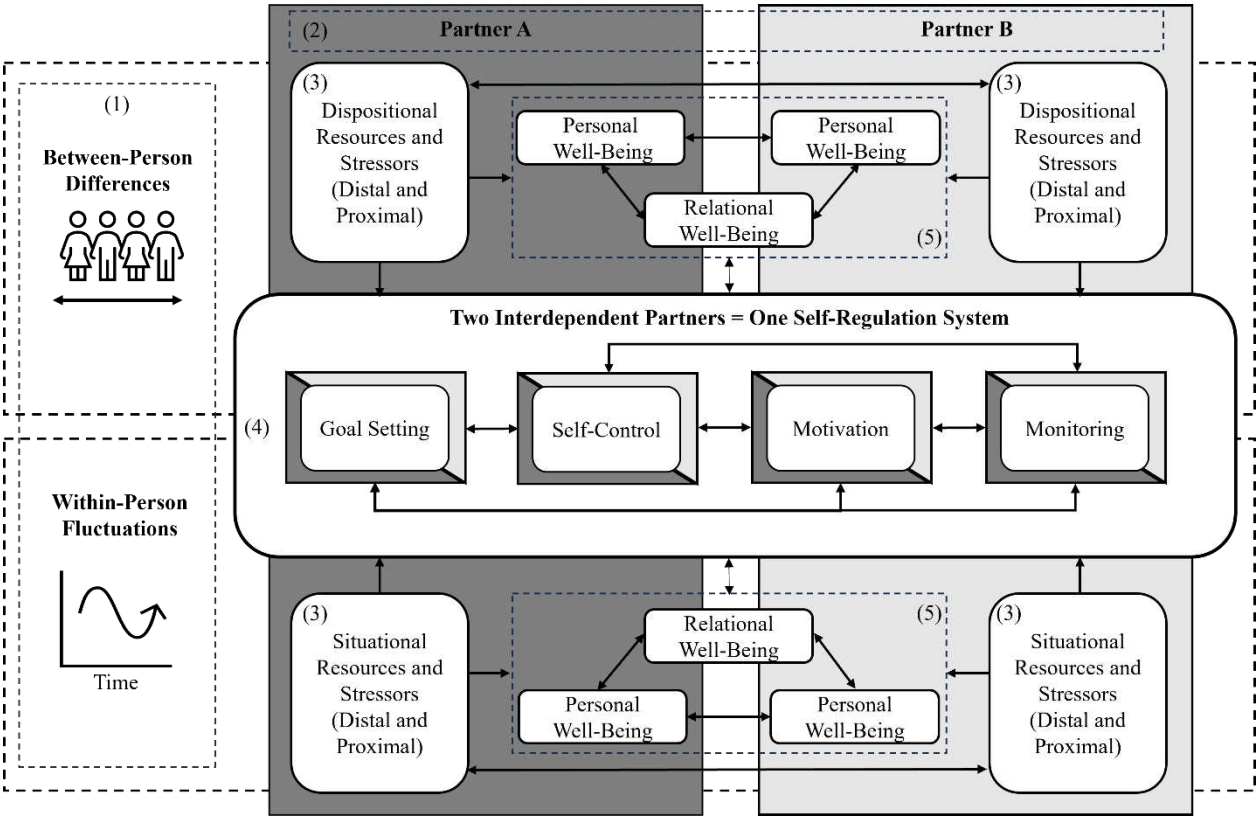
longitudinal studies across different study populations, to strengthen the evidence presented in this dissertation.

5.3. Implications for Theory, Future Research, and Practice

Based on the presented results supporting previous reports of the significance of self-regulation for psychosocial functioning (Righetti et al., 2022; Tangney et al., 2004), as well as the identified limitations of this dissertation, I now want to derive several implications, or "lessons learned", for theory and future research, but also for practical applications. In general, the implications of this dissertation are fivefold. These implications are illustrated in the conceptual framework presented in Figure 2.

Figure 2

A Conceptual Framework to Assess Self-Regulation and Psychosocial Functioning in Close Relationships in Future Research Approaches and Practical Applications



First, when evaluating the role of self-regulation for psychosocial functioning of individuals in close relationships, researchers and practitioners (e.g., couple or family counselors, therapists, social workers, teachers, etc.) should consider the interplay between stable differences in trait self-regulation and transient fluctuations in state self-regulation (Kotabe & Hofmann, 2015). From a

research perspective, this distinction is crucial, given that it is yet to be determined whether these two levels of analysis (trait vs. state) relate to one common functional system, or are represented by two qualitatively different, and potentially opposite systems (Inzlicht et al., 2021). Future research endeavors should therefore more closely review how self-regulation processes between persons (i.e., on the trait level) are comparable to processes within persons (i.e., on the state level) in association to psychosocial outcomes throughout the lifespan. To respect these two levels of analysis, researchers need to further incorporate designs that allow to disentangle how self-regulation processes fluctuate and change across different time scale (i.e., from hour to hour, day to day, month to month, or year to year) within individuals, and how these changes relate to psychosocial functioning within and between individuals. Measurement bursts designs (Sliwinski, 2008) provide a feasible approach to study both, short-term fluctuation, as well as long-term change processes without overtaxing participant burden. For example, designs applying temporally fine-grained assessment (e.g., once an hour) for several days, repeated every few months over many years, are necessary to evaluate the role of self-regulation for the development and maintenance of psychosocial functioning. In addition, from a practical perspective, the findings of my thesis mainly reinforce the notion that even individuals that typically possess high self-regulation can experience "bad days" and struggle with goal conflict, which, in turn, might result in individual and relational distress. Therefore, they might just as much benefit from self-regulation interventions as individuals with typically low self-regulation, or require specific interventions tailored to their distinct needs. Likewise, individuals with typically low self-regulation also experience days of high self-regulation, giving (mental) health care professionals the opportunity to guide their clients through the process of identifying under which circumstances they fare better at regulating their thoughts, feelings, and actions.

Second, this dissertation highlights that psychosocial functioning is the result of transactive dynamics between two (or more) relationship partners (Fitzsimons et al., 2015), which is why presumably it does not only depend on the each partner's individual self-regulatory efforts, but also their dyadic interplay. That is, the dynamics between to relationship partners are not only determined by how each partner self-regulates individually, but also how both their approaches work together in company. In the past, research dedicated abundant focus on how each relationship partner's self-regulation, individually, contributes to psychosocial functioning in close relationships (Righetti et al., 2022), but far less is known about how both partners' self-regulation, conjunctively, affect couple partners individually and the relationship altogether. For example, the

results of this thesis indicate that psychosocial functioning might not only benefit from two close relationship partners, individually, exhibiting high trait self-regulation, but also from their concurrent self-regulation levels being similarly high or low. Therefore, (relationship) researchers should routinely collect data from both relationship partners and go beyond treating them as interdependent individuals by modelling actor and partner effects (Kenny & Ledermann, 2010), contemplating other models of dyadic data analysis which might better match their conceptual frameworks (Iida et al., 2018). Taking up on this matter, future studies should also address under which circumstances similarly high or low, or, in turn, complementing levels of self-regulation are beneficial or detrimental for the relationship, using context-sensitive assessment designs. From a practical perspective, this highlights that to understand everyday relationship processes, it does not suffice to merely consider one partners self-regulatory efforts—or lacks thereof—but also how the other partner counteracts them. By addressing the whole relationship system, practitioners (e.g., couple counselors) can guide clients through the process of understanding such relational transactions and identifying circumstances in which a relationship can thrive from totaling high or low, similar, or complementing levels of self-regulation between partners, establishing strategies to find the right "fit" in the right moments.

Third, it can be assumed that the interplay of diverse dispositional and situational factors affects self-regulation on the trait and state level. For example, dispositional stressors and resources, including distal factors such as the family home (e.g.., socio-economic status, parenting style, experience of interpersonal violence) (Morris et al., 2017; van der Kolk et al., 2005), critical life events (e.g., loss of close relationship partners, chronic illness) (Turner et al., 2012; Wrosch & Freund, 2001) or stigma and discrimination (e.g.., sexism, racisms, homophobia) (Inzlicht et al., 2006; Richman & Lattanner, 2014), as well as proximal factors (e.g., distrust, hostile attribution bias, internalized stigma) (Finkenauer et al., 2015; Waugh et al., 2014) are likely to affect individuals overall capacity to apply self-regulation. In turn, distal and proximal situational stressors, and resources (e.g., the presence of a supporting partner) (Hofmann et al., 2012) might shape current self-regulation levels in the moment. Consequently, unique intersections of such dispositional stressors and resources presumably moderates the role of self-regulation on the psychosocial functioning of individuals and couples, while situational factors might explain whether, how, and when their self-regulation fluctuations translate into enhanced or diminished psychosocial functioning. Going forward, one major challenge in determining these heterogenous conditions will be closing the systematic gap of data from groups that are typically

underrepresented in research. This will require the development and routine use of sophisticated assessment tools to capture population diversity allowing for meta-analytical inquiries across single studies, multi-centric collaborations, and the installation of large databases ensuring safe data storage in the future (Stadler, Chesaniuk, et al., 2023). Identifying these determinants can massively contribute to the development of adaptive interventions for practical application, tailored to the specific needs of the individual or couple (e.g., Given diverging experiences with stigma, do individuals in same-gender and mixed-gender couples need the same or different self-regulation strategies to stay happy?), as well as the requirements of certain time points or contexts (e.g., Given fluctuations in environmental demands, what kind of self-regulation strategies do individuals during more or less stressful time periods?).

Fourth, beyond self-control as a proxy to self-regulation, scholars and practitioners should address the interplay between different self-regulation processes in evaluating how self-regulation affects individuals in close relationships. For example, following process-orientated models of self-regulation (Carver & Scheier, 1998; Heckhausen & Gollwitzer, 1987), Righetti et al. (2022) identify four ingredients of self-regulation that might be of relevance for relational processes: Setting of goals (e.g., regulatory focus), self-regulation capacity (i.e., self-control), motivation (e.g., goal commitment), and monitoring of goal progress. This dissertation studies self-control and psychosocial functioning in isolation of other self-regulatory processes, just as most previous studies. However, there are examples pointing towards interplays between these ingredients, such as higher promotion focus mediating the link between high trait self-control and increased positive affect (Cheung et al., 2014). Future research should more closely consider such interplays across different levels of analyses (i.e., between-person vs. within-person level, individual vs. couple level) to account for the complexity of self-regulatory processes and to develop integrative models of self-regulation and psychosocial functioning.

Fifth, this dissertation points toward differential effects of self-regulation on specific personal and relational outcomes, therefore, the complex interplay between these outcomes should be considered more closely in the future. For example, one of my studies (Study 1) shows that higher self-regulation is accompanied by higher positive affect in terms of feeling calmer and less troubled, but not necessarily in terms of feeling joyful and excited in life. Likewise, another study (Study 3) shows that the role of self-regulation might differ when assessing more specific relational experiences, such as closeness, or considering rather global evaluations of the quality of the

relationship. Furthermore, this thesis hints at certain trade-offs between personal and relational well-being related to high self-regulation, seeing that in Study 3, high self-regulation was related to increased personal well-being in couples, but not with closeness. It is likely that endeavors promoting self-regulation promoting individual growth and personal accomplishment might, in some cases, lead close relationship partners to feel more distant and hurt their relational ties. In turn, engaging in self-regulation efforts to benefit the relationship can come at the cost of undermining one's personal needs. Initial research suggests that individuals with high trait self-regulation "intuitively" find an appropriate balance between their own and their partner's needs (Visserman et al., 2017). Future research should aim at identifying mechanisms that help relationship partners bridge across their respective individual and relational needs, informing intervention techniques for those relationship partners that struggle finding such balance.

6. Conclusions

Self-regulation has been in the focus of psychological research and related fields for several decades. This research identified self-regulation as a fundamental determinant of individual accomplishment and health, but also social relationships. This dissertation provides novel insights to this research by linking three current directions in the study of self-regulation. First, it accounts for both stable, trait-like differences and transient, state-like changes in self-regulation. Second, it compares links between self-regulation and personal well-being (i.e., affect, life satisfaction) at both levels of analysis (i.e., trait and state). Third, it investigates the role of trait and state self-regulation in close relationships from an individual, but also from a dyadic perspective. The results presented in this dissertation broaden our understanding of the psychosocial correlates of self-regulation in everyday life, extending previous findings mainly focusing on trait-like differences in self-regulation across time. In Study 1, I showed that on days of higher self-regulation than usual, undergraduate students report enhanced serene affect, diminished negative affect, and increased life satisfaction. Furthermore, in Study 2, I showed that on days children report higher self-regulation than usual, they report to get along better with their parents, which is also mirrored in parent's perceptions of the daily interactions with their child. Finally, in Study 3, I showed that on days couples report higher self-regulation on average, they also report enhanced positive affect and life satisfaction, yet couples experienced more closeness on days both partners reported similar, rather than simply high levels of self-regulation. Overall, this dissertation provides useful insight into the everyday experiences of human beings across different age groups (children and adults), hinting at how daily interactions with close relationship partner (e.g., parents and intimate relationship partners) relate to the maintenance of self-regulation efforts on the one side or self-regulation deficits on the other side. Future studies are required to further examine the mechanisms underlying the observed results, which should further account for the different levels of analysis (i.e., between-person vs. within-person, individual vs. dyadic, and global vs. specific assessments of self-regulation and psychosocial processes in close relationships) considered in this dissertation. Most importantly, future studies should fill current gaps in the literature regarding the antecedents and consequences of individual self-regulation fluctuations in everyday life, to gather a more comprehensive picture of the reciprocal effects between individuals and their close surroundings. This will be the starting point to develop effective self-regulation interventions tailored to specific individuals in the right moments and contexts, helping humans to life a fulfilling life and nourish well-functioning and supporting relationships.

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Appendix A: Fluctuations in Self-Regulation and Personal Well-Being (Study 1)

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Self-control fluctuates from day to day and is linked to subjective well-being within and between persons

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Abstract

The psychological trait of self-control has been linked to interindividual differences in subjective well-being: Individuals with higher self-control report less negative affect, more positive affect, and higher life satisfaction. However, less is known about how much self-control fluctuates from day to day and how these fluctuations are related to subjective well-being. This intensive longitudinal study describes day-to-day fluctuations in self-control and investigates whether and how they are related to subjective well-being. A sample of 64 undergraduate students at the entry phase of university ($M = 22.55$ years, $SD = 6.51$, range = 18–53, 97% female) provided 1459 reports of their self-control and subjective well-being, collected every evening across three 9-day measurement bursts over 6 months. Participants' self-control fluctuated substantially from day to day with less than 40% of the variability in daily self-control being attributable to interindividual differences in self-control. On days with higher self-control, participants reported less negative affect, more serenity, and

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higher life satisfaction. We found no relationship between self-control and vigor. The findings suggest that researchers need to go beyond current assessment practices and theories treating self-control as a stable trait to help develop tailored well-being interventions for everyday life.

KEYWORDS
affect, daily diary study, life satisfaction, self-control, self-control fluctuations, subjective well-being

INTRODUCTION

Since Mischel's early experiments (e.g. Mischel et al., 1972), self-control—that is, the ability to orchestrate one's actions, feelings, and thoughts to pursue long-term goals (i.e. by resisting short-term temptations; Tangney et al., 2004)—has been studied abundantly as a rather stable personality trait that differs between individuals. This research quite consistently suggests a beneficial role of high trait self-control throughout a broad range of life domains, such as better achievements at school and work, more adaptive health behaviors, and better overall psychosocial adjustment (e.g. de Ridder et al., 2012; Hagger et al., 2019; Tangney et al., 2004). Lately, researchers also considered how self-control relates to subjective well-being. Subjective well-being is typically conceptualized as a multifaceted construct. It encompasses an affective component (i.e. affective well-being), referring to experiencing a hedonic balance of positive and negative affect, and a cognitive component, also referred to as life satisfaction, as one's global evaluation of different life domains (Diener, 2009).

In contrast to stereotypical beliefs that self-control implies denying oneself joy and pleasure, empirical studies highlight a positive relationship between high trait self-control and subjective well-being: People with high levels of self-control typically report less negative affect, more positive affect, and higher life satisfaction (Cheung et al., 2014; Grund et al., 2015; Hofmann et al., 2014; Nielsen et al., 2019; Stavrova et al., 2020; Wiese et al., 2018). This could be due to the fact that people with high trait self-control manage goal conflict more favorably (Grund et al., 2015; Hofmann et al., 2014) by using antecedent-focused self-control strategies (Nielsen et al., 2019). For example, people with high self-control might be able to shift their attention away from distractions more easily, thus maintaining smoother goal pursuit, which in turn could lead to increased well-being (Hofmann et al., 2014). Likewise, high well-being could contribute to more self-control by reducing the urge to give in to short-term temptations and facilitating the use of self-regulatory strategies (Aspinwall, 1998). Thus, theory suggests a bidirectional link between self-control and subjective well-being, supported by research on the between-person level.

However, it has long been proposed that self-control does not only account for differences between individuals (i.e. trait self-control) but also fluctuates in time within individuals due to internal and external factors, such as changes in motivation and social and environmental demands (i.e. state self-control; Baumeister et al., 2007). Thus, individuals might show higher self-control on one occasion, while not being able to regulate their behaviors, thoughts, and emotions on another occasion. Initial studies show, for example, that self-control is diminished under high

levels of alcohol intoxication and is influenced by the presence of others when facing goal conflict (Hofmann et al., 2012). Meanwhile, high state self-control predicts healthy behaviors, such as engagement in physical activity, above and beyond trait self-control (Schöndube et al., 2017). Also, on days with higher self-control, individuals report less arguing and anger toward their partners (Crane et al., 2014) as well as more marital satisfaction (Buck & Neff, 2012). In addition, individuals experience less stressors on days with high self-control and subsequent days (Park et al., 2016) but indicate more mental exhaustion when having to resist temptations (Milyavskaya & Inzlicht, 2017). Hence, the question arises whether such fluctuations in self-control across time are also accompanied by within-person changes of subjective well-being.

Complementing the research on the link between self-control and subjective well-being on the between-person level with studies on the within-person level has, in our view, three main advantages. First, the link might differ in direction and size on the between- and within-person levels (Curran & Bauer, 2011). Second, results obtained on the within-person level cannot be explained by rather stable third variables, such as age, socioeconomic status, health-related variables, or personality traits (Hamaker, 2012). Finding a within-person link provides a stronger claim that there may be a causal relationship because stable third-variable explanations are naturally controlled for by sampling data from the same person across multiple time points in within-person designs (i.e. intensive longitudinal designs; Bolger & Laurenceau, 2013). Third, such designs allow researchers to examine if psychological constructs covary within a certain time frame and thus enable researchers to theorize about temporal matters, including the timing of psychological interventions (Scholz, 2019). For example, establishing daily covariation in self-control and subjective well-being encourage efforts to improve subjective well-being with short-term interventions helping to overcome momentary lack of self-control complementing interventions targeting trait self-control. Taken together, research on the within-person level is a crucial ingredient for establishing a dynamic understanding of the link between self-control and subjective well-being.

So far, within-person links between self-control and well-being have mostly been studied with a focus on participants' affective experiences. Momentary self-control success (i.e. high state self-control) is linked to better affective well-being (Wenzel et al., 2021; Wiese et al., 2018). Furthermore, one study showed that applying a specific self-control strategy—shifting attention away from tempting distractions—was linked to higher positive affect (Wenzel et al., 2016). Neither of these studies considered how everyday fluctuations in self-control relate to life satisfaction. This is probably due to the notion that affective well-being and life satisfaction differ regarding their temporal stability, with affective well-being changing more dynamically in everyday life than life satisfaction (Diener, 2009). However, as affective well-being and life satisfaction have distinct correlates, it has been suggested that researchers "equate the time frames across all measures of [subjective well-being] to ensure that the empirical differences between these components reflect structural differences rather than the influence of different time frames on the information that is cognitively activated" (Luhmann et al., 2012, p. 13). To our knowledge, there is only one study on the link between self-control and subjective well-being measuring affective well-being and life satisfaction concurrently (Buyukcan-Tetik et al., 2018). This study implemented biweekly assessments over 39 weeks, providing evidence that higher self-control is linked to better affective well-being as well as life satisfaction within persons.

