Current Methodological Approaches for Studying the Association Between Love and Psychological Well-Being in Daily Life

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Abstract

We review the literature linking the experience of love in daily life to psychological well-being, with a particular emphasis on the methodologies used to investigate this relationship. Experience sampling methodology has emerged as a key ecologically valid approach that captures real-time experiences within individuals' natural environments. Experience sampling yields rich intensive

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longitudinal data, which, when analyzed using dynamic models, offers promising avenues for exploring love as a momentary, fluctuating emotional experience and its connection to well-being. We provide a concise demonstration of how to analyze daily-life data on love and well-being with such dynamical models, with tutorial files made available online on the Open Science Framework.

Keywords

Love · Well-being · Experience sampling · Longitudinal data · Ctsem · Dynamics

Background

In both philosophical and scientific discourse, the concept of love has been explored through various lenses. Philosophical conceptualizations of love, which predate its scientific study, were not bound to romantic contexts, and included love between friends and love for one's neighbors (Aumann, 2013; Hendrick & Hendrick, 2003; Krishek, 2008) (see Vanderheiden's chapter ▶ ""A Friend? A Single Soul Dwelling in Two Bodies." Friendship—A Special Kind of Love"). In this context, a distinction was made between neighborly love and preferential love (Krishek, 2008). While preferential love spans romantic and nonromantic contexts to include friends and romantic partners, neighborly love is situated in nonromantic contexts and directed more toward strangers and humanity (Krishek, 2008). Despite these broader conceptualizations, the scientific study of love (which began around the 1940s; Hatfield et al., 2012), has been dominated by the exploration of passionate love in romantic settings (Hendrick & Hendrick, 2003). In these settings, romantic love has been further differentiated into passionate and companionate forms (Fehr et al., 2014; Hendrick & Hendrick, 2003, 2019; Langeslag et al., 2013; Masuda, 2003; Myers & Shurts, 2002). While research has progressed to explore love within specific relationships—such as those between romantic partners, family members, or, more recently, friends (Heshmati & Donaldson, 2020)—scientific inquiry has largely remained focused on these domains (Vanderheiden, 2021; Xia et al., 2023).

Broader conceptions of love in everyday life often rely on perspectives from nonexperts (i.e., laypeople). For example, the *prototype approach* conceptualizes love in everyday life through the clearest cases or best examples (i.e., prototypes) that nonexperts identify (Buss, 1988; Fehr, 1988). Similarly, the *love story approach* frames love through narratives that nonexperts construct to make sense of their experiences (Sternberg, 1994, 2006). Another related framework is the *essentialist approach*, which conceptualizes love through the "essential" features that nonexperts deem necessary for the feeling of love to exist (Bergner et al., 2013). Finally, the *cultural consensus approach* (Heshmati et al., 2019; Oravecz et al., 2016) explores love in everyday life by examining the culturally shared views of nonexperts within a specific cultural context.

Introduction

The aim of this chapter is to provide a comprehensive summary of the conceptualizations of love in everyday life, with particular emphasis on how love manifests across both romantic and nonromantic contexts. Additionally, this