Given the scarcity of research investigating the within-person link between self-control and subjective well-being in general and life satisfaction in particular, the current study promises to make several contributions to the literature. First, it investigates real-life fluctuations in self-control and subjective well-being, providing ecologically valid data on their within-person link (Reis, 2012). Second, following Buyukcan-Tetik et al. (2018), the current study considers

fluctuations in both affective well-being and life satisfaction within the same time frame. However, given that self-control fluctuations occur on a day-to-day basis (e.g. Hofmann et al., 2012), it aims to extend previous findings by applying an even more fine-grained, daily assessment. Finally, the current study draws on a sample of undergraduate students at the entry phase of university. First-year students are facing an important and not uncommonly stressful transition period in their life (de Paula et al., 2022; Tosevski et al., 2010). Facing more freedom but also a demanding study schedule, the first-year students need to establish new routines—which poses high self-regulatory demands on them (To et al., 2021). Thus, investigating individual trajectories and covariations in their self-control and subjective well-being was of particular interest to us.

Overall, we predict that self-control fluctuates reliably from day to day and that undergraduate students show less negative affect, more positive affect (i.e. vigor and serenity), and higher life satisfaction on days with higher self-control than usual (within-person links). Replicating prior research, we also expect that undergraduate students with higher self-control report less negative affect, more positive affect (i.e. vigor and serenity), and higher life satisfaction in general (between-person links).

METHODS

Sample and design

In this intensive longitudinal study, undergraduate students ($N = 64$; 97% women; age: $M = 22.55$ years, $SD = 6.51$, range = 18–53 years) filled out up to 27 daily evening surveys in three measurement bursts (9 days each) over 6 months. Students were eligible for study participation if they were enrolled as first semester students in the undergraduate psychology program at university and gave written informed consent to participate. Participants provided 1459 valid entries, which is 84.4% of a maximum of 1728 possible entries (3 bursts × 9 days × 64 participants; see Figure S1 for flow of participants in the study).[1] The study was approved by the national psychological ethics committee established by the German Psychological Association.

Procedure

Participants were recruited via introductory lectures for psychology students and an announcement on the notice board at the Department of Psychology. Upon their consent, participants indicated whether they preferred to receive links to the online surveys (i.e. background questionnaires asking for sociodemographic information and daily surveys) via email and/or text message. Daily survey links were sent out at 3 p.m. on nine consecutive days, and participants were instructed to answer within 1 h of going to bed. It took up to 10 min to fill out each daily survey. All participants received course credit for their participation. The study started at the beginning of participants' first semester (Burst 1) and continued during exam preparation at the end of first semester (Burst 2) and at the beginning of the second semester (Burst 3). These time points were chosen to track undergraduate students' individual trajectories throughout the entry phase of university.

[1] https://osf.io/4wu39/?view_only=83b379cb5a994b008d6fd8e5013d5e93

Measures

Our measures were adapted from commonly used, reliable, and validated self-report inventories. For each measure, we computed reliability estimates on the between-person level (i.e. reliability of interindividual differences) and the within-person level (i.e. reliability of intraindividual changes from day to day; Shrout & Lane, 2012), which all showed excellent between-person reliability and acceptable to high within-person reliability (Table 1).

Self-control

To measure daily self-control, we adapted six items of the *Brief Self-Control Scale* (Tangney et al., 2004; e.g. "Today, I was good at resisting temptation," 1 = *not at all true*, 5 = *totally true*). We decided against the use of a comprehensive inventory to keep daily participant burden in this intensive longitudinal study manageable (Trull & Ebner-Priemer, 2020) and chose the respective items based on their high face validity in everyday life.

Subjective well-being

Each evening, participants indicated their current affect ("How do you feel right now?," 1 = *not at all*, 5 = *extremely*) using items from the *Profile of Mood States-15* scale (Cranford et al., 2006). To assess *negative affect*, we used nine items (angry, resentful, annoyed, anxious, on edge, uneasy, sad, hopeless, and discouraged). To assess *vigor*, we used three items (vigorous, cheerful, and lively), which captures pleasant-activated affect. In addition, we included three items to assess *serenity* (i.e. relaxed, calm, and at ease; Cohen et al., 2003) to also capture pleasant-deactivated affect. To measure daily life satisfaction, participants were asked "How satisfied are you regarding the following domains right now?" (1 = *very unsatisfied*; 5 = *very satisfied*), with each of the following five domains rated separately: family, friends, school (university), myself, and life in general (Diener, 2009).

TABLE 1 Means, standard deviations, reliability coefficients, and intercorrelations with confidence intervals.

Variable	*M*	SD_b	SD_w	ICC	R_{KF}	R_C	1	2	3	4
1. Self-control	3.18	0.45	0.63	.39	.97	.69				
2. Negative affect	1.56	0.40	0.46	.44	.99	.85	−.34** [−.54, −.11]			
3. Vigor	2.44	0.56	0.65	.44	.98	.73	.20 [−.05, .42]	−.15 [−.39, .10]		
4. Serenity	2.95	0.54	0.67	.45	.98	.69	.27* [.03, .48]	−.33* [−.53, −.09]	.54** [.34, .69]	
5. Life satisfaction	3.71	0.50	0.35	.57	.99	.64	.41** [.18, .59]	−.57** [−.71, −.37]	.48** [.27, .65]	.47** [.26, .64]

Note: *M*, SD_b, and SD_w are used to represent the mean and the between-person and average within-person standard deviations, respectively. ICC refers to the intercorrelation coefficient, R_{KF} to between-person reliability, and R_C to within-person reliability. Values in square brackets indicate the 95% confidence interval for each correlation.
*$p < 05$, and **$p < .01$.

Data analysis

We conducted a power analysis for replicating the between-person link between self-control and subjective well-being based on a previous meta-analysis (de Ridder et al., 2012) reporting a medium effect size ($r = .33$). A cross-sectional replication requires a sample size of at least 69 participants to detect an effect of $r = .33$ with 80% power assuming $\alpha = .05$ conducting a two-tailed test (Faul et al., 2009). We were not able to reach the planned sample size with only 64 participants providing valid data for analysis. However, we believe that the current study with its multiple repeated assessments of both self-control and subjective well-being was expected to have higher reliability and thus less error for this between-person link, allowing for a somewhat smaller sample size. Moreover, the current study with its detailed description of random effects will provide the necessary estimates for informing power analyses for future studies with sufficient sample size (Bolger & Laurenceau, 2013) to examine the within-person effect of self-control and subjective well-being.

We confirmed that the time stamps registered online for each survey entry were in line with the study protocol (i.e. filled out once and on time each evening). To analyze between- and within-person links between self-control and subjective well-being, we used multilevel models with random intercept and slope for within-person fluctuations in self-control (Bolger & Laurenceau, 2013). To differentiate the effect of within-person fluctuations from trait-like individual differences in the predictor self-control, we split the raw scores into two components via centering of the scores: a *between-person component*, centered at the grand mean across person means, indicating individual i's trait-like tendency for higher/lower self-control than other participants, and a *within-person component*, centered at each individual's person mean, indicating individual i's tendency on day t for higher/lower self-control than usual. To facilitate the interpretation of results and comparison of within- and between-person effects, we divided the predictor (within-person fluctuations and between-person differences in self-control) and each of the four well-being outcomes (negative affect, vigor, serenity, and life satisfaction) by the respective between-person standard deviation across the study period to identify small, moderate, and large effect sizes in standard deviation units (Cohen, 1992). We chose between-person standardization to keep in line with the research literature, which so far mainly focused on the between-person links.

For each well-being outcome, we calculated a two-level regression model (Equation 1), including two-way interactions between self-control (between-person and within-person) and each study burst (with Burst 1 being the reference group), to test the link between self-control and each well-being outcome, while accounting for changes in this link over time. We also included a linear time slope to control for systematic increase or decrease in each well-being outcome within each study burst, as well as two-way interactions between this linear time slope and the study burst, to control for different change rates across bursts.

$$\begin{aligned} WellBeing_{it} = {} & (\gamma_{00} + u_{i0}) + (\gamma_{01} + u_{i1})\,\mathrm{Day}_{it} + \gamma_{02}\,\mathrm{SelfConB}_{i} + (\gamma_{03} + u_{2i})\,\mathrm{SelfConW}_{ti} + \gamma_{10}\,\mathrm{Burst2}_{it} \\ & + \gamma_{11}\,\mathrm{Burst2}_{it} \times \mathrm{Day}_{it} + \gamma_{12}\,\mathrm{Burst2}_{it} \times \mathrm{SelfConB}_{i} + \gamma_{13}\,\mathrm{Burst2}_{it} \times \mathrm{SelfConW}_{ti} \\ & + \gamma_{20}\,\mathrm{Burst3}_{it} + \gamma_{21}\,\mathrm{Burst3}_{it} \times \mathrm{Day}_{ti} + \gamma_{22}\,\mathrm{Burst3}_{it} \times \mathrm{SelfConB}_{i} + \gamma_{23}\,\mathrm{Burst3}_{it} \\ & \times \mathrm{SelfConW}_{ti} + \varepsilon_{it}. \end{aligned} \tag{1}$$

Thus, we used this model to test whether the following fixed effects differed from 0:

a. an intercept, γ_{00}, representing the mean level of the outcome on Day 1 of Burst 1 for a participant with an average level of self-control in the sample;
b. an average linear time trend, γ_{01}, indicating the change in the outcome across time, with Day 1 in Burst 1 coded as 0, Day 10 (the first day in Burst 2) as 1.00, and Day 19 (the first day in Burst 3) as 2.00, with equal increments in between;
c. the between-person effect of self-control in Burst 1, centered at the grand mean of self-control over all person means and all bursts, γ_{02}, indicating the difference in the outcome for participants with higher self-control of one unit (i.e. one between-person standard deviation in self-control), compared with the typical participant's self-control;
d. the within-person effect of self-control in Burst 1, centered at the participant's person mean over all bursts, γ_{03}, indicating the change in the outcome on days with higher self-control of one unit (i.e. one between-person standard deviation in self-control) than the participant's usual amount of self-control;
e. the difference in the mean level of the outcome in Burst 2 (coded 1) versus Burst 1 (coded 0), γ_{10};
f. the difference in the average linear time trend in Burst 2 versus Burst 1, γ_{11};
g. the difference in the between-person effect of self-control in Burst 2 versus Burst 1, γ_{12};
h. the difference in the within-person effect of self-control in Burst 2 versus Burst 1, γ_{13};
i. the difference in the mean level of the outcome in Burst 3 (coded 1) versus Burst 1 (coded 0), γ_{20};
j. the difference in the average linear time trend in Burst 3 versus to Burst 1, γ_{21};
k. the difference in the between-person effect of self-control in Burst 3 versus Burst 1, γ_{22}; and
l. the difference in the within-person effect of self-control in Burst 3 versus Burst 1, γ_{23}.

The model also tested whether the following between- and within-person random effects differ from 0: The random intercept, u_{0i}, captures how much a participant deviates from the average intercept (i.e. random intercept); the random time slope, u_{1i}, captures how much a participant deviates from the average time slope; and the random self-control slope, u_{2i}, captures how much a participant deviates from the average within-person effect (i.e. association between self-control and the outcome in Burst 1). Finally, the residual error, ε_{it}, indicates how much a participant on a given day deviates from the outcome value predicted by their person-specific regression line.

We allowed for a maximal random effects structure with covariances of all random effects. To account for the longitudinal data structure, we modeled time dependence of the residuals with a first-order autoregressive structure (Bolger & Laurenceau, 2013). All models were conducted with restricted maximum likelihood estimation and a probability level of $p < .05$ to indicate significance using the nlme package (version 3.1–153) in R (version 4.2.2). The analyses reported in this article were not preregistered. To ensure full transparency and enable reproducibility, the data, as well as the used analysis script, can be openly accessed via the Open Science Framework (see link above).

RESULTS

Descriptive statistics for all study variables are depicted in Table 1, including their intercorrelations on the between-person level. As expected, participants showed considerable intra-individual variations across time, with self-control, vigor, and serenity fluctuating around the

midpoint, negative affect within the lower third, and life satisfaction within the upper third of their respective scale. Only 39% (ICC = .39) of the variability in daily self-control was due to individual differences in self-control, while the remaining 61% was attributable to within-person fluctuations and residuals (see Figure 1 for a breakdown of three example participant's

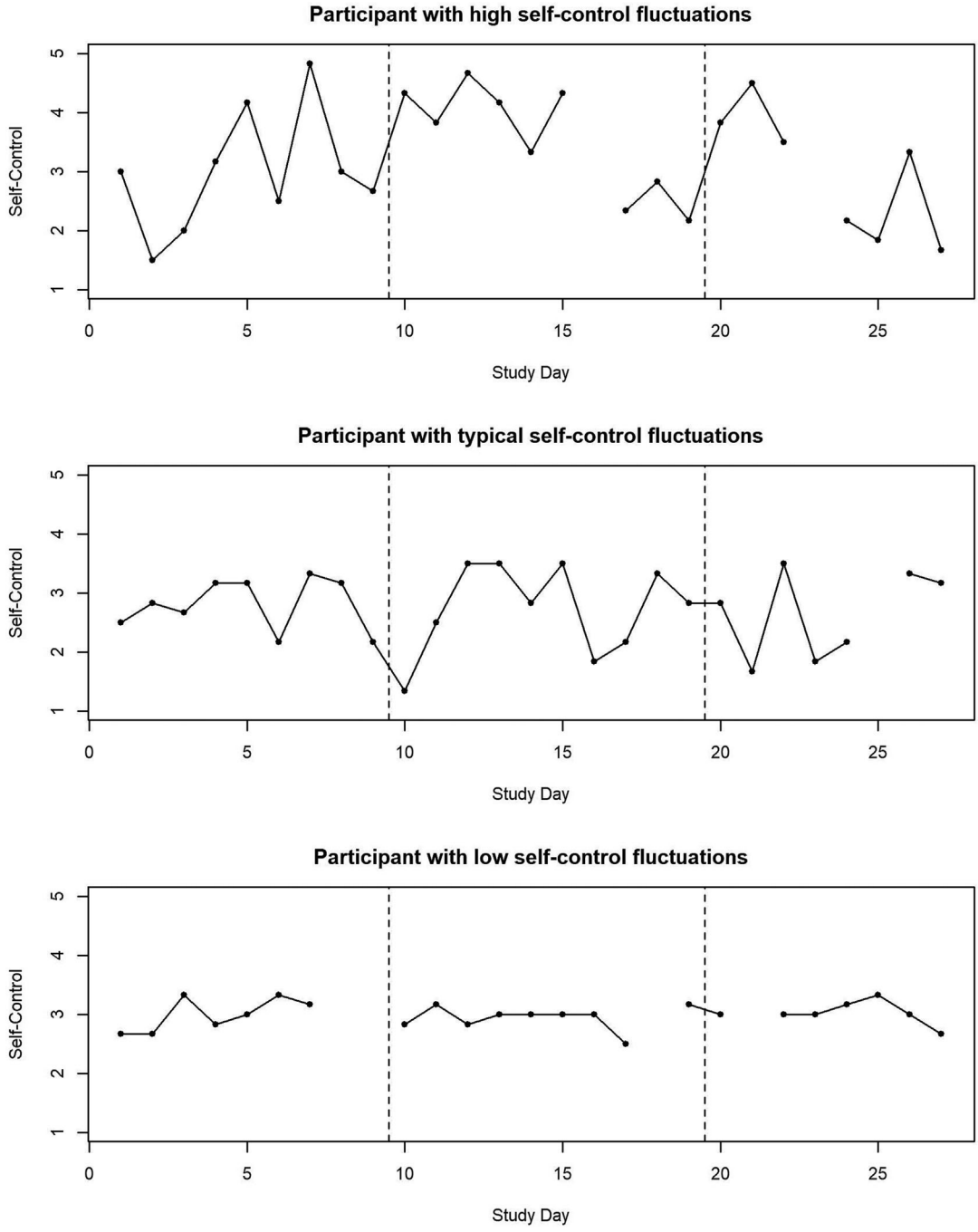

FIGURE 1 Within-person fluctuations in self-control for three example participants with high, typical, and low self-control fluctuations.

self-control variability). For the well-being outcomes, between 44% (negative affect) and 57% (life satisfaction) of the variability resulted from individual differences.

To analyze within- and between-person links between daily self-control and each well-being outcome, we computed four separate multilevel models (Bolger & Laurenceau, 2013; see Table 2 and Figure 2). First, we found a negative within-person link between self-control and negative affect: On days with higher self-control, participants reported less negative affect than on days with lower self-control during the initial burst ($\gamma_{03} = -0.14$, $p < .001$), and this within-person link did not change significantly in subsequent bursts (see Table S1 for separate analyses of anger, anxiety, and depressed affect, which all yielded a comparable results pattern). Second, unexpectedly, we found no within-person link between self-control and vigor; however, this link showed comparably large between-person variation (random self-control slope $\tau_{22} = 0.14$). Third, we found a positive within-person link between self-control and serenity: On days with higher self-control, participants reported more serenity than on days with lower self-control during the initial burst ($\gamma_{03} = 0.15$, $p < .001$), and this within-person link did not change significantly in subsequent bursts. Fourth, we found a positive within-person link between self-control and life satisfaction: On days with higher self-control, participants reported higher life satisfaction than on days with lower self-control during the initial burst ($\gamma_{03} = 0.10$, $p < .001$), and this within-person link did not change significantly in subsequent bursts.

Furthermore, we replicated prior research reporting between-person links between self-control and negative affect, as well as life satisfaction. Participants with higher self-control reported less negative affect ($\gamma_{02} = -0.23$, $p = .047$) and higher life satisfaction ($\gamma_{02} = 0.44$, $p < .001$) than students with lower self-control during the initial burst. For negative affect, the between-person link was lower in Burst 2 compared with Burst 1 ($\gamma_{12} = -0.21$, $p = .025$), but not in Burst 3 compared with Burst 1. For life satisfaction, the between-person link did not change significantly in size in subsequent bursts. Regarding positive affect, the between-person link between self-control and vigor was positive but did not reach significance in Burst 1 ($\gamma_{02} = 0.26$, $p = .052$), was lower in Burst 2 in the stressful exam period ($\gamma_{12} = -0.18$, $p = .036$), and showed the same effect size in Burst 3 as in Burst 1. We found a consistently positive between-person link between self-control and serenity: Participants with higher self-control reported more serenity during the initial burst ($\gamma_{02} = 0.33$, $p = .012$), and this between-person link did not change significantly in size in subsequent burst. Overall, the effect sizes for the between-person link were greater than the effect sizes for the within-person link for each measurement burst.

In addition, we found a temporal decline in vigor during Burst 1 ($\gamma_{01} = -0.61$, $p = .001$), with no significant change in slope during Burst 2 compared with Burst 1, but during Burst 3 compared with Burst 1 ($\gamma_{21} = 0.59$, $p = .036$), indicating no decrease in vigor during Burst 3. Also, we found a decline in serenity during Burst 1 ($\gamma_{01} = -0.57$, $p = .007$), with no significant change in slope in subsequent bursts. Finally, we found overall lower life satisfaction ($\gamma_{10} = -0.62$, $p = .003$) and elevated negative affect ($\gamma_{10} = 0.67$, $p = .048$) during the stressful exam period in Burst 2 compared with Burst 1.

DISCUSSION

This intensive longitudinal study quantified the extent of self-control variability in the everyday life of undergraduate students at the entry phase of university. Although up to now, this construct has been studied predominantly as a rather stable personality trait (e.g. de Ridder

TABLE 2 Multilevel models to test the within- and between-person associations between self-control and each subjective well-being outcome.

		Negative affect		Vigor		Serenity		Life satisfaction	
Fixed effects		**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**	**Estimate**	**SE**
Burst 1 (start of first semester)									
Intercept: Initial level	γ_{00}	3.70***	0.14	4.76***	0.15	5.85***	0.16	7.42***	0.14
Time slope	γ_{01}	−0.20	0.21	−0.61**	0.18	−0.57**	0.21	0.13	0.13
Self-control, between-person differences	γ_{02}	−0.23*	0.11	0.26^{+}	0.13	0.33*	0.13	0.44***	0.11
Self-control, within-person fluctuations	γ_{03}	−0.14***	0.04	0.04	0.04	0.14***	0.04	0.10***	0.03
Change at burst 2 (end of first semester), compared with burst 1									
Change in level	γ_{10}	0.67*	0.34	−0.30	0.30	0.02	0.34	−0.62**	0.21
Change in time slope	γ_{11}	0.09	0.31	0.35	0.30	0.001	0.31	0.27	0.19
Change in between-person effect of self-control	γ_{12}	−0.21*	0.10	−0.18*	0.09	−0.07	0.10	0.10	0.06
Change in within-person effect of self-control	γ_{13}	−0.01	0.05	0.05	0.05	−0.10^{+}	0.06	−0.006	0.03
Change at burst 3 (start of second semester), compared with burst 1									
Change in level	γ_{20}	0.48	0.57	−0.13	0.51	0.17	0.58	−0.58^{+}	0.35
Change in time slope	γ_{21}	0.007	0.31	0.59*	0.27	0.40	0.31	0.31	0.19
Change in between-person effect of self-control	γ_{22}	−0.17	0.11	−0.07	0.11	−0.11	0.12	−0.05	0.09
Change in within-person effect of self-control	γ_{23}	0.06	0.05	−0.01	0.06	−0.07	0.06	−0.01	0.03
Random effects[a]		**Estimate**	***SE***	**Estimate**	***SE***	**Estimate**	***SE***	**Estimate**	***SE***
Level 2 (between persons)									
Intercept: Initial level	τ_{00}	0.73	0.16	0.97	0.21	0.92	0.21	0.97	0.20
Time slope	τ_{11}	0.19	0.03	0.26	0.03	0.25	0.04	0.26	0.02
Self-control within-person fluctuations	τ_{22}	0.14	0.009	0.14	0.009	0.09	0.007	0.11	0.004
Intercept and time	τ_{01}	0.35	0.05	−0.17	0.06	−0.20	0.07	−0.44	0.05
Intercept and self-control within-person fluctuations	τ_{02}	−0.33	0.03	0.33	0.03	−0.29	0.03	−0.65	0.02
Time and self-control within-person fluctuations	τ_{12}	−0.43	0.01	−0.005	0.01	0.58	0.01	0.27	0.007
Level 1 (within persons)									
Residual	ε_{it}	1.16	0.06	1.15	0.05	1.24	0.06	0.69	0.02
Autocorrelation	ρ	0.25	0.03	0.04	0.03	0.15	0.03	0.30	0.03

[a]For facilitating their interpretation, we reported all random components in standard deviation and correlation metric, whereas their standard errors refer to the (co)variation metric.
$^{+}p < .10$.
*$p < .05$, **$p < .01$, and ***$p < .001$.

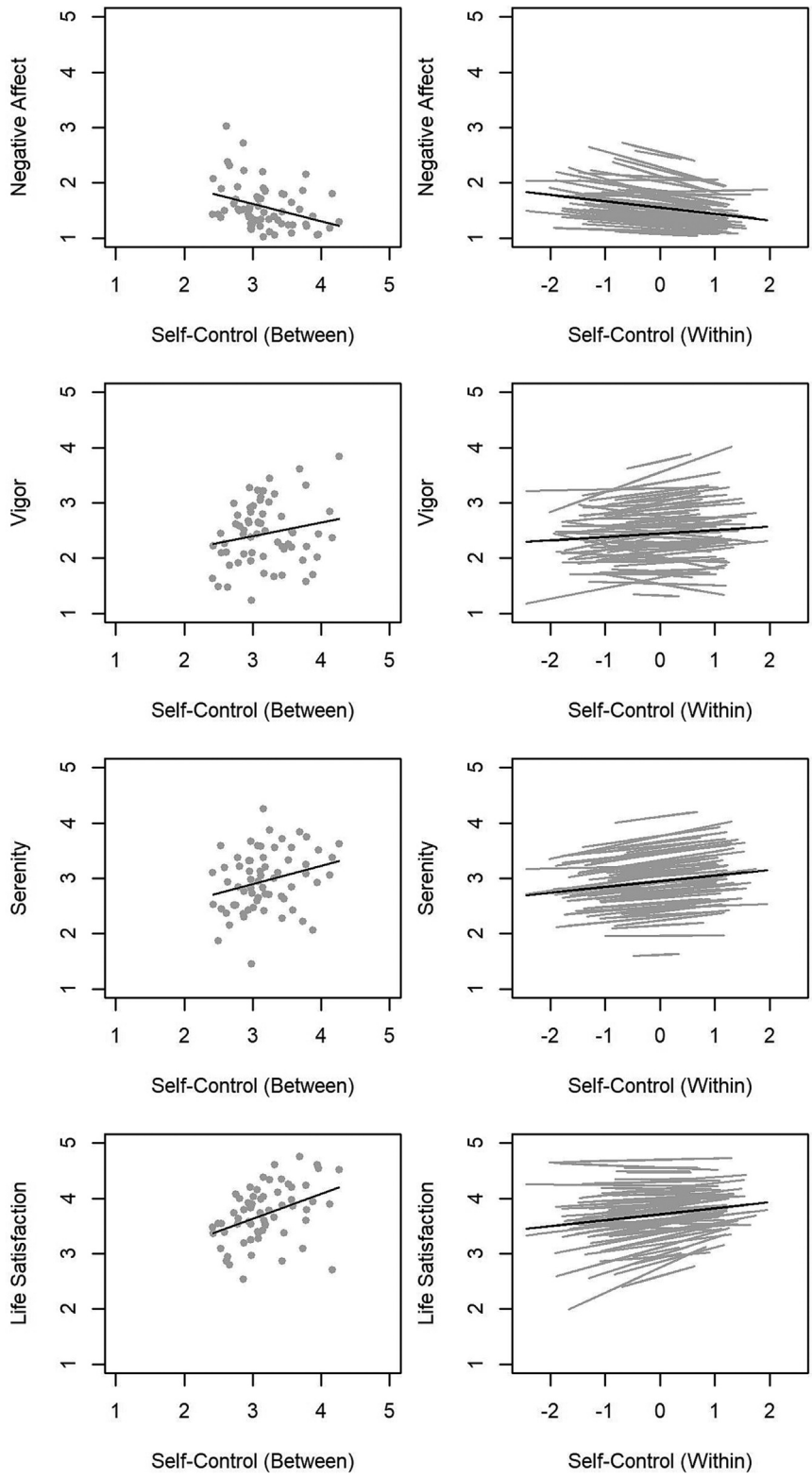

FIGURE 2 Legend on next page.

et al., 2012; Nielsen et al., 2019; Tangney et al., 2004), we found considerable and reliable fluctuations in self-control from day to day, with only 39% of the variability being attributable to stable between-person individual differences. The remaining variability leaves ample room for examining the effect of within-person fluctuations in self-control and their association with subjective well-being. As hypothesized, undergraduate students experienced less negative affect and more serenity and were more satisfied with their life on days with higher self-control than usual. This is in line with prior findings suggesting that self-control success in everyday life is related to better affective well-being (Wenzel et al., 2016, 2021; Wiese et al., 2018) and extends those findings by showing that highs in self-control also relate to more favorable cognitive evaluations of life (Diener, 2009). Thus, our results are also mostly in line with previous research findings showing that self-control and life satisfaction show concurrent covariation across time (Buyukcan-Tetik et al., 2018). By implementing a day-to-day assessment across multiple days, our study examines the temporal dynamics between self-control and life satisfaction with an even more fine-grained approach than the only other study of temporal dynamics applying biweekly assessments.

Within the chosen time frames, we found consistent links between fluctuations in self-control and negative affect, across more activated affect states, such as anger and anxiety, as well as deactivated states, such as depressed affect. Meanwhile, fluctuations in self-control were positively related to serenity but not vigor on the daily level. That is, on days with higher self-control, participants felt calmer, but not necessarily more cheerful. We did, however, find comparably large variation in the within-person link between self-control and vigor, indicating that the link between self-control and vigor differs considerably for different participants. Nonetheless, our findings support theoretical approaches suggesting to differentiate affective experiences not only in terms of valence (i.e. positive vs. negative affect) but also instead seeking a more nuanced assessment of affective experiences, for example, also considering different activation levels (Posner et al., 2005). Our results imply that on a day-to-day basis, self-control is related to feeling relaxed (i.e. pleasantly deactivated), but not necessarily to feeling joyful (i.e. pleasantly activated).

Taken together, our results strengthen the evidence of a short-term dynamic between self-control and subjective well-being, irrespective of the time intervals between assessments. In addition, by means of sampling participant data across several time points, this finding gets us one step closer toward establishing a causal link between self-control and subjective well-being in everyday life, because it cannot be explained by stable individual differences (i.e. age, socioeconmic status, health-related variables, and personality traits) as third-variable explanations. However, the current study does not allow to determine which processes covary in time either acting as third variables or true mediators of this link and, thus, to sufficiently derive causal dynamics between self-control and subjective well-being.

One possible mechanism underlying the observed within-person link might be that on days of high self-control, individuals experience more harmonious interpersonal contacts (Finkel & Campbell, 2001; Moschko et al., 2023), resulting in better affective well-being and higher life satisfaction. In our study, we included five different life domains (satisfaction with family,

FIGURE 2 Between-person and within-person relationships between self-control and subjective well-being. Between-person self-control is represented as person means across study days. Within-person self-control is represented as deviations from the person means. As we only found a change in the size of the between-person link of self-control and negative affect between Bursts 1 and 2, we decided to aggregate the data across all three bursts for this visualization.

friends, university, oneself, and life in general) in the life satisfaction score (Diener, 2009). In response to a comment from one previous reviewer of this article, we reiterated our analyses with self-control regressed onto each domain separately. These analyses yielded a positive within-person (and between-person) relationship between self-control and life satisfaction across all three bursts for satisfaction with university, oneself, and life in general. There were no associations between self-control and satisfaction with friends. Furthermore, the analyses revealed a within-person relationship between self-control and satisfaction with one's family; however, this relationship faded after Burst 1. Thus, higher self-control does not seem to be (consistently) linked to relational aspects of life satisfaction, which potentially rules out this explanation—at least within this specific sample. These additional results are accessible as online supplementary material (Table S2), encouraging future research to confirm the observed patterns and to more closely investigate into how, when, and for whom self-control is linked to different aspects of life satisfaction.

Furthermore, another explanation for the within-person link could be that on days individuals demonstrate high self-control, they might be less likely to experience goal conflict due to, for example, anticipatory management or devaluation of distractions (Nielsen et al., 2019) and more likely to experience goal accomplishment (Galla & Duckworth, 2015). This, in turn, could warrant better affective well-being and a more favorable evaluation of one's life. At the same time, on days of experiencing better affective well-being and enhanced life satisfaction, exerting self-regulatory behavior might be facilitated (Aspinwall, 1998), as individuals might experience less craving toward a short-term gratification related to, for example, going out with friends rather than preparing for an exam or trust themselves more to be capable of successfully pursuing their long-term goals.

To analyze such underlying mechanisms and clarify the direction of effects, future studies should therefore adapt measures of potential time-varying mediators (i.e. achievement appraisal) and correlates in parallel to measuring self-control and subjective well-being. Even more crucial, we propose to implement experimental manipulation of either self-control or subjective well-being in future studies, to be able to truly disentangle their causal pathways in everyday life (Reis, 2012). Another possibility to evaluate directionality of effects is the use of random intercept cross-lagged panel models (Hamaker et al., 2015). However, we believe that such lagged effects are more likely to appear in even shorter time frames than our day-to-day or burst-to-burst assessments. For example, lagged effects of self-control across days are less likely to appear because of or might be highly confounded by sleep quality (Pilcher et al., 2015). Therefore, in this study, we decided to only conduct concurrent rather than cross-lagged analyses.

Besides revealing within-person links between self-control and subjective well-being, we also replicated prior findings on the between-person level. For instance, undergraduates with higher trait self-control showed less negative affect, more serenity, and higher life satisfaction than undergraduates with lower self-control. This finding is consistent with previous research on the relationship between self-control and subjective well-being (e.g. Cheung et al., 2014; Grund et al., 2015; Hofmann et al., 2014; Nielsen et al., 2019; Stavrova et al., 2020; Wiese et al., 2018). Also, a positive yet smaller between-person link between self-control and vigor did not reach statistical significance. Interestingly, we found that the between-person link between self-control and negative affect was stronger during the exam period, while the link between self-control and vigor vacated completely during this period, potentially implying a scissor effect of self-control in face of increased challenges. Overall, our results consistently indicate that self-control is linked with subjective well-being more strongly on the between-person level than on the within-person level, again mirroring previous research findings

(Buyukcan-Tetik et al., 2018). This leads us to cautiously assume that consistently high self-control might be even more beneficial for well-being than momentary peaks in self-control.

Finally, by implementing a measurement burst design, we were able to observe not only day-to-day fluctuations in self-control and subjective well-being but also changes across longer time frames. For example, our analyses revealed that vigor and serenity of undergraduate students declined within study bursts, and altogether, life satisfaction was lower during Burst 2 compared with Burst 1, while negative affect was higher. This appears unsurprising, considering the time frames in which the study took place: While Bursts 1 and 3 were conducted at the beginning of participating undergraduates first and second study semesters, respectively, they might have been faced with increased workload, and thus, less vigor and serenity, as time progressed. Similarly, during Burst 2, exams approached with each study day, with the enhanced burden of exam preparation negatively affecting student's overall well-being. However, these temporal trajectories did not seem to be associated with changes in the link between self-control, serenity, and life satisfaction. We interpret this as a sign that even as study demands increase, trait self-control as well as momentary fluctuations in self-control is positively related to individuals' experience of serenity and life satisfaction.

Limitations

This study has some notable limitations. First, our sample consisted of mostly young undergraduate students at the entry phase of university. Compared with peers or middle-aged adults working a full-time job or taking on care responsibilities, it can be assumed that the everyday life of undergraduate students is typically less structured. As they face a particularly high degree of freedom and independence, the need to exert self-control is especially high in this group of people and during this period, potentially modifying general self-control levels as well as the extent of self-control fluctuations. In addition, subjective well-being is lower in young adults in general (Carstensen et al., 2011) and undergraduate students specifically (de Paula et al., 2022; Tosevski et al., 2010). Taken together, it can be assumed that both self-control and subjective well-being might have shown a pattern of covariation specific for the investigated age group (i.e. predominantly young adults) and time span (i.e. first semester of university). To ensure generalizability, future studies should highlight the link between self-control and subjective well-being in different age groups across and beyond the college years.

Second, our sample was predominantly female. Compared with male undergraduates, female undergraduates report higher levels of stress, more negative affect, and more sleep problems (Amaral et al., 2018; Graves et al., 2021), implying gender differences in psychological adjustment to university. Also, female students appear to use different strategies to cope with stress than male students. For example, female students more often seek social support (Graves et al., 2021), while rumination is more common among male students (Amaral et al., 2018). Thus, gender is likely to moderate the link between self-control and subjective well-being, which challenges the generalizability of our results. However, previous studies consistently find a link between self-control and subjective well-being on the between-person level (e.g. 64% female, Hofmann et al., 2014; 56% female, Nielsen et al., 2019; 47% female, Stavrova et al., 2020) and the within-person level (49% female, Buyukcan-Tetik et al., 2018), irrespective of the sample's gender distribution, which gives preliminary evidence for generalizability. Nonetheless, we encourage researchers to replicate our results in other samples and to specifically evaluate effects of gender to probe the generalizability of our results.

Third, despite aiming for a sample size to detect a medium effect on the between-person effect with sufficient power, our study sample was still relatively small. To draw more robust conclusions, a larger sample size would be ideal (Schönbrodt & Perugini, 2013). Our study makes up for the small sample size somewhat by applying a measurement burst design with data collection on multiple occasions. Yet, we encourage researchers to replicate our results in a larger sample to further probe the consistency of effects and effect sizes. Most importantly, we want to emphasize the need for a preregistered replication of our study to confirm our results, being aware of the issues related to studies that have not been preregistered (Andrade, 2021).

Finally, we found acceptable reliability of change for all our measures. As found in other studies (Cranford et al., 2006), the observed reliability of change is lower than the reliability of individual differences that is based on an aggregate across many observations across time. However, future research should seek to develop more precise measures of change, especially measures of self-control fluctuations, for repeated assessment (Trull & Ebner-Priemer, 2020).

Implications

Our study demonstrates substantial and reliable self-control fluctuations in the daily life of undergraduate students, showing that their self-control is malleable, with less than half of the variance due to stable between-person individual differences. This implies that practitioners in educational, work-related, and clinical settings should seek repeated assessments of self-control, rather than relying on assessment procedures treating self-control as a stable trait that can be assessed on a single occasion. Such a change of perspective would also allow us to identify precursors, correlates, and successors of high self-control (e.g. on days after sufficient sleep; Pilcher et al., 2015) and see if these can be replicated to achieve consistently higher self-control. This might help to implement more effective self-control interventions in health care settings, for example, by delivering them only at time points when self-control is flagging, thus reducing intervention intensity and thus possibly diminishing barriers to help-seeking and boosting intervention engagement (Amanvermez et al., 2022). Furthermore, our results suggest that such self-control interventions should not only target individuals' affective responses, for example, through teaching emotion regulation skills (Wenzel et al., 2021), but also have the potential to improve subjective well-being by targeting cognitive evaluations of life circumstances.

Furthermore, our study shows both between-person and within-person links between self-control and multiple subjective well-being outcomes, implying that both differences in trait self-control, as well as self-control fluctuations across time, account for variance in young adults' affective experiences and life satisfaction. Therefore, it suggests the need for a theory of self-control in time (Scholz, 2019). Previous studies showed that self-control fluctuations are linked to subjective well-being in middle to long-term time intervals (Buyukcan-Tetik et al., 2018). Our study gives preliminary evidence for an even more short-term dynamic and thus contributes to building a comprehensive theory of determinants, correlates, and consequences of faltering self-control across different time frames (Baumeister et al., 2007). Also, although we found substantial variance in the size of the within-person links of self-control and subjective well-being, these links were still comparable in a large majority of participants. Still, future research should address why some individuals experience stronger covariation in self-control and subjective well-being, informing idiographic descriptions of individual experiences (Molenaar & Campbell, 2009).

CONCLUSION

This study quantifies the extent of variability in self-control in the daily life of undergraduate students at the entry phase of university. Collecting ecologically valid data in an intensive longitudinal study design, we found that self-control is related to negative affect, serenity, and life satisfaction on a between-person level, as well as within-person level. With both self-control and subjective well-being being closely related to health and health behavior, understanding their interplay in everyday life is crucial for developing tailored health prevention intervention programs.

CONFLICT OF INTEREST STATEMENT

We have no known conflicts of interest to disclose.

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DATA AVAILABILITY STATEMENT

To ensure full transparency and enable reproducibility of our findings, the data, as well as the used analysis script, can be openly accessed via the Open Science Framework (https://osf.io/4wu39/?view_only=83b379cb5a994b008d6fd8e5013d5e93).

ETHICS STATEMENT

The research project was conducted according the ethical standards of the Germany Psychological Association.

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SUPPORTING INFORMATION

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Appendix B: Fluctuations in Self-Regulation and Parent-Child Interactions (Study 2)

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Fluctuations in children's self-regulation and parent-child interaction in everyday life: An ambulatory assessment study

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Abstract

Self-regulation has mostly been studied as an intrapersonal trait which fluctuates across time and impacts everyday behavior related to individual goal pursuit and achievement. Although it is plausible that self-regulation affects not only individuals but also their social network, there is less research on how self-regulation levels and fluctuations are linked to social processes in daily life, such as interactions between children and their parents. To this end, this study tracked children's (aged 9 to 11 years; $N = 70$) self-regulation, and their daily interaction quality with parents, across 54 days, using child and parental self-reports. Participants reported higher interaction quality in dyads in which children showed higher self-regulation levels in comparison to others, as well as on days on which children showed higher self-regulation compared to their typical levels. The extent of this association varied between dyads, which needs to be addressed in future studies. As self-regulation and parent-child interaction quality fluctuate in parallel, this study suggests that researchers should aim to understand the underlying mechanisms in order to develop dynamic self-regulation interventions in family contexts and improve family well-being.

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self-regulation, parent-child interaction, family functioning, ambulatory assessment, daily fluctuations

The psychological trait of self-regulation has been frequently studied to account for interindividual differences in behavior. Self-regulation describes the ability to shape and orchestrate one's actions, feelings, and thoughts to pursue long-term goals (e.g., reducing weight, achieving good grades; Inzlicht et al., 2021). High trait self-regulation is considered beneficial for psychosocial adjustment and health outcomes, including better well-being, and lower risk for obesity, alcohol abuse, and deviant behavior (de Ridder et al., 2012; Tangney et al., 2004). Moreover, higher trait self-regulation is related to children's academic success (e.g., de Ridder et al., 2012; Gawrilow, Fäsche, et al., 2014). Beyond individual outcomes, self-regulation also impacts relational outcomes. For example, relationship satisfaction is highest in couples where both partners exhibit high trait self-regulation (Vohs et al., 2011). In children, high trait self-regulation is predictive of positive relationships with peers and adults (e.g., Eisenberg et al., 2014). Hence, self-regulation intersects with a broad range of intra- and interpersonal life domains across the life course. The present study investigates self-regulation in childhood while considering trait-like differences in children's self-regulation as well as day-to-day fluctuations and links them to daily interactions between children and parents.

Daily fluctuations in self-regulation

Several theoretical models proposed that while some people might exhibit higher self-regulation than others (i.e., between-person differences), people can also show fluctuations in self-regulation over time (i.e., within-person differences). For example, Baumeister (2007) proposed that self-control depletes and restores dynamically across time, and van der Meere (2005) links fluctuations in self-regulation problems with current activation levels for individuals with pathological self-regulation deficits such as attention-deficit hyperactivity disorder.

Empirically, lab studies showed within-person fluctuations under presumably constant contextual conditions, as well as following manipulations of motivational and social factors (Kofler et al., 2013; vanDellen & Hoyle, 2010; Wieber et al., 2011). These laboratory conditions mirror how self-regulation changes in daily life, where self-regulation fluctuates under far more complex contextual conditions. An increasing number of ecological momentary assessment studies investigates such 'real-life' fluctuations in adults' self-regulation (e.g., Hofmann, Baumeister, et al., 2012), as well as their situational correlates, such as subjective well-being (Buyukcan-Tetik et al., 2018). The number of studies tracking children's and adolescents' self-regulation in everyday life is far more restricted. Initial studies showed substantial day-to-day variability in the self-regulation of children (Blume et al., 2022; Leonard et al., 2021; Ludwig et al., 2016; McCoy et al., 2022), and adolescents (Berg et al., 2014; Schmid et al., 2020). However,

little is known about the circumstances under which young people's self-regulation is attenuated or increased. Some experience sampling studies in the area of romantic relationships consider ups and downs in couples' relational outcomes (Totenhagen et al., 2012) as covariates of self-regulation fluctuations in daily life (e.g., Buck & Neff, 2012). However, to our knowledge, there are no comparable studies in the area of parent-child relationships.

Children's self-regulation and parent-child interactions

The development of self-regulation is an important milestone of early child development. The family environment plays a fundamental role within this process (Bridgett et al., 2018; Posner et al., 2014). For example, parental self-regulation is theorized to influence children's self-regulation through genetic and socialization processes (Bridgett et al., 2015). Socially, children's self-regulation is influenced by their parents as models of regulatory behaviors, as well as through parenting behavior (Morris et al., 2017). Empirical studies show that children's self-regulation is strengthened by warm, consistent, and responsive parenting and undermined by overly directive and critical parenting (e.g., Morawska et al., 2019). Likewise, higher trait self-regulation in children is associated with parents' encouragement and guidance, as well as setting boundaries (Karreman et al., 2006; Piotrowski et al., 2013).

How parents interact with their children also influences children's social functioning (Eisenberg et al., 2014). For example, non-hostile and warm parenting contributes to children's prosocial skills besides self-regulation (Williams & Berthelsen, 2017), so that children can build new social relationships, but also maintain a secure and attuned relationship with their parents (Davis et al., 2017; Herd et al., 2018). Thus, the relationship between children's self-regulation and the quality of their social interactions is, in parts, reciprocal. For example, in one quasi-experimental study, mothers with poor executive functioning (i.e., low working memory capacity, which is correlated with self-regulation abilities; Hofmann, Schmeichel, et al., 2012) showed more negative reactivity towards challenging child behavior than mothers with better executive functioning (Deater-Deckard et al., 2010). Also, in one longitudinal study, children with higher self-regulation deficits at baseline perceived their mothers to be more hostile and less accepting one year later (Lifford et al., 2009). Taken together, such studies indicate a negative influence of the child's dysregulated behavior on dysregulated parenting behavior—which, in turn, can continue to negatively affect the child's self-regulation and perpetuate differences in children's self-regulation and family problems across development (Feldman, 2015).

Overall, the links between self-regulation and outcomes related to parent-child interactions are typically studied in parent-child dyads, applying either cross-sectional or longitudinal designs across longer developmental periods. Given that children's self-regulation fluctuates substantially on a daily level, we consider this a substantial shortcoming. Thus far, it is unknown whether and how such daily fluctuations in children's self-regulation translate into relational outcomes within the parent-child relationship.

The present study

As part of one self-regulation system (Fitzsimons et al., 2015), self-regulation fluctuations in children are likely to influence both child and parent on a daily level. For example, on days the child exhibits high self-regulation, it might rely less on support from the parent to engage in tedious tasks (i.e., finishing their homework) relevant for long-term goal pursuit (i.e., receive good grades at schools). Thus, fluctuations in children's self-regulation are likely to be directly reflected in relational outcomes. To this end, our study uses an ambulatory assessment design (Trull & Ebner-Priemer, 2013) to capture day-to-day fluctuations in children's self-regulation and to better understand the daily link between self-regulation and parent-child interaction quality. We consider the ambulatory assessment approach suitable to track such within-person fluctuations in the real world (i.e., within natural environments that cannot be recreated in laboratories) and in real time (i.e., through momentary ratings instead of retrospective reports). We apply both children's self-reports and parental reports of children's self-regulation (cf. Berg et al., 2014).

Replicating previous findings, we aim to test the hypothesis that there is a positive between-person relationship between children's self-regulation and interaction quality, i.e., children with higher self-regulation than others should report more positive interactions with their parents, and parents who perceive their child to have higher self-regulation than others should report more positive interactions with their child. In addition, we establish and test the novel hypothesis that there is also a positive within-person relationship between children's self-regulation and interaction quality. That is, on days on which children report higher self-regulation than they usually do, they should also report more positive interactions with their parents, and on days on which parents perceive their children to have higher self-regulation than they usually do, they should report more positive interactions with their children.

Method

Study design and sample

This study used a dyadic ambulatory assessment design with measurement bursts (Sliwinski, 2008). We followed children and one of their parents (the same parent across the whole study period) for a maximum of 54 days, distributed across three bursts of 18 days spaced out over 13 months. Thus, this design balances fine-grained daily assessment and its corresponding participant burden to capture everyday experiences over a longer developmental period. Throughout the study period, we asked children and parents to rate children's self-regulation and parent-child interaction quality on a daily basis. So far, there are no comparable studies to derive meaningful starting values for powering the hypothesized within-person effect (Bolger et al., 2012), so that the current study will provide the necessary estimates for power analysis in future ambulatory assessment studies. Therefore, we powered the study to collect sufficient data for detecting a between-person effect of medium effect size ($r = .35$; i.e., Tangney et al., 2004, for family cohesion and self-control), with 80% power and $\alpha = .05$. The power analysis resulted in a required sample of at least 61 participants. Expecting cases where data are only available for the child or only for the parent, we aimed to recruit 15% more dyads ($n = 9$).

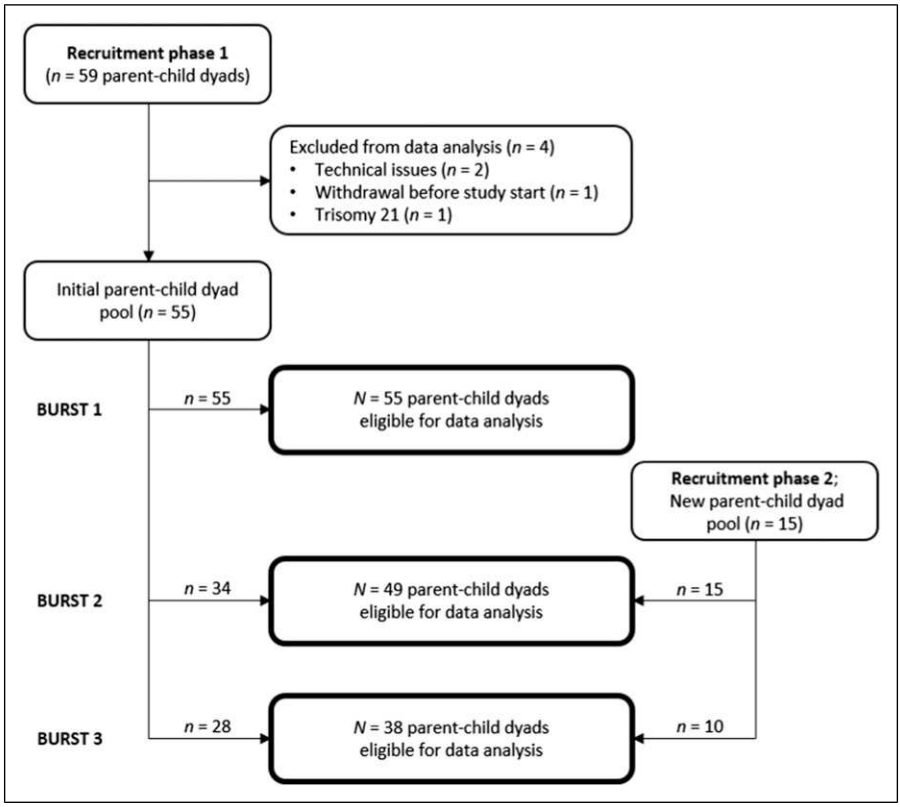

Figure 1. Diagram of parent-child dyad's study participation throughout all bursts. While $n = 21$ parent-child dyads dropped out after Burst 1, two of them re-enrolled for Burst 3, resulting in $n = 26$ parent-child dyads (37% of all dyads considered for data analysis) that participated in all three measurement bursts.

Thus, in total, 70 parent-child dyads participated in our study. All children (39 girls, $M = 10$; 9 years, $SD = 5.7$ months) attended Grade 5 at the beginning of Burst 1 and were recruited from six different secondary or comprehensive schools. Eight children were diagnosed with attention-deficit hyperactivity disorder (ADHD), all of which were receiving medical treatment. Participating parents were typically children's biological mothers ($n = 65$, 93%). They had different education levels with 41% ($n = 29$) having obtained a university entrance qualification. Figure 1 gives an overview of the recruitment and retention of these 70 dyads throughout the study period. We successfully recruited 55 dyads for Burst 1, missing the targeted recruitment goal, and thus recruited 15 more dyads in Burst 2.

All parents gave written informed consent for their child and themselves to participate in this study and received a €40 voucher after each burst for a self-chosen excursion with the family. The overarching research project was approved by the ethics committee of the

German Psychological Society (DGPs). The Ministry of Culture, Youth and Sport in Baden-Württemberg approved recruitment at schools.

Procedure

At each burst, a study team visited the schools and provided participating children with mobile phones (Moto G5 plus smartphones by Motorola, Libertyville, Illinois) for daily data collection. The phones were programmed to only allow access to the study contents and no other phone functions. Children were instructed to use these phones to fill out short diaries, asking about their experiences, including self-regulation and interaction quality, three times a day for 18 consecutive days. Filling out these diaries took about 5 minutes per occasion. Items were presented in a predefined order with only one item on screen at a time. Children were able to navigate through items using arrow buttons, and could choose to deny responses for any item.

Every participating child was asked to fill out the first diary on a Wednesday morning. We used a time-contingent sampling method with the phones prompting children via a ringtone to respond. Each time the phone rang children had 30 minutes to respond, otherwise their answers were recorded as missing. We asked children to fill out the diaries shortly after waking up in the morning, after school in the afternoon, and before going to bed in the evening. Response prompts followed individual timetables adapted to children's daily schedules and thus differed slightly between children. For example, in the evenings, most children were prompted at 8 pm, varying between 7:30 and 9:30 pm before school days, and 7:30 and 11 pm on Fridays and Saturdays.

In parallel, every evening between 8 pm and 12 am, we asked parents to fill out a short questionnaire about their children's daily experiences, including self-regulation and interaction quality. This took about 3 minutes per occasion. Parents could choose whether they would fill out these questionnaires online or use paper-pencil versions of the questionnaire to submit by mail at the end of each burst. Within each burst, approximately 50% of parents chose to fill out the questionnaire online. They also participated in a telephone interview before each burst, to collect background information about family socio-demographics, children's characteristics, and their everyday lives.

The procedure was repeated for each measurement burst.[1] Burst 1 took place from November to December 2017, Burst 2 from April to July 2018, and Burst 3 from November to December 2018. For organizational reasons, children from different schools had individual assessment periods within these time frames.

Measures

Self-regulation in everyday life. Children's daily self-regulation was measured using a total of seven items adapted for daily use, drawing on the Self-Control Scale (SCS-K-D; Bertrams & Dickhäuser, 2009, original: Tangney et al., 2004; 3 items) to assess core self-regulation, and Conners 3 (Lidzba et al., 2013; 4 items) to assess self-regulation deficits (e.g., impulsiveness, or lack of concentration; Schmid et al., 2020). Children filled out these items three times a day, while parents did so once a day—that is, we modified the

items to record state self-regulation with shorter time frames for children (e.g., Since the last alarm, I had difficulty concentrating), and a longer time frame for parents (e.g., Today, my child had difficulty concentrating; see Table A1). To allow participants to respond in a more nuanced way, we changed the response scale, using a six-point Likert scale ranging from 1 (Not at all) to 6 (Exactly). We recoded reverse items before data analysis, so that higher scores represent higher self-regulation. Children and parents answered slightly different item sets, which were chosen based on a proof-of-concept trial and proved to be most suitable to track self-regulation fluctuations. To obtain mean self-regulation scores, we calculated averages across all items for each occasion a child or a parent answered at least four of the seven items. Also, to be able to compare children and parent reports, we calculated daily self-regulation scores across all three occasions per day for child reports. These daily scores were used for all statistical analyses. We computed multilevel reliability estimates (Shrout & Lane, 2012) to determine the reliability of these scores to capture individual differences as well as day-to-day fluctuations in self-regulation. Between-person reliability was .99 for child reports and parental reports, respectively, and within-person reliability was .62 (child report) and .70 (parental report).

Background information on self-regulation. To confirm the validity of the self-regulation scores obtained within the daily assessment, we compared the average scores across all study days with full baseline scores on the SCS-K-D (Rauch et al., 2014; higher scores imply higher self-regulation), as well as Conners 3 (Lidzba et al., 2013; higher scores imply lower self-regulation). Both questionnaires were administered at the beginning of each burst in telephone interviews with parents. For children's self-reports, self-regulation scores from the daily assessment were associated with SCS-K-D at Burst 1 (r = .12) and 3 (r = .09) with small correlations, but not at Burst 2 (r = -.02). Also, they were associated with Conners 3 with small to moderate correlations at each measurement burst (all r < -.13). For parents, daily scores showed moderate to large negative correlations with SCS-K-D scores at each measurement burst (all r > .38), as well as with Conners 3 (all r < -.35). Overall, these results indicate that children and parents provide unique and distinct perspectives on children's everyday experiences.

Parent-child interaction quality. Quality of parent-child interactions was measured once a day in the evening, using a single item ("Today I got along well with my parents/my child") on a six-point Likert scale ranging from 1 (Not at all) to 6 (Exactly) with higher scores representing better interaction quality.

Statistical analysis

In this study, we repeatedly collected data on self-regulation and parent-child interaction. Thus, the data are nested within participants. To account for this hierarchical structure, we tested our hypotheses using mixed linear models (Bolger & Laurenceau, 2013) implemented in the nlme package (version 3.1–153) in R (version 4.1.1). To dissociate effects on the between-person and within-person level, daily reported self-regulation scores were decomposed into a stable between-person score, $bpSR_i$—that is, a child i's

average self-regulation score across all study days, centered at the grand mean—and a time-varying within-person score, $wpSR_{ij}$—that is, a child i's higher or lower self-regulation score on study day j, fluctuating around child i's average self-regulation score.

To test our hypotheses, we fitted mixed models to child-reported data (child model) and parent-reported data (parent model), respectively. Both models examined whether and how children's between-person differences and within-person fluctuations in self-regulation (predictors) and interaction quality (PCI_{ij}; outcome) are related across time.

We conducted full random slope models using the following equations:

Level 1: $PCI_{ij} = \beta_{0i} + \beta_{1i}\ time_{ij} + \beta_{2i}\ wpSR_{ij} + e_{ij}$

Level 2: $\beta_{0i} = \gamma_{00} + \gamma_{01}\ bpSR_i + u_{0i}$

$\beta_{1i} = \gamma_{10}$

$\beta_{2i} = \gamma_{20} + u_{1i}$

The Level 1 equation represents the within-person level, while the Level 2 equations represent the between-person level. Accordingly, for both the child model and the parent model, we considered the following fixed effects: the intercept, γ_{00}, indicating the starting point for the typical child in the sample on Day 1; an average linear time trend, γ_{10}, indicating a possible change in interaction quality across time; the average between-person slope for self-regulation, γ_{01}, indicating a between-person association of self-regulation and interaction quality; and the average within-person slope for self-regulation, γ_{20}, indicating a within-person association of fluctuations in self-regulation and interaction quality. Additionally, we considered two *random effects* to account for individual shifts from the sample's average: children's deviation from the average intercept, u_{0i}; and children's deviation from the average within-person slope for self-regulation, u_{1i}; as well as the residual error e_{ij}.

The models were calculated using maximum likelihood estimation and $\alpha = .05$, and were controlled for a continuous auto-correlation of Level 1 residuals (e.g., Bolger & Laurenceau, 2013).[2] To obtain standardized regression coefficients and thus facilitate the interpretation of results in terms of effect sizes, as well as comparisons of within- and between-person effects across informants, both model predictors (between-person differences and within-person fluctuations in self-regulation) were divided by the between-person standard deviation of self-regulation scores.

Results

Descriptive statistics

On average, children provided data on self-regulation and interaction quality on a median of 28 days (range: 7–53 days). Among parents, three did not report any data, while the remaining provided data on a median of 25 days (range: 3–54 days). For self-regulation, children provided 66% ($n = 2314$), and parents 56% ($n = 1965$) of possible observations (55 dyads with 54 study days, and 15 dyads with 36 study days = 3510 possible observations). For interaction quality, children provided 58% ($n = 2027$), and parents 56% ($n = 1960$) of 3510 possible observations. Information on both variables, self-regulation and

interaction quality, was present for 57% (n = 2006), and 56% (n = 1960) of observations respectively from children and parents.

Overall, children's self-regulation and interaction quality were rated rather high on the scale from 1 to 6 by both informants (Table 1). Person mean scores across time from child and parental report were correlated moderately for self-regulation, $r(65) = .39$, $p = .001$, and weakly for interaction quality, $r(65) = .24$, $p = .047$. Moreover, children's self-regulation, as well as interaction quality, varied substantially across time and participants (Figure 2), as well as within participants. Intraclass correlation coefficients indicated that more than 50% of variability in children's self-regulation and at least 60% of variability in interaction quality did not originate from between-person differences but occurred due to within-person fluctuations and residual error.

Hypotheses testing

Before testing our hypotheses, we were interested in thoroughly investigating the time course of participant's responses, as well missingness patterns. The results from all additional analyses can be retrieved online from the Open Science Framework (https://osf.io/u3wbh/?view_only=f58702fe2e8b4c99971bcb5e8d7fb29a). The results from mixed linear modeling to test our hypotheses are depicted in Table 2 (child model) and Table 3 (parent model). In line with our hypotheses, we found a between-person link between children's self-regulation and parent-child interaction quality: Children with higher self-regulation than others had more positive parent-child interactions across time, according to children themselves ($\gamma_{01} = 0.18$, 95% CI [0.04, 0.31], $p = .011$), as well as their parents ($\gamma_{01} = 0.40$, 95% CI [0.29, 0.50], $p < .001$). Furthermore, in line with our hypothesis, we found a positive link between children's self-regulation and interaction quality, as well as between parents' reports of children's self-regulation and interaction quality; on the within-person level: On days on which children showed higher self-regulation than usual, parent-child interactions were more positive (child model: $\gamma_{20} = 0.15$, 95% CI [0.10, 0.20], $p < .001$; parent model: $\gamma_{20} = 0.46$, 95% CI [0.40, 0.53], $p < .001$). The size of this

Table 1. Descriptive statistics across all 54 study days for self-regulation and parent-child interaction quality in both children's self-reports and parent-reports.

	Between-person			Within-person			
	M	*SD*	Range	M_{ISD}	*SD*	Range	ICC
Child-report							
Self-regulation	5.31	0.46	3.78–5.95	0.45	0.21	0.16–1.31	.47
Interaction quality	5.48	0.60	3.53–6.00	0.70	0.54	0.00–2.09	.40
Parent-report							
Self-regulation	4.73	0.65	3.15–5.94	0.60	0.19	0.21–1.04	.49
Interaction quality	5.13	0.64	3.72–6.00	0.84	0.48	0.00–2.20	.36

Note. M_{ISD} = mean intra-individual standard deviation, ICC = intraclass correlation coefficient.

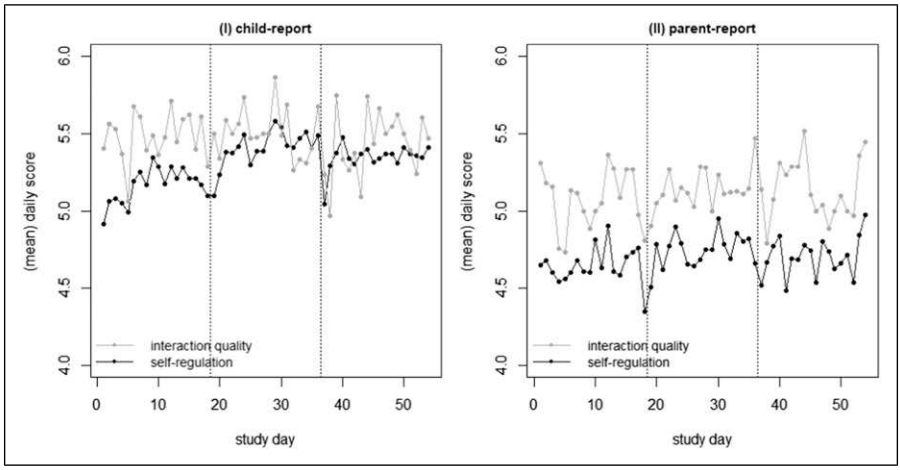

Figure 2. Time course of child-reported (left) and parent-reported (right) self-regulation and parent-child interaction quality across all 54 study days. The dashed lines indicate breaks between each burst.

within-person link varied substantially (child model: *SD* = 0.14, parent model: SD = 0.21), with a majority of parent-child dyads showing a positive within-person link between children's self-regulation and interaction quality (Figure 3). In addition, there was no linear change in participants' reports of parent-child interaction quality across time.

Discussion

As the first of its kind, this study aimed to investigate school children's self-regulation in association with parent-child interaction quality in everyday life, considering daily self-regulation fluctuations in children (e.g., Blume et al., 2022; Ludwig et al., 2016). The use of ambulatory assessment across several days within 13 months allowed us to reliably capture between-person differences, as well as day-to-day within-person variations in children's self-regulation within shorter time frames (i.e., on a day-to-day basis) and across a longer developmental period (i.e., within one school year). In accordance with our hypotheses, we found significant associations between children's self-regulation and interaction quality on a between-person level. That is, children characterized by higher self-regulation compared to the sample's average had better interactions with their parents. This is in line with previous research, theorizing that self-regulation is a key element in social functioning, with low self-regulation impairing interactions between parents and children (e.g., Eisenberg et al., 2014; Tangney et al., 2004). The association we found was evident across informants: Both children characterizing themselves as having higher self-regulation, and parents characterizing their children as having higher self-regulation, reported to get along better with each other. This is somewhat surprising, considering that children's self-rated self-regulation and parent-rated self-regulation

Table 2. Mixed linear model to test the within- and between-person association between self-regulation and parent-child interaction quality for child-reported data.

Fixed effects	Estimate	95% CI Lower	95% CI Upper	*p*
Intercept, γ_{00}	5.50	5.35	5.65	<.001
Time slope[a], γ_{10}	-0.04	-0.20	0.13	.67
Self-regulation, between-person differences, γ_{01}	0.18	0.04	0.31	.011
Self-regulation, within-person fluctuations, γ_{20}	0.15	0.10	0.20	<.001

Random effects	Estimate	95% CI Lower	95% CI Upper	*p*[b]
Level 2 (between-person)				
Intercept, $SD(u_{0i})$	0.54	0.45	0.66	
Self-regulation fluctuations[c], $SD(u_{1i})$	0.14	0.09	0.20	<.001
Intercept and self-regulation fluctuations, $r(u_{0i,}\ u_{1i})$	-0.26	-0.61	0.18	.24
Level 1 (within-person)				
Residual, $SD(\varepsilon_{it})$	0.83	0.80	0.86	
Autocorrelation, ρ	0.11	0.06	0.16	<.001

Note. N = 70 children, n = 2006 total observations.
[a]Time is coded 0 = study day 1, 1 = study day 54, with equal intervals for the intervening study days.
[b]The respective *p* values for the Level 2 random effects were obtained by sequentially adding both parameters to a model with all fixed effects and just the random intercept in the order depicted in this table and comparing all resulting model variants via likelihood ration test. Likewise, to obtain the *p* value for the estimate of the Level 1 autocorrelation of residuals, we compared a model not controlled for first order autoregressive structure to a model controlled for such a correlation structure via likelihood ratio test.
[c]Under the assumption of normally distributed random effects around the fixed effect, the personal slope between self-control and life satisfaction falls between 0.01 and 0.29 for 68% of participants (γ_{20} 0.15 ± 1 *SD* 0.14), and another 16% of participants have a within-person slope greater than 0.29, resulting in at least 84% of participants showing a positive within-person slope.

across all study days were only correlated moderately, and highlights the need for dyadic assessments of children's self-regulation in the context of family environment.

On a daily within-person level, our results indicate that short-term fluctuations in self-regulation were positively related to parent-child interaction quality. On days on which children reported better self-regulation than usual, they reported to get along better with their parents. This relationship was also reflected in parental reports. Our finding is in line with initial evidence from romantic relationships showing that self-regulation dynamically relates to relationship quality in everyday life (Buck & Neff, 2012). They also complement previous findings showing that children's self-regulation during daily activities (i.e., toothbrushing) varied from day-to-day in accordance to changes in parental instructions (Leonard et al., 2021).

Comparing the effect sizes in our study, it appears that the link between children's self-regulation and parent-child interaction quality is stronger in parents' view than in

Table 3. Mixed linear model to test the within- and between-person association between self-regulation and parent-child interaction quality for parent-reported data.

Fixed effects	Estimate	95% CI Lower	95% CI Upper	*p*
Intercept, γ_{00}	5.10	4.97	5.24	<.001
Time slope[a], γ_{10}	0.07	-0,11	0.24	.46
Self-regulation, between-person differences, γ_{01}	0.40	0.29	0.50	<.001
Self-regulation, within-person fluctuations, γ_{20}	0.46	0.40	0.53	<.001

Random effects	Estimate	95% CI Lower	95% CI Upper	*p*[b]
Level 2 (between-person)				
Intercept, $SD(u_{0i})$	0.42	0.34	0.53	
Self-regulation fluctuations[c], $SD(u_{1i})$	0.21	0.15	0.29	<.001
Intercept and self-regulation fluctuations, $r(u_{0i}, u_{1i})$	-0.71	-0.90	-0.29	<.001
Level 1 (within-person)				
Residual, $SD(\varepsilon_{it})$	0.84	0.81	0.87	
Autocorrelation, ρ	0.22	0.17	0.27	<.001

Note. N = 67 parents, n = 1960 total observations.
[a]Time is coded 0 = study day 1, 1 = study day 54, with equal intervals for the intervening study days.
[b]The respective *p* values for the Level 2 random effects were obtained by sequentially adding both parameters to a model with all fixed effects and just the random intercept in the order depicted in this table and comparing all resulting model variants via likelihood ration test. Likewise, to obtain the *p* value for the estimate of the Level 1 autocorrelation of residuals, we compared a model not controlled for first order autoregressive structure to a model controlled for such a correlation structure via likelihood ratio test.
[c]Under the assumption of normally distributed random effects around the fixed effect, the personal slope between self-control and life satisfaction falls between 0.04 and 0.88 for 95% of participants (γ_{20} 0.46 ± 2 *SD* 0.21), and another 2% of participants have a within-person slope greater than 0.88, resulting in at least 97% of participants showing a positive within-person slope.

children's view. While we want to point out that these effects should be compared cautiously as they have not been estimated within the same statistical model, we believe there might be two main explanations for this difference. First, children—especially those with higher self-regulation deficits on a trait level—might hold positively biased perceptions of themselves and thus rate their self-regulation, as well as their interactions, as overly positive compared to their parents (Volz-Sidiropoulou et al., 2016). Indeed, on the aggregated level, reports of self-regulation and parent-child interaction quality were higher in children's self-reports than parental reports. Consequently, the estimated effect sizes in the child model might be diminished due to a ceiling effect. Second, children might be less receptive of the consequences of their actions on their social interactions. Thus, although they might have experienced fluctuations in their self-regulation, they might have been less observant of the concurrent changes in their social surroundings.

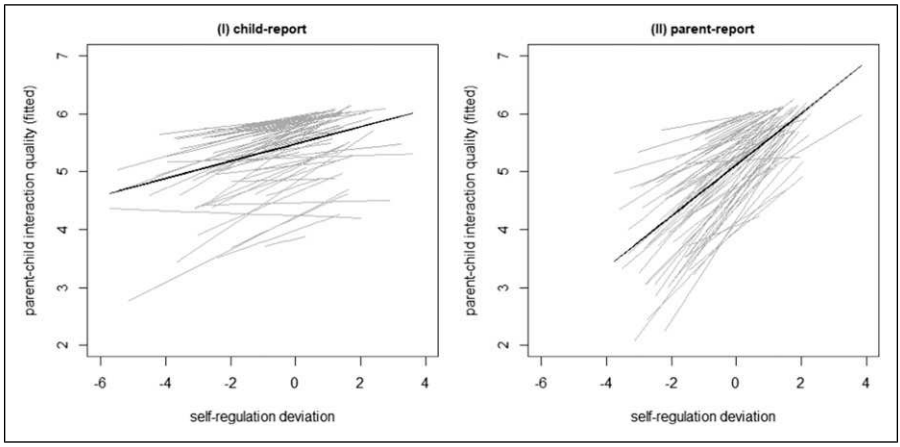

Figure 3. Spaghetti plot of average (black lines) and subject-specific (grey lines) regression lines for child- (left) and parent-reported (right) parent-child interaction quality as a function of a children's daily deviations from their average self-regulation. The daily deviations from their average self-regulation are represented in units of the between-person standard deviation in self-regulation.

Furthermore, for some parent-child dyads, children's self-regulation was more strongly interlinked with interaction quality than in others. Several moderators might explain this variability. First, children's self-regulation capacity varies between different domains, for example school and interpersonal relationships (Tsukayama et al., 2013). Some children are particularly impulsive when it comes to schoolwork, while others show self-regulation deficits in social interactions. Thus, for some children in our study, fluctuations in self-regulation might have mainly affected the academic domain (i.e., lower academic success on days of low self-regulation; Blume et al., 2022), while for other children, such fluctuations might have predominantly affected interpersonal behavior (i.e., talking back to the parent on days with lower self-regulation). Second, deficits in children's self-regulation challenge parents to put additional effort into helping their children achieve their goals (i.e., helping out with their homework), which might be particularly difficult for parents with low executive control (Deater-Deckard et al., 2010). Third, early attachment, is a common predictor for both self-regulation and relationship quality. For example, high trait self-regulation is related positively to secure attachment, and negatively to avoidant and anxious attachment (Tangney et al., 2004). Subsequently, the co-variability in children's self-regulation and parent-child relationship quality is possibly more pronounced in insecurely attached children (and parents). In sum, the self-regulation-interaction link may differ between dyads for many reasons, including the domains affected by children's self-regulation (non-social vs. social), differences in parental regulatory capacities, and parent and child attachment styles. Therefore, the current study provides evidence that no "general law" (Hamaker, 2012, p. 43) can be deduced declaring that children's self-regulation and interaction quality are associated

similarly within each parent-child dyad, supporting a more idiographic approach to researching individual experiences and relationships (Molenaar & Campbell, 2009).

Limitations

The current study has several limitations regarding the study procedures. First, for planning this study there were no meaningful starting values available to determine sample sizes regarding participants and repeated assessments to reach adequate statistical power for the within-person effects (Bolger et al., 2012). The current study is a starting point for conducting these power analyses for future studies. Second, we worked with a restricted number of items to assess children's self-regulation. Even though these items were adapted from existing scales, more sophisticated and standardized items for self-regulation would have been preferable. Thus, the available data cannot capture different components of self-regulation (i.e., cognitive control, or emotion regulation; Inzlicht et al., 2021), as well as different self-regulation domains (Tsukayama et al., 2013), which limits the generalizability of our results. Third, children and parents answered somewhat different self-regulation scales. We chose the items for informants based on a preceding proof-of-concept trial, selecting only those items that showed considerable intraindividual fluctuations for the final study protocol. This limits the comparability of children and parent ratings. Fourth, we assessed parent-child interaction quality using a single item. Although we found significant associations of self-regulation with this global rating, specific aspects of how children and parents get along with each other (such as closeness or conflict) might relate distinctly to children's self-regulation. Fifth, the item used to assess child-reported parent-child interaction quality referred to more than one parent. Thus, the item does not assess the specific relationship with the parent who filled in the parent questionnaire. We might assume that the parent participating in the study also spent more time with their child in everyday life. Thus, child-reports regarding the parent-child interactions quality would mostly reflect interaction quality with this parent. However, we have no means to check this assumption. Sixth, our study mainly focused on the variability in children's experiences, which we assessed using children's self-reports and parental reports. By limiting our focus to children, we missed to collect important parental predictors and outcomes (i.e., parental stress, parenting style, attachment style, self-regulation) that should be included in future studies.

Overall, the procedures we adopted in this study were mainly motivated by the aim to keep participant burden manageable. Having to participate in a study which requires to repeatedly fill out a lengthy questionnaire impedes study uptake, increases drop-out rates, and interferes considerably with participant's everyday life. This issue might have been avoided by using passive assessments. For example, low self-regulation in everyday life (e.g., lack of motoric control) was successfully studied using accelerometers (Gawrilow, Kühnhausen, et al., 2014), while audio recordings of everyday interactions can be used to study daily social behaviors (Mehl, 2017). However, the latter is currently vastly limited

by data protection laws. Therefore, the research community should seek to establish procedures to capture such sensitive data in line with legal requirements.

Finally, we would like to discuss how our results are also limited to their specific research location, which was the south of Germany. Throughout our manuscript, we argue that 'getting along' with each other influences, but also requires a child's self-regulation. In general, this is achieved by accommodating one's thoughts, feelings, and behavior to certain cultural values, rules, and norms, which differ across cultures. While children's self-regulation is interculturally predictive of academic success (Wanless et al., 2011), self-regulation deficits might be experienced as more disruptive of interpersonal norms in certain cultural settings (Trommsdorff, 2009; Wei et al., 2013). We therefore highly recommend conducting cross-cultural studies to test such cultural hypotheses, to reproduce our results and evaluate their generalizability.

Implications and future research

The present study informs future research to further develop, apply and evaluate appropriate measures and designs to study children's behavioral and family functioning in everyday life. For example, everyday life interaction between parents and children could be better understood by including a broader approach to assess children's self-regulation while also considering predictors and outcomes on the parental side. This has the potential to unveil the mechanisms underlying our results. As discussed above, one possibility is that children's low self-regulation on a particular day burdens parent-child relationships because it demands more parenting effort to support the child's goal pursuit. This, in turn, might enhance parental stress under circumstances where supporting the child in daily life activities (i.e., doing their homework) is harder to coordinate with the parent's goals for themselves (i.e., working longer hours), or the child (i.e., becoming independent). Enhanced parental stress might then account for adverse parenting behaviors, increasing the likelihood of parent-child conflicts and reducing relationship satisfaction. Thus, we suggest that future studies should prioritize investigating such transactive goal dynamics (Fitzsimons et al., 2015) as well as variables that predict whether and how children's self-regulation problems translate into parental stress, parent-child conflict, and relational disruptions (i.e., How much support did parents have to give to the child throughout the day? What did this 'cost' them?). Moreover, as parental self-regulation presumably transmits to children's self-regulation through parenting behavior (Bridgett et al., 2015), it is essential to consider parental self-regulation to understand how parent-child interactions in everyday life shape and are shaped by children's self-regulation. Such interdependencies in children's and parental self-regulation should also be addressed in future studies, using a fully dyadic design and data analysis (e.g., actor-partner interdependence model; Kenny & Ledermann, 2010).

In general, zooming into daily life and studying family dynamics in such a way has the potential to uncover what parent-child transactions lead to the developmental stability of children's self-regulation problems and dysfunctional interaction patterns across child development (Feldman, 2015), and derive tailored interventions to break up

such dynamics. For example, one previous study found that on days of more parental praise, and less parental instruction, children brushed their teeth longer, which can be considered an important indicator for personalized interventions to enhance children's self-regulation in everyday life (Leonard et al., 2021). Additionally, intervention outcomes could be promoted by identifying which individual or family parameters contribute to a more pronounced reactivity between children's regulatory deficits and relational outcomes. For example, previous studies suggest that emotional reactivity to their child's behavioral problems is higher in mothers with lower executive control (Deater-Deckard et al., 2010). Future studies should also address which dispositional factors on the children's side (i.e., academic vs. interpersonal self-regulation; early attachment style) moderate the extent of the within-person link between self-regulation and parent-child interaction quality. For example, future studies should address the interplay between momentary fluctuations in self-regulation and dispositional self-regulation deficits, such as attention-deficit hyperactivity disorder (ADHD). Our sample included eight children with ADHD, which is why we considered children's ADHD diagnosis as a covariate in our models. Yet, we encourage future studies to systematically test whether and how our results generalize to, or are influenced by ADHD patients. Considering that there are differences in the prevalence and symptom variations of ADHD between boys and girls, we would also suggest testing gender differences in future studies.

Finally, our results further question theories and assessment methods treating self-regulation as only a stable personality trait (i.e., Whiteside & Lynam, 2001). Seeing that children experience day-to-day variations in self-regulation calls for a more dynamic assessments of self-regulation. Furthermore, our results complement research highlighting the role of self-regulation for successful social interactions (e.g., Eisenberg et al., 2014), suggesting that children's self-regulation and parent-child interaction quality fluctuate in parallel in families' everyday lives. However, our results cannot primarily be used to infer judgments about causality. In general, the relationship between self-regulation and parent-child interaction quality is possibly bidirectional. That is, warm and supportive interactions with parents are key elements in the development of children's self-regulation (Karreman et al., 2006; Morawska et al., 2019; Piotrowski et al., 2013), and higher self-regulation in children contributes to better social interactions (Williams & Berthelsen, 2017). Following the helpful suggestion of one of the reviewers of this article, we did perform additional analyses on our data, applying random-intercept cross-lagged panel models (Hamaker et al., 2015) to get insight in the direction of effects. The analyses yielded no clear cross-lagged relationships between children's self-regulation and parent-child interaction quality across bursts and across informants (children, parents). As we did not consider these analyses in our pre-registered analysis plan, we report these results as supplementary online material. However, we would like to point out that even though such models are used to infer casual relationships, their use for this purpose is widely discussed (e.g., Lüdtke & Robitzsch, 2021). After all, the gold standard to reach robust conclusions regarding causal relationships between two variables are experiments and randomized controlled trails. Thus, to gain further insight into the underlying causal

mechanisms, future studies should adapt the current study by adding experimental manipulations of children's self-regulation or interaction quality at certain points within the assessment period.

Conclusion

In sum, our study extends previous research findings on the role of self-regulation for social functioning. While individuals exhibiting high self-regulation are able to establish better relationships in the long run, intraindividual fluctuations of self-regulation also seem to translate into relational outcomes on a daily level. This study revealed that children and their parents are getting along better on days children's self-regulation is particularly high. Thus, children's self-regulation and parent-child interaction quality oscillate simultaneously in everyday lives. Although this might appear very much obvious for some researchers and practitioners, it does rarely manifest in research or clinical practice, where children's self-regulation is commonly evaluated based on one-time assessments, and in isolation of environmental factors. Likewise, parenting practice commonly lacks awareness of the dynamic interplay between children's self-regulation and social processes, culminating in strained parent-child relationships, instead of mutual understanding and support. Overall, our findings help to describe children's and parents' everyday experiences, which is useful to elaborate our understanding on how children develop and maintain good social relationships.

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Open research statement

As part of IARR's encouragement of open research practices, the authors have provided the following information: This research was pre-registered. The aspects of the research that were pre-registered were data analysis. The registration was submitted to OSF (https://osf.io/kta3s). The data used in the research are available. The data can be obtained by emailing: tomasz.moschko@uni-tuebingen.de. The materials used in the research are available. The materials can be obtained by emailing: tomasz.moschko@uni-tuebingen.de.

Notes

1. An intervention to improve children's self-regulation was implemented from Burst 2 onwards, with children being allocated to two different intervention conditions (mental contesting vs. mental contrasting with implementation intentions). While children's self-regulation improved, no differential intervention effects were found across groups. Thus, we do not expect the intervention to meaningfully bias the results of this study. Intervention material and procedure can be requested via email from the first author of this study.
2. We tested our models for linearity, homoscedasticity, and normal distribution of residuals to evaluate the tenability of model assumptions. Both models showed systematic deviations from this model assumptions, even after using logarithmic and square root transformations on the outcome variable. We attribute this mainly to ceiling effects, as most participants reported high values for parent-child interaction quality.

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Appendix

Table A1. List of items used to assess the children's self-regulation skills and parent-child interactions quality by children themselves, and their parents.

Item (child)	Item (parent)	Item (child, German)	Item (parent, German)
Self-regulation skills			
Since the last alarm I talked too much.	Today my child talked too much.	Seit dem letzten Ausfüllen habe ich zu viel geredet.	Heute hat mein Kind zu viel geredet.
Since the last alarm I had too much energy to stay still.	Today my child had too much energy to sit still.	Seit dem letzten Ausfüllen habe ich zu viel Energie gehabt, um still zu sitzen.	Heute hat mein Kind zu viel Energie gehabt, um still zu sitzen.
Since the last alarm I occasionally forgot what I had to do.	Today my child started a lot of things without finishing them.	Seit dem letzten Ausfüllen habe ich zwischendurch vergessen, was ich eigentlich tun sollte.	Heute hat mein Kind viele Sachen angefangen und nicht zu Ende gebracht.
Since the last alarm I had difficulty concentrating.	Today my child had difficulty concentrating.	Seit dem letzten Ausfüllen habe ich mich schlecht konzentrieren können.	Heute hat mein Kind sich schlecht konzentrieren können.
Since the last alarm I did something I regretted afterwards.	Today my child could resist temptations well.	Seit dem letzten Ausfüllen habe ich was gemacht, was ich danach bereut hab.	Heute konnte mein Kind Versuchungen gut widerstehen.
Since the last alarm I was lazy.	Today my child was lazy.	Seit dem letzten Ausfüllen was ich faul.	Heute war mein Kind faul.
Since the last alarm I was able to pull myself together.	Today I wished my child had more self-discipline.	Seit dem letzten Ausfüllen konnte ich mich gut zusammenreißen.	Heute habe ich mir gewünscht, dass mein Kind mehr Selbstdisziplin hat.
Parent-child interaction quality			
Today, I got along well with my parents.	Today I got along well with my child.	Heute bin ich gut mit meinen Eltern zurecht gekommen.	Heute bin ich gut mit meinem Kind zurecht gekommen.

Note. All items had the same 'response scale': (1) not at all (trifft gar nicht zu) to (6) exactly (trifft ganz genau zu); the complete list of study items used in children and parent diaries is available as online supplemental material (translated into English by the first author of this study.

Appendix C: Couple and Daily-Level Relations of Self-Regulation and Well-Being (Study 3)

Moschko, T., Buhr, L., Stadler, G., Schober, P., & Gawrilow, C. (2024). *A dyadic score analysis of how both romantic partners' self-regulation relates to their personal and relational well-being in daily life* [Unpublished manuscript]. Department of Psychology, University of Tübingen.

A Dyadic Score Analysis of how Both Romantic Partners' Self-Regulation Relates to Their Personal and Relational Well-Being in Daily Life

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Abstract

Self-regulation is a key determinant of success and well-being in individuals. It is plausible that self-regulation plays an important role in close relationships, yet few studies investigate self-regulation in dyads so far. Adapting a framework of transactive goal dynamics between two close relationship partners, we aim to better understand how average levels and differences in two partners' self-regulation are related to their personal and relational well-being in everyday life. We hypothesized that well-being in couples is higher when both partners exhibit (1) overall higher levels (higher partner averages), (2) complementing levels (greater partner differences), or (3) similar (smaller partner differences) levels in self-regulation. To evaluate these hypotheses, 53 mixed-gender couples (M_{age} = 24.29 years) individually completed daily diaries across 21 study days. Multilevel dyadic score modeling largely showed evidence for Hypothesis 1 (totality): High partner averages in self-regulation were related to more positive affect between and within couples, less negative affect and higher overall relationship quality between couples, and more life satisfaction within couples. However, similarity (i.e., Hypothesis 3) in self-regulation was related to more closeness on the within-couple level. Together, our findings underline the importance of considering different levels of analyses (i.e., individual vs. dyad, between-couple vs. within-couple, and global vs. specific assessments of relationship functioning) when studying the role of self-regulation in close relationships.

Key words. self-regulation, subjective well-being, relationship functioning, couples, daily diaries, dyadic score model

A Dyadic Score Analysis of how Both Romantic Partners' Self-Regulation Relates to Their Personal and Relational Well-Being in Daily Life

Background

With the beginning of a new year, John and Julie, a young couple, set themselves some goals. By the end of the year, John wants to pass a difficult exam at university, and thus, intends to study for several hours each week. Meanwhile, Julie aims to improve her health by exercising, intending to go to the gym every other night. One key determinant for their success in these matters is self-regulation. In this article, we refer to self-regulation as the ability to orchestrate one's thoughts, feelings, and actions in a way that benefits advancing towards a (long-term) goal over a conflicting (short-term) temptation, commonly also labeled as self-control (Inzlicht et al., 2021). In the past, research accumulated substantial evidence that high self-regulation benefits individual goal pursuit, and thus, personal accomplishment in different areas, including academic and vocational success, and better health (de Ridder et al., 2012; Hagger et al., 2019). Going beyond such an individual perspective, more recent approaches also adopt a social perspective to investigate how self-regulation shapes and is shaped by close relationships (Righetti et al., 2022)—that is, for example, considering how both John's and Julie's self-regulation, individually and conjointly, contribute to their individual and relationship success. Tying in with such approaches, the objective of the current study is to investigate whether and how total levels and (dis)similarity in couple partners' self-regulation relates to their personal and relational well-being in daily life.

The Individual Perspective on Self-Regulation and Well-Being

Although John and Julie each have desirable, personal goals in mind, are highly motivated to reach these goals, and know how to work towards them (i.e., studying, going to the gym), they still might struggle to initiate or maintain goal-approaching behavior.

Commonly, this so-called intention-behavior gap (Sheeran & Webb, 2016), is caused by (real or anticipated) goal conflict. Goal conflict occurs when two (or more) goals compete, for example when Julie's long-term goal to exercise more conflicts with her desire to relax on the couch after a long day at university. Self-regulation encompassed a variety of cognitive, affective, motivational, and behavioral strategies (e.g., situation selection, attentional deployment, inhibition)(Duckworth et al., 2016) helping individuals to stay on track of long-term ambitions by shielding themselves from conflicting short-term temptations (e.g., Parks-Stamm et al., 2010). Therefore, individuals with high self-regulation are also more likely to accomplish their (long-term) goals (Galla & Duckworth, 2015).

Accordingly, self-regulation is related to a wide range of favorable personal outcomes across the life span. For example, empirical studies provide evidence that high (vs. low) self-regulation is linked to educational and vocational success (i.e., better academic skills, better grades, lower rates of unemployment) (Gawrilow et al., 2014; Robson et al., 2020; Tangney et al., 2004). Moreover, high self-regulation is related to health-promoting behaviors, such as physical activity (e.g., de Bruin et al., 2012), and a healthy nutrition (e.g., Verplanken et al., 2005; Wills et al., 2007) while low self-regulation is linked to problematic substance consumption, smoking, and high fat food consumption (e.g., Pearson et al., 2013; Wills et al., 2007), as well as insufficient sleep (Kroese et al., 2016). As self-regulation is quite volatile and influenced by internal and external factors such as changes in motivation or environmental demands (Baumeister et al., 2007; Hofmann et al., 2012) more recent studies also report that within-person fluctuations in (state) self-regulation are related to health behaviors above and beyond between-person differences in (trait) self-regulation (Schöndube et al., 2017). In consequence, both higher trait and state self-regulation are positively linked to personal well-being (i.e., more positive affect, less negative affect, higher life satisfaction) (Buyukcan-Tetik et al., 2018; Cheung et al., 2014; Hofmann et al., 2014; Schmid et al.,

2024). Thus, differences in goal accomplishment and personal well-being can partially be accounted for by between-person and within-person variations in their individual self-regulation efforts. However, when individuals set goals, their accomplishment, and thus, the goal-setters well-being, is not only linked to the "self", but also its direct surrounding, especially its close others.

Going Beyond the Individual: Self-Regulation in the Context of Close Relationships

How well Julie and John will reach their personal goals does not only depend on their own self-regulation efforts. For example, Julie can verbally encourage John to study for his exam, sit down with him to revise exam question, or take over some other of John's tasks for him to concentrate on his study. In contrast, she might insist on John to go to the gym with her or do other tasks, keeping him from studying. Thus, close relationships partners can support and facilitate each other's goal pursuit, or, in turn, sidetrack and hold each other back (e.g., Berli et al., 2018; Keller et al., 2020; Knoll et al., 2017). To add even more complexity, relationship partners might not only hold goals for themselves (e.g., Julie wanting to exercise more), but also goals that are explicitly orientated towards a relationship partner (e.g., Julie wanting to John to pass this exam) or a relationship system (e.g., Julie wanting John and her to spend more time together). This makes it even more evident that, ultimately, both relationship partners contribute to their individual and shared goal outcomes.

One theoretical framework that situates goal pursuit within such dynamics between two (or more) relationship partners is built by *Transactive Goal Dynamic* theory (Fitzsimons et al., 2015). It characterizes relationship partners as "interdependent subparts of one self-regulation system" (Fitzsimons et al., 2015, p. 648), in which all entities exist in a complex, dynamic, and hardly extricable net of co-regulation. Accordingly, individual experiences and behavior underlie more than the mere self-regulation efforts—or lacks thereof—of each individual partner, respectively. For example, empirical studies show that just by thinking of

a partner who might be instrumental for reaching a goal, individuals decrease their self-regulatory efforts, relying on their partner's help (Fitzsimons & Finkel, 2011). While this can lead to more relationship commitment on part of the "outsourcing" party, the other party might experience the relationship as less satisfying if this hinders them from approaching their own goals (Orehek & Forest, 2016). Consequently, relationship functioning is presumably related to both, each relationship partner's self-regulation individually, as well as the combination of both partners' self-regulation.

Regarding the individual contributions of self-regulation on relationship functioning, research quite consistently indicates that people with high self-regulation appear to fare better in their relationships in manifold ways (Righetti et al., 2022). For example, longitudinal research on child development indicates that individuals with high compared to low self-regulation in childhood are more likely to develop and maintain harmonious relationships with peers and adults later in life (Caspi, 2000; Eisenberg et al., 2014). In the context of adult relationships, low trait self-regulation and high impulsivity are associated with destructive communication patterns (e.g., intimate partner aggression, avoidance, lying, withdrawal) (Baker et al., 2018; Tan et al., 2017), as well as breaking promises towards relationship partners (Peetz & Kammrath, 2011), and infidelity (Brady et al., 2020; Pronk et al., 2011). In turn, high trait self-regulation helps individuals to engage in constructive communication and problem-solving behaviors (Bornstein et al., 2017; Guilfoyle et al., 2019) For example, individuals with high (vs. low) self-regulation are better able to accommodate in response their partners destructive behaviors, such as occasional outbursts of anger (Finkel & Campbell, 2001). Accordingly, individuals with high vs. low trait self-regulation experience more intimacy and satisfaction in their relationship (Boiman-Meshita & Littman-Ovadia, 2022; Dyrenforth et al., 2010; Tan et al., 2017; Zuo et al., 2020). Likewise, relationship functioning is also related to state self-regulation: On days on which an individual

experiences low self-regulation, their relationships are marked by lower interaction quality, more conflict, and more anger towards their partners (Buck & Neff, 2012; Crane et al., 2014; Moschko et al., 2023).

Thus, enhanced self-regulation is related to a variety of pro-relationship behaviors. These behaviors do not only affect one's own relational experiences (i.e., *actor* effects), but also the way the partner experience the relationship (i.e., *partner* effects) (Kenny & Ledermann, 2010). For example, partners tend to be more forgiving towards destructive relationship behavior (e.g., rejection) performed by someone with high (vs. low) trait self-regulation (Gomillion et al., 2014). Furthermore, individuals with higher self-regulation than others are perceived as more trustworthy by their partners (Righetti & Finkenauer, 2011). Ultimately, some studies document that not only those individuals with high trait self-regulation are more satisfied in their relationship, but also their partners (Tan et al., 2017). However, across studies, such partner effects emerge far more inconsistently, and, if they find them, these partner effects are typically smaller (Boiman-Meshita & Littman-Ovadia, 2022; Dyrenforth et al., 2010; Zuo et al., 2020). One possible explanation for this might be that most studies merely consider how both partners, individually, affect each other (i.e., How does Julie's self-regulation relate to her own well-being as well as John's well-being, and vice versa?), irrespective of how both partners, conjointly, contribute to relationship functioning (i.e., How does the combination of Julie's and John's self-regulation predict their well-being?). For example, in one study, actor self-regulation was predictive of intimate partner aggression, while partner self-regulation was not—however, actor and partner self-regulation interacted significantly, resulting in intimate partner aggression being most probable when both individuals in the relationship were low in self-control (Quigley et al., 2018). Thus, the combination of both partners' self-regulation, rather than their individual efforts or shortcomings, proved to be the best predictor of relationship functioning.

Therefore, questions about the most favorable combination of two relationship partner's self-regulation regarding relationship functioning in everyday life arise?

Given the vast number of pro-relationship effects of high self-regulation, one can assume that both partners should exhibit high self-regulation to be "happiest". This so-called *totality hypothesis* received considerable empirical support in the past, with studies showing that relationship satisfaction is highest when both partners score high at self-regulation measures, and, in turn, relationship problems are most probable, when both partners dispose low self-regulation (Crane et al., 2014; Quigley et al., 2018; Vohs et al., 2011). Meanwhile, two additional assumptions have been discussed in the literature. In line with the common "opposites attract" belief, the *complementary hypothesis* predicts that dissimilarity in self-regulation benefits a relationship most, as opposite relationship partners balance out each other's strengths and weaknesses. For example, an individual with low self-regulation, resulting in high impulsivity—but, potentially, also in more openness and empathy—might be the best match for an individual with high self-regulation, but less empathy (Apfelbaum et al., 2010). In contrast, the *similarity hypothesis* assumes that comparable levels—be it comparably high or low—in self-regulation benefit relationship functioning the most. While relative to complementary, similarity previously got more empirical support (Cheung et al., 2022; Derrick et al., 2016), other studies propose that similarity in closely related personality factors (e.g., conscientiousness) only explains little variance in relationship satisfaction when controlling for actor and partner effects (e.g., Dyrenforth et al., 2010). All in all, previous research endeavors draw a rather inconsistent picture about the most favorable combination of self-regulation in a romantic relationship, calling for further investigation into that matter.

The Current Study

Given the ambiguity of previous results, our study aims to further examine self-regulation as an impelling factor contributing to relationship functioning. Grounded in

Transactive Goal Dynamics theory, our study conceives of couples as one self-regulation system, with both partner's self-regulation culminating in one shared resource. Thus, instead of focusing on two individuals, our study considers the couple as the unit of analysis (Iida et al., 2018). We will investigate whether and how average levels in couple's self-regulation (i.e., higher average level in couples where both partners, in total, exhibit high self-regulation), and couple differences in self-regulation (i.e., lower difference in couples where both partners exhibit similar self-regulation) are related to personal well-being (i.e., positive and negative affect, life satisfaction), and relational well-being (i.e., closeness, overall relationship quality), evaluating the three opposing accounts discussed in the literature (see Table 1). First, according to the *totality hypothesis* (H1), personal and relational well-being should be highest when both partners exhibit high self-regulation (i.e., high partner averages), irrespective of partner differences. Second, according to the *complementarity hypothesis* (H2), personal and relational well-being should be highest when one partner exhibits high self-regulation, while the other one exhibits low self-regulation (i.e., high partner differences), irrespective of partner averages. Third, according to the *similarity hypothesis* (H3), personal and relational well-being should be highest when both partners exhibit comparably high or low levels in self-regulation (i.e., small partner differences), irrespective of partner averages.

Moreover, our study aims to account for between-couple (e.g., some couples reporting more similarity than others) and daily within-couple variations (e.g., a couples experiencing more similarity on some days than others) in self-regulation and psychosocial functioning. Thus, our study will complement previous research endeavors (Buck & Neff, 2012; Crane et al., 2014) by testing within-couple associations of totality, similarity, and complementarity in partners' self-regulation on personal and relational well-being above and beyond between-couple associations. Presumably, this might help disentangle why previous studies find

contradicting evidence regarding the optimal combination of self-regulation in couples. All hypotheses, as well as the data analysis plan, were pre-registered through the Open Science Framework prior to data collection.

Materials and Methods

Design and Sample

The study followed mixed-gender couples with a dyadic intensive longitudinal design over 21 days. Participants filled out short diaries on their personal smartphone three times a day. To enroll in the study, both partners of the couple needed to be between 18- and 30-year-old, in a committed mixed-gender relationship for at least 3 months and speak German fluently. In the end, one participant that was older than 30 (32 years) participated in the study, who we chose not to exclude from the study since age was not hypothesized to influence the results. The Ethics Committee of the Faculty of Economics and Social Sciences at the University of Tübingen, Germany, granted ethical approval for the study (file A2.5.4-278_bi).

We aimed to recruit 47 couples with the goal to obtain 80% power to detect a medium sized correlation of $r = .40$ at $\alpha = .05$ for the association between self-regulation and relational well-being on the between-couple level (cf. Vohs et al., 2011). At the time of sample size planning, there were no comparable studies to derive meaningful starting values for powering the hypothesized within-person effect (Bolger & Laurenceau, 2013), so that the current study will, aside from its main research questions, provide the necessary estimates for power analyses in future studies. Expecting cases where data was only available for one partner due to the study protocol, we planned to oversample the recruitment goal by about 15%.

In the end, we recruited 114 participants (57 women, 57 men) in 57 dyads. Four couples were excluded because none or just one partner completed a background

questionnaire in the beginning of the study, resulting in 53 couples included in the study. All couples were in committed relationships (relationship length: M = 37.36 months, SD = 28.81), with 45.28% of couples living together, 15.09% being married, and 0.02% having children. On average, participants were 24.29 years old (SD = 3.17), most identified as heterosexual (83.02%), cis-gender (97.17%) individuals born in Germany (88.68%). Overall, couples showed a high diary completion rate of 77.12% (n = 5150 of 53 couples × 2 partners × 21 days × 3 occasions per day = 6678 possible observations).

Procedure

Participants were recruited via a circular email sent to all members of the local university, flyers, and internet postings. After both partners gave written informed consent to participate in the study, they received individualized login details to access the data collection platform m-Path which had to be installed on personal smartphones (Mestdagh et al., 2022). Upon registering in m-Path, each participant was asked to fill out a 30-min questionnaire to provide background information on themselves (i.e., age, gender) and their relationship (i.e., relationship length). Once both partners filled out this questionnaire, a daily diary period with a fixed, time-contingent schedule over 21 consecutive days was activated. This period always started on a Monday, with three assessments per day. Each day, we prompted participants to fill out a short diary (3-4 min) at 12:00 pm, 4:30 pm, and 9:00 pm, respectively. We chose these time points to be able to track changes in self-regulation throughout the day regarding to another research question related to research project. After each prompt, participants had one hour to respond. Partners were asked to complete their diaries separately. Each participant received up to 30€ or 2.5 study hours for their individual participation, based on the number of completed diaries.

Measures

Self-Regulation

To measure daily self-regulation, we adapted two items from the German version of the State Self-Control Capacity Scale (SSCCS) (Bertrams et al., 2011), a reliable and measure capturing momentary self-control[1]. We agreed on these items based on their face validity to capture momentary lacks in willpower to initiate or maintain goal-directed behavior ("If I were tempted by something right now, it would be very difficult for me to resist," and "If I was assigned any difficult task right now, I would give it up," 0 = I disagree completely, 6 = I agree completely). The two items were strongly inter-correlated on the between-person level ($r = .59$, $p < .001$), and moderately correlated on the within-person level ($r = .43$, $p < .001$), indicating passable internal consistency. Participants responses were re-coded so that higher values indicate elevated self-regulation. Self-regulation was assessed three times a day and we computed partner averages and partner differences for each item before calculating daily-level aggregates.

Personal Well-Being

Personal, or rather, subjective well-being, is typically conceptualized as a multifaceted construct encompassing an affective (i.e., a hedonic balance of positive and negative affect), and a cognitive component (i.e., life satisfaction) (Diener, 2009). Thus, we applied a short version of the Positive and Negative Affect Scale (Thompson, 2007), which comprises 10 items (i.e., "How do you feel right now?," 0 = not at all [alert/upset/…], 4 = Very much [alert/upset/…]), as well as a single-item measure of life satisfaction adapted from the Satisfaction With Life Scale (Diener et al., 1985)("All in all, how satisfied were your with your life today?," 0 = Very unsatisfied, 6 = Very satisfied). To account for

[1] In our pre-registration, we planned on using the Strengths and Weaknesses of ADHD Symptoms and Normal Behaviour (SWAN) Scale (Swanson et al., 2012) to capture self-regulation in terms of daily levels of inattention, impulsivity, and hyperactivity. However, after initial screening of the data, we decided against using the SWAN scale for the following reasons: (1) At the end of the study, several study participants feedbacked to struggle with answering the SWAN items; (2) the scale showed limited intraindividual variability; and (3) male and female scores were unrelated on the between-couple ($r = .16$, $p = .25$), and weakly related on the within-couple level ($r = 0.07$, $p < .05$), indicating limited shared variability. Overall, this made the SWAN scale less suitable to use as a predictor in the planned models of dyadic processes.

differing temporal stability of affect and life satisfaction (Diener, 2009), positive and negative affect were assessed three times a day, while life satisfaction was only assessed once a day, in the evening. We computed partner averages and partner differences for each item before calculating daily-level aggregates for positive and negative affect, respectively.

Relational Well-Being

To assess relational well-being, we adapted seven items from a previous study investigating daily variability in relationship quality (Totenhagen et al., 2016) and used them once a day, in the evening. We chose *closeness* ("Today, how close did you feel to your partner?," 0 = Not at all, 6 = Very much) as the primary relational outcome for our study, as we expected closeness to be particularly fluctuating in couples' everyday lives. Furthermore, we added single-item measures of *relationship satisfaction*, *commitment*, *conflict*, *ambivalence*, *maintenance*, and *love* (all measured on a 6-point scale) to compute a more comprehensive scale indexing overall relationship quality. Participants' responses for conflict and ambivalence were re-coded so that higher values indicate higher relational well-being (i.e., less conflict and less ambivalence). As these seven items were not used as one index scale before, we applied multilevel confirmatory factor analyses (MCFA) to confirm a one-factorial structure of the scale. The MCFA revealed insufficient model fit (CFI = .842, TLI = .763, SRMR = .095, RMSEA = .118) according to the cut-off scores suggested by (Hu & Bentler, 1999). However, dropping the item with lowest factor loading on both the between-person and within-person level (conflict) led to reasonable model fit (CFI = .930, TLI = .883, SRMR = .057, RMSEA = .091). Consequently, we computed the relationship quality index without this item (i.e., just relationship satisfaction, commitment, closeness, ambivalence, maintenance, and love).

Covariates

We considered marital status (0 = not married, 1 = married), cohabitation (0 = not cohabitating, 1 = cohabitating), having dependent children (0 = no children, 1 = children), and relationship length (in months) as couple-level covariates. Furthermore, daily-level covariates included time spent together in person when awake (in hours), and time spent together remotely (i.e., making phone calls, video chatting or texting; in hours), assessed once a day, every evening, via self-report. After excluding implausible data (i.e., values indicating more than 24 hours), we computed a couple average in cases the partners' responses did not align. On average, couples indicated to spend around 4.20 hours together (between-couple *SD* = 2.50, within-couple *SD* = 2.85) per day on workdays (i.e., Monday to Friday,) and 6.77 hours on weekends (between-couple *SD* = 3.87, within-couple *SD* = 3.08), with additional 0.89 hours (between-couple *SD* = 0.73, within-couple *SD* = 0.58) of communicating remotely on workdays and 0.60 hours (between-couple *SD* = 0.70, within-couple *SD* = 0.45) on weekends. Before entering these daily-level covariates into our models, we used mean substitution imputation to replace missing values by the couple's average time spent together (in person/remotely) on workdays and weekends, respectively. For couples not reporting any data on time spent together, we imputed the population means for workdays (*n* = 3 couples) and weekends (*n* = 8 couples), respectively.

Data analysis

To model the link between self-regulation and well-being as a dyadic couple-level process over time, we implemented an extended, multilevel dyadic score model (Iida et al., 2018) depicted in Figure 1. The data analytic approach followed the procedure reported by Stadler et al. (2023). On the between-couple level—that is, across all time points—the predictor variable (self-regulation) is represented as the partner average (i.e., mean of both partners), and the (undirected) partner difference in self-regulation, both centered at the grand mean. In addition, to account for fluctuations on the within-couple level, all predictors and

outcomes were represented as daily couple averages and daily partner differences (undirected), both centered at the couple mean. All predictor variables were entered into two-level regression models, with separate analyses for partner averages and partner differences of each outcome variable (positive affect, negative affect, life satisfaction, closeness, overall relationship quality), respectively. All models were adjusted for linear effects over time by including a time variable representing the investigated day (centered on the first day), as well as day of week (0 = Monday-Friday, 1 = Saturday-Sunday [weekend]). To account for the intensive longitudinal data structure, we modeled time dependence of the residuals with a first-order autoregressive structure. For each model, we specified a maximal random effects structure including a random intercept, a random time slope, and random slopes of both within-person predictors. In case of non-convergence, we reduced the random effect structure successively until reaching convergence. To rule out third-variable explanations, we entered all daily-level (i.e., Level 1) and couple-level (i.e., Level 2) covariates into the models. All models were conducted with restricted maximum likelihood estimation using R (version 4.3.3). We used the standard $p < .05$ criterium for determining which model estimates differ statistically significant from zero.

Results

Prior to analyzing couple- and daily-level associations of self-regulation with psychosocial functioning in couples, we computed the intraclass correlation coefficient (ICC) to determine the share of between-person differences (54%) vs. within-person differences and residual error (46%) in the variability of daily self-regulation reports. Furthermore, self-regulation reports by male and female partners scores were strongly correlated on the between-couple level ($r = .50$, $p < .001$), and weakly correlated on the within-couple level ($r = .07$, $p = .036$), indicating considerable shared variance. Taken together, these analyses underscore the importance of modeling our predictor variable (i.e., self-regulation) as a

fluctuating and dyadic variable, which we did by applying multilevel dyadic score models as described above. Descriptive statistics for all six variables (self-regulation, positive affect, negative affect, life satisfaction, closeness, overall relationship quality) are provided in Table 2, computed as partner averages and partner differences.

Multilevel Dyadic Score Models

Multilevel dyadic score models were used to evaluate if totality (H1; high partner averages), complementarity (H2; great partner differences), or similarity (H3; small partner differences) in two partner's self-regulation scores predict high personal and relational well-being. Figure 2 gives an overview of the fixed effects of partner averages and partner differences in self-regulation regarding the partner averages in outcomes. The full model results are depicted in Table 3 (partner averages of outcomes) and Table 4 (partner differences of outcomes). Please note that we were only able to include a random intercept and a random time slope, as the inclusions of further random effects (i.e., random slope of partner averages and partner differences in self-regulation) led to non-convergence. The fixed

Self-Regulation and Positive Affect

Multilevel dyadic score modeling of self-regulation and positive affect provided evidence in favor of the *totality hypothesis* (H1) on both the between-couple, as well as the within-couple level. Couples with higher average self-regulation than others showed higher partner averages in positive affect ($b = 0.18$, $p = .009$). Furthermore, on days couples exhibited higher self-regulation than usual, they showed higher partner averages in positive affect ($b = 0.22$, $p < .001$). Partner differences in self-regulation were not predictive of partner averages in positive affect. However, couples with higher differences in self-regulation than others experienced greater differences in positive affect (b = .32, p = .006), and on days couple partners differed more in their self-regulation than usual, they also experienced greater differences in positive affect ($b = 0.09$, $p < .001$). In addition, regarding

the study covariates, the models revealed that partner averages in positive affect decreased over the course of the study (b = -0.006, p = .014), were lower on weekends (b = -0.05, p = .045), but were higher the more time couple partners spent together in person throughout a day (b = 0.007, p =.044). Moreover, partner differences were smaller the more time couple partners spent together in person throughout a day (b = -0.009, p =.020).

Self-Regulation and Negative Affect

Multilevel dyadic score modeling of self-regulation and negative affect provided evidence in favor of the *totality hypothesis* (H1) as well, but only on the between-couple level. Couples with higher average self-regulation than others showed lower partner averages in negative affect (b = -0.12, p = .022), as well as a smaller partner difference in negative affect (b = -0.15, p = .035). Differences in negative affect were also smaller on days couples exhibited higher partner averages in self-regulation than usual (b = -0.05, p = .008), as well as on days with smaller partner differences in self-regulation than usual (b = 0.03, p = .045). Partner differences in self-regulation, as well as the covariates, were not predictive of partner averages in negative affect. However, on weekend, partner differences in negative affect were smaller (b = -0.06, p = .025).

Self-Regulation and Life Satisfaction

Multilevel dyadic score modeling of self-regulation and life satisfaction provided evidence in favor of the *totality hypothesis* (H1), but only on the within-couple level. On days couples exhibited higher self-regulation than usual, they showed higher partner averages in life satisfaction (b = 0.29, p < .001). Partner differences in self-regulation were not predictive of life satisfaction. In addition, partner averages in life satisfaction were higher in married couples (b = 0.93, p = .006), and higher the more time couple partners spent together throughout the day in person (b = 0.04, p < .001). The study covariates were unrelated to partner differences in life satisfaction.

Self-Regulation and Closeness

Multilevel dyadic score modeling of self-regulation and closeness provided evidence in favor of the *similarity hypothesis* (H3), but only on the within-couple level. On days couples exhibited smaller differences in self-regulation than usual, they showed higher partner averages in closeness (b = -0.18, p < .002), as well as smaller partner differences in closeness (b = 0.12, p < .036). Partner averages in self-regulation were not predictive of closeness. In addition, partner averages in closeness were lower in cohabitating couples (b = -0.60, p = .032), and higher the more time couple partners spent together throughout the day in person (b = 0.17, p < .001). Moreover, partner differences were smaller the more time couple partners spent together throughout the day in person (b = -0.06, p < .001).

Self-Regulation and Overall Relationship Quality

Multilevel dyadic score modeling of self-regulation and overall relationship quality provided evidence in favor of the *totality hypothesis* (H1), but only on the between-couple level. Couples with higher partner averages in self-regulation than others showed higher partner averages in overall relationship quality (b = 0.35, p = .020). Partner differences in self-regulation were not predictive of overall relationship quality. In addition, partner averages in overall relationship quality were higher in married couples (b = 0.62, p = .032), and higher the more time couple partners spent together throughout the day in person (b = 0.08, p < .001), and remotely (b = 0.06, p = .048). Also, partner differences in overall relationship quality were smaller the more time couple partners spent together throughout the day in person (b = -0.03, p < .001).

Discussion

This study aimed at understanding how self-regulation is linked to psychosocial functioning in romantic couples. We conceptualized couples as one self-regulating system (Fitzsimons et al., 2015) with the combination of both partners' self-regulation predicting

personal and relational well-being in everyday life. Hence, to account for the covariance in both partners' self-regulation, as well as disentangle between-couple differences and within-couple fluctuations in self-regulation, we contemplated overall and daily partner averages and differences in self-regulation (Iida et al., 2018; Stadler et al., 2023). Thus, we evaluated three hypotheses regarding their link with personal and relational well-being: (1) the totality hypothesis, (2) complementary hypothesis, and (3) similarity hypothesis.

According to the *totality hypothesis*, psychosocial functioning in couples should be mainly related to high partner averages in self-regulation, irrespective of (dis)similarity between partners' self-regulation (Vohs et al., 2011). Our results align with this account in four of the five outcomes considered in this study; however, result patterns diverge somewhat on the between and within couples. Regarding personal well-being, we found that higher partner averages in self-regulation were related to more positive affect and less negative affect on the between-couple level. On the within-couple level, higher partner averages in self-regulation were related to more positive affect and higher life satisfaction. This widely mirrors previous results linking self-regulation to (personal) well-being in individuals (i.e., subjective well-being) (Buyukcan-Tetik et al., 2018; Cheung et al., 2014; Hofmann et al., 2014; Schmid et al., 2024). However, contrasting these studies, partner averages in self-regulation were not related to negative affect within couples, and life satisfaction between couples. Notably, our couples scored rather high on life satisfaction and showed little within-couple fluctuations in negative affect. Such boundary effects, potentially resulting from specific properties of our sample (i.e., highly motivated, young, and educated participants), together with the small sample size, might be an explanation for the respective links not reaching significance in this study. Furthermore, regarding relational well-being, partner averages in overall relationship quality were related to partner averages in self-regulation on the between-couple, but not on the within-couple level. While this result conforms with a vast

body of literature connecting trait self-regulation with relationship functioning (Righetti et al., 2022), it raises the questions why short-term fluctuations in self-regulation would not also be reflected in fluctuations in overall relationship quality (Buck & Neff, 2012; Crane et al., 2014) in the current study. One possible explanation could be that individuals with high trait self-regulation better accommodate to (Finkel & Campbell, 2001), and are more forgiving (Gomillion et al., 2014) destructive partner behaviors (i.e., snapping back, withdrawing), and dependency (i.e., needing help with achieving a set goal) resulting from occasional lows in their partner's self-regulation. Accordingly, relationship quality might predominantly be affected by recurrent, dispositional self-regulation problems, rather than (transient) fluctuations in self-regulation in otherwise well-regulated couples. Meanwhile, (dis)similarity in self-regulation—as indicated by great or small differences between two partners' self-regulation—was not related to higher partner averages in positive affect, negative affect, life satisfaction, and overall relationship quality. However, similarity (i.e., small partner difference) in self-regulation was related to similarity in positive affect on the between-couple level, as well as to similarity in positive and negative affect on the within-couple level.

Taken together, we interpret these patterns as evidence for the totality hypothesis, which aligns both with previous empirical findings (Crane et al., 2014; Quigley et al., 2018; Vohs et al., 2011), as well as theoretical accounts. For example, given that goals are almost always pursued in the company of close others, *Transactive Goal Dynamics* theory considers how relationship partners' goals, goal pursuit, and related outcomes (i.e., relationship functioning) interweave with each other (Fitzsimons et al., 2015). Relationship partners can perceive this interdependence as beneficial (= transactive gain) or detrimental (= transactive loss) depending on several factors. Most importantly, favorable goal outcomes are facilitated if both partners' goal pursuits coordinate well. Goal congruence is one factor determining

goal coordination—that is, it is easier to coordinate if both partners work on compatible goals—but also self-reliant pursuit of (in)congruent goals. One partner's low self-regulation can undermine goal coordination, as they start relying on a partner's regulatory efforts to help them approach their goals (Fitzsimons & Finkel, 2011). For example, circling back to the couple introduced at the beginning of this article, if John starts relying too much on Julie's support to initiate behavior relevant for his goal pursuit (e.g., when Julie needs to sit down with John for him to start studying), she might no longer be able to pursue her own goals (i.e., going to the gym). While this constellation can suit the "outsourcing" party (i.e., John), their partner (i.e., Julie) might conclude that they would be more successful outside of the relationship, and, eventually, end the relationship. Consequently, psychosocial functioning, should be highest in couples in which both partners perceive each other as instrumental—that is, as a helpful means to approach important goals (Orehek & Forest, 2016). Generally, one can assume that mutual instrumentality is most likely if both partners exhibit high self-regulation. However, we can also think of instances where such a constellation is not helpful. For example, in couples, or on occasions, where two relationship partners determinately pursue rather incongruent goals, the relationship can fall by the wayside. Consequently, couples might benefit from occasional low self-regulation of one or both relationship partners. Therefore, we also evaluated two alternative accounts considering whether and how (dis)similarity, rather than totality, in self-regulation is associated with personal and relational well-being.

According to the *complementary hypothesis*, psychosocial functioning in couples should be mainly related to great partner differences in self-regulation, irrespective of partners' total self-regulation. In contrast, according to the *similarity hypothesis*, psychosocial functioning in couples should be mainly related to small partner differences in self-regulation, irrespective of partners' total self-regulation. We could not find evidence for

either of those accounts regarding positive affect, negative affect, life satisfaction, and overall life satisfaction. However, in line with the similarity account, in our study, couples exhibited higher partner averages in closeness on days they experienced more similarity (i.e., smaller differences) in self-regulation than usual (i.e., within-couple association). On such days, partner reports of closeness were also more similar. Partner averages in self-regulation, however, were not linked to closeness, and we found no between-couple links of self-regulation and closeness. This raises the question why results for closeness diverge from all other constructs considered in this study, especially overall relationship quality. Closeness between relationship partners is usually conceptualized as an emotional bond, a feeling of "we-ness", and intimacy (Branand et al., 2019), which increases when partners connect via meaningful and positive interactions. On the one side, high self-regulation can promote such interactions, as, for example, it prevents high work demands and accompanying frustration to spill over and negatively affect relationship behavior at home (Danner-Vlaardingerbroek et al., 2016). In addition, it can help partners to initiate activities that relate to individual or shared goals, creating a mutual sense of accomplishment. On the other side, a feeling of closeness can also arise whenever both partners lack self-regulation, as, for example, proposed by symptom-system fit theory (Shoham et al., 2007). That is, if both partners fail to initiate a goal-directed behavior but instead engage in a conflicting, yet shared interaction (e.g., when John and Julie both decide to watch a TV series together instead of studying and working out) can—in the short-term—induce closeness (Pauly et al., 2023), but not necessarily benefit personal and relational well-being in the long run. Furthermore, while we assumed closeness to be a predominantly positive relationship process, in some cases, it can also reflect a rather dysfunctional enmeshment between partners (Cox & Paley, 1997). This can, for example, be the result of relationship partners not setting clear boundaries between personal and relational concerns—as can happen in individuals with low self-regulation

(Visserman et al., 2017). In summary, these considerations might explain why similarity (but not totality) in self-regulation is related to elevated closeness (but not to personal well-being or overall relationship quality) within couples (but not between couples).

Ultimately, our results indicate the need to differentiate between different relationship processes when studying the role of self-regulation in the context of (close) relationship. Therefore, for exploratory purposes, we also performed separate analyses for all seven relationship outcomes assessed in our study, rather than compiling them into one relationship quality index. The full results of these analyses are provided as Online Supplementary Material of this manuscript. In summary, these analyses draw a heterogenous picture of links between partners' self-regulation, further demonstrating the need to cautiously disentangle the role of self-regulation in relationship functioning. In addition, to shed more light on the complex relationship processes in couples' everyday life, future studies should also consider potential moderators (i.e., goal (in)congruency) (Fitzsimons et al., 2015) and mechanisms (i.e., mutual instrumentality) (Orehek & Forest, 2016) underlying our observations.

Limitations

While we provide novel insights into daily relationship processes, we want to allude to some considerable limitations of our research design. First, in the current study, we averaged and subtracted individually reported self-regulation to calculate dyadic scores (Iida et al., 2018). As self-regulation is typically conceptualized as an individual trait, this is a rather unconventional and not uncontroversial approach. While we linked this procedure to *Transactive Goal Dynamics* theory (Fitzsimons et al., 2015), we acknowledge that it needs to be validated in future studies by applying comparable approaches (e.g., actor-partner interdependence models, response surface analyses). This appears especially important seeing that the reliability to capture daily fluctuations in partner averages and differences of the self-regulation measure we applied in this study is clearly improvable. Notably, this might have

solely resulted from the brevity of our measure, as we only assessed self-regulation with two items to minimize participant burden. However, future studies should also seek to use more sophisticated self-regulation measures. Second, our intensive longitudinal study merely provides correlational evidence and does not allow causal interpretations of the results. Again, drawing on *Transactive Goal Dynamics* theory (Fitzsimons et al., 2015), we treated self-regulation as predictor, and personal and relational well-being as outcome, implying that self-regulation affects well-being. Future research should test this direction of effects by implementing interventions to increase self-regulation in dyadic partners (i.e., dyadic planning) (e.g., Knoll et al., 2017) and evaluate whether, how, and when (i.e., timing of effects) (Scholz, 2019) intervention effects translate into elevated well-being. Third, longer-term studies are needed to evaluate the impact of self-regulation on relationship persistence, which is the main relational outcome considered in *Transactive Goal Dynamics* theory. Fourth, although we asked participating couples to complete their daily diaries individually, we need to assume that partners discussed and compared their answers. This might not only have led to more partner similarity in the data, but also influenced relationship quality, as partners engage in shared reflections of their relationship. Lastly, while our results emerged despite controlling for several covariates (e.g., cohabitation, etc.), certain specifics of our sample limit the generalizability of our results. We specifically recruited young adults (18-30 years) in committed, mixed-gender relationships. Consequently, relationship duration of participating couples was rather short (maximum of 10 years), only a small percentage of the participating couples was married, and almost all couples were childless. In the future, research should address how these variables might influence effect sizes, conducting studies that are adequately powered to perform moderation analyses. Also, it remains open whether and how our results apply to for example same-sex couples, longer-lasting relationships, and

parents, implying the need to apply recruitment strategies that approach more diverse samples in the future.

Conclusion

In conclusion, the results of our study are largely in line with a totality account: In general, high personal and relational well-being of romantic relationship partners is linked to both partners possessing high self-regulation, rather than them having similar or complementing self-regulation abilities. However, our study also provides novel insight into couples' daily lives, highlighting the need to look a little closer when studying the role of self-regulation in romantic relationships by disentangling (1) individual and conjoint contributions of both relationship partners, (2) processes on the between- and within-couple level, and (3) unique mechanisms related to global vs. specific relationship outcomes. Thus, while we found that couples report higher overall relationship quality if, together, they possess more self-regulation than other couples (= between-couple association), we also found that on days couples reported to have similarly high or low self-regulation, they felt closer (= within-couple association). Hence, high trait self-regulation appears to be beneficial for overall relationship quality, which, in turn, might not as much be affected by (transient) fluctuations in state self-regulation. In contrast, feelings of closeness fluctuate in parallel to similarity in partners' self-regulation, with couples experiencing more closeness on days of particularly low self-regulation just as much as on days of particularly high self-regulation, given they are on a comparable level. Overall, these dynamics deserve further research in the future to better understand the complex processes that can contribute to both personal, as well as relationship success.

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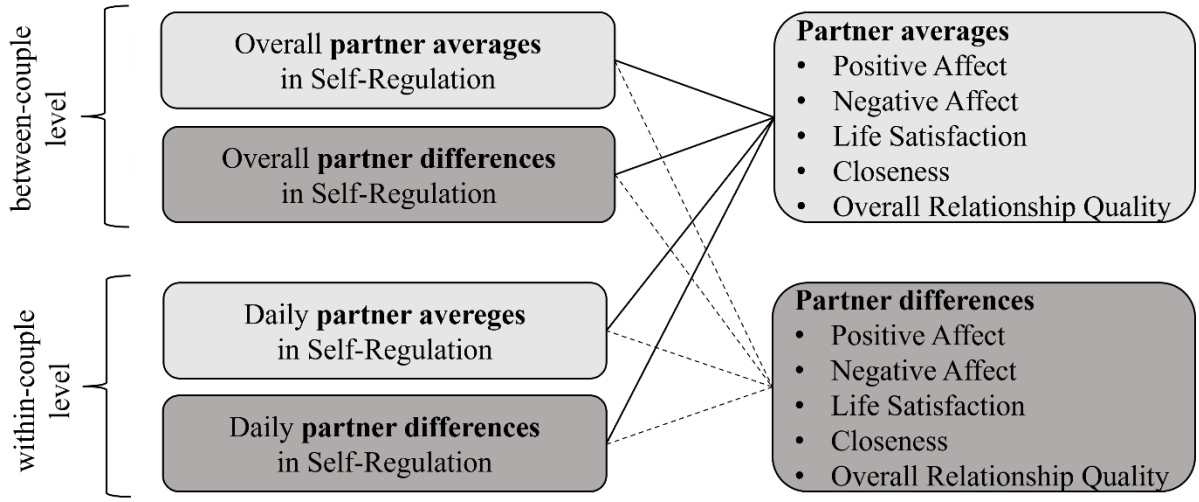
Figure 1

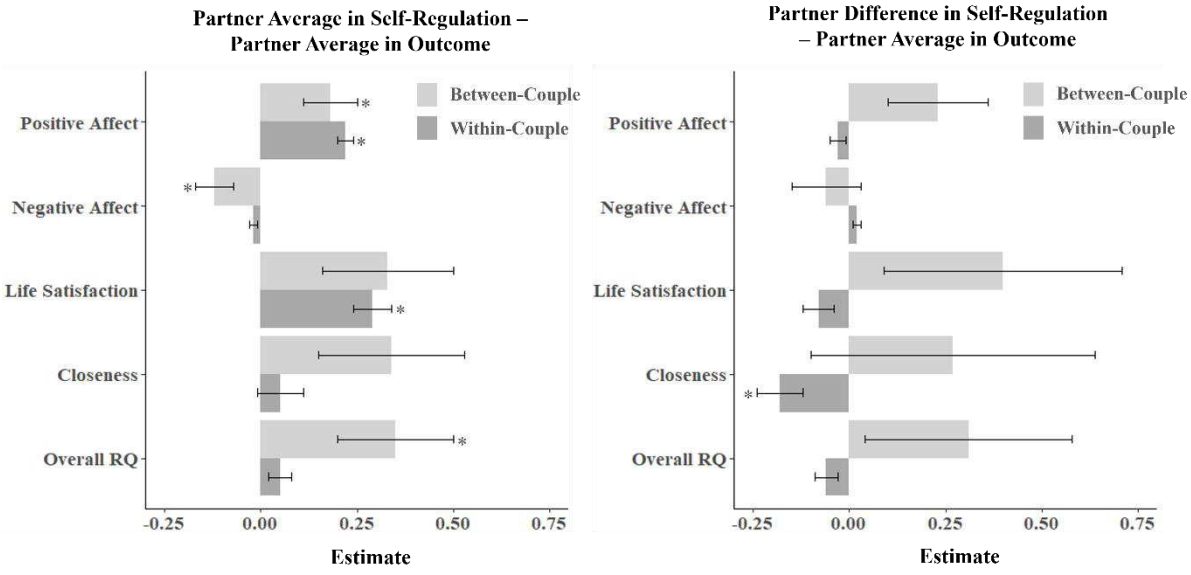
Extended Dyadic Score Model Applied in this Study.



Note. This illustration does not include the covariates considered in our models. The solid lines are of particular importance to evaluate our research hypotheses.

Figure 2

Overview of Model Estimates for Fixed Effects (with Standard Errors) of Partner Averages (left) and Partner Differences (right) in Self-Regulation Regarding Partner Averages in Positive Affect, Negative Affect, Life Satisfaction, Closeness, and Overall Relationship Quality (RQ)



Note. While the left panel reveals that the totality hypothesis (H1; higher partner averages in self-regulation – higher well-being) can be supported regarding positive affect (between-couple and within-couple), negative affect (between-couple), life satisfaction (within-couple) and overall relationship quality (between-couple), the right panel reveals support for the similarity hypothesis (H2, smaller partner averages in self-regulation – higher well-being) regarding closeness on the within-couple level. The asterisks indicate that an estimate differs significantly from zero.

Table 1

Research Hypotheses Regarding the Association of Partner Averages and Partner Differences with (Personal and Relational) Well-Being in Couples

	Partner averages	Partner differences
H1: Totality	Higher averages = Higher well-being	No association
H2: Complementarity	No association	Greater differences = Higher well-being
H3: Similarity	No association	Smaller differences = Higher well-being

Table 2

Sample Characteristics on the Between-Couple and Within-Couple Level for each Variable, Including Means, Standard Deviations, the Theoretical Scale Range, the Empirical Range, the Sample Size for Couples and Time Points, and Reliability Measures.

	M	SD_B	SD_W	Scale Range	Min – Max	*N*	*n*	R_{KF}	R_C
Self-Regulation									
Partner Average	3.86	0.82	0.64	0 – 6	1.00 – 6.00	53	911	.99	.58
Partner Difference	1.65	0.41	0.71	0 – 6	0.00 – 5.00	53	911	.91	.40
Positive Affect									
Partner Average	1.83	0.31	0.36	0 – 4	0.53 – 3.25	53	910	.99	.82
Partner Difference	0.98	0.28	0.36	0 – 4	0.07 – 3.00	53	910	.96	.54
Negative Affect									
Partner Average	0.31	0.24	0.21	0 – 4	0.00 – 1.50	53	910	.99	.70
Partner Difference	0.47	0.36	0.31	0 – 4	0.00 – 2.53	53	910	.98	.64
Life Satisfaction									
Partner Average	4.32	0.75	0.77	0 – 6	1.00 – 6.00	50	734	-	-
Partner Difference	1.07	0.50	0.90	0 – 6	0.00 – 5.00	50	734	-	-
Closeness									
Partner Average	4.34	0.98	1.03	0 – 6	0.00 – 6.00	50	732	-	-
Partner Difference	0.98	0.52	0.87	0 – 6	0.00 – 6.00	50	732	-	-
Relationship Quality									
Partner Average	4.69	0.77	0.57	0 – 6	0.08 – 6.00	50	732	.99	.81
Partner Difference	0.99	0.36	0.49	0 – 6	0.08 – 6.00	50	732	.93	.53

Note. *M* = between-couple means, SD_B = between-couple standard deviation, SD_W = within-couple standard deviation of daily fluctuations, *N* = number of couples, *n* = number of available data points (out of 53 couples x 21 days = 1.113 possible data points), R_{KF} = reliability of between-couple differences, R_C = reliability of within-couple fluctuations.

Table 3

Parameter Estimates of Testing the Effects of Self-Regulation (Partner Averages and Differences) on Partner Averages in Positive Affect, Negative Affect, Life Satisfaction, Closeness, and Overall Relationship Quality

	Partner Averages									
	Positive Affect		Negative Affect		Life Satisfaction		Closeness		Overall RQ	
	Est.	*SE*	Est.	*SE*	Est.	*SE*	Est.	*SE*	Est.	*SE*
Fixed Effects										
Intercept	1.97***	0.08	0.33***	0.05	4.32***	0.18	3.67***	0.21	4.28***	0.15
SR, Partner Averages										
Level 2 (Between-Couple)	0.18**	0.07	-0.12*	0.05	0.33	0.17	0.34	0.19	0.35*	0.15
Level 1 (Within-Couple)	0.22***	0.02	-0.02	0.01	0.29***	0.05	0.05	0.06	0.05	0.03
SR, Partner Differences										
Level 2 (Between-Couple)	0.23	0.13	-0.06	0.09	0.40	0.31	0.27	0.37	0.31	0.27
Level 1 (Within-Couple)	-0.03	0.02	0.02	0.01	-0.08	-0.04	-0.18**	0.06	-0.06	0.03
Level 2-Covariates										
Marriage	0.21	0.14	-0.05	0.10	0.93**	0.32	0.58	0.38	0.62*	0.28
Cohabitation	-0.05	0.10	-0.06	0.07	-0.09	0.23	-0.60*	0.27	-0.25	0.20
Children	-0.19	0.33	-0.07	0.23	-1.30	0.72	-1.11	0.83	-0.84	0.62
Relationship Length	-0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
Level 1-Covariates										
Time Slope	-0.01*	0.002	-0.00	0.00	-0.00	0.01	-0.01	0.01	-0.00	0.01
Weekend	-0.05*	0.03	-0.02	0.02	0.10	0.07	-0.08	0.09	0.02	0.05
Time Together (in Person)	0.01*	0.00	-0.00	0.00	0.04***	0.01	0.17***	0.01	0.08***	0.01
Time Together (Remotely)	-0.01	0.01	0.00	0.01	-0.05	0.04	0.07	0.05	0.06*	0.03
Random Effects										
Level 2										
Intercept	0.27		0.20		0.62		0.63		0.50	
Time Slope	0.01		0.01		0.01		0.03		0.02	

Intercept × Time Slope	-0.06	-0.17	0.19	0.50	0.65
Level 1					
Residual Error	0.32	0.21	0.76	0.93	0.53
Autocorrelation	0.14	0.16	0.18	0.10	0.16

Note. Est. = estimated effect, *SE* = standard error, RQ = relationship quality, SR = self-regulation. For facilitating their interpretation, we reported all random components in standard deviation and correlation metric, whereas their standard errors refer to the (co)variation matric. * $p < 0.05$, ** $p < .01$, *** $p < 0.001$.

Table 4

Parameter Estimates of Testing the Effects of Self-Regulation (Partner Averages and Differences) on Partner Differences in Positive Affect, Negative Affect, Life Satisfaction, Closeness, and Overall Relationship Quality

	Partner differences									
	Positive Affect		Negative Affect		Life Satisfaction		Closeness		Overall RQ	
	Est.	*SE*	Est.	*SE*	Est.	*SE*	Est.	*SE*	Est.	*SE*
Fixed Effects										
Intercept	1.02***	0.07	0.51***	0.05	1.08***	0.15	1.23***	0.15	1.20***	0.10
SR, Partner Averages										
Level 2 (Between-Couple)	0.04	0.06	-0.16*	0.07	-0.07	0.12	-0.15	0.11	-0.15	0.08
Level 1 (Within-Couple)	0.04	0.02	-0.05	0.02	-0.08	0.08	0.08	0.06	-0.04	0.03
SR, Partner Differences										
Level 2 (Between-Couple)	0.32**	0.11	-0.05	0.14	0.18	0.23	0.27	0.22	0.21	0.15
Level 1 (Within-Couple)	0.09***	0.02	0.03	0.02	0.06	0.06	0.11*	0.05	0.02	0.03
Level 2-Covariates										
Marriage	-0.13	0.12	-0.13	0.15	-0.24	0.23	0.01	0.22	-0.11	0.15
Cohabitation	0.00	0.08	-0.09	0.10	-0.09	0.17	0.22	0.16	0.16	0.11
Children	0.06	0.27	-0.08	0.33	-0.39	0.50	-0.06	0.48	0.10	0.33
Relationship Length	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00
Level 1-Covariates										
Time Slope	-0.00	0.00	-0.00	0.00	0.00	0.01	-0.00	0.01	-0.01	0.00
Weekend	-0.01	0.03	-0.02	0.02	0.09	0.09	-0.08	0.08	-0.04	0.05
Time Together (in Person)	-0.01*	0.00	-0.00	0.00	-0.02	0.01	-0.06***	0.01	-0.03***	0.01
Time Together (Remotely)	-0.00	0.02	0.00	0.01	0.05	0.05	-0.05	0.05	-0.04	0.03
Random Effects										
Level 2										
Intercept	0.19		0.31		0.36		0.40		0.29	
Time Slope	0.01		0.01		0.02		0.03		0.01	

Intercept × Time Slope	0.46	-0.33	0.05	-0.43	-0.36
Level 1					
Residual Error	0.35	0.31	0.94	0.90	0.49
Autocorrelation	0.09	0.17	0.09	0.07	0.17

Note. Est. = estimated effect, *SE* = standard error, RQ = relationship quality, SR = self-regulation. For facilitating their interpretation, we reported all random components in standard deviation and correlation metric, whereas their standard errors refer to the (co)variation matric. * $p < 0.05$, ** $p < .01$, *** $p < 0.001$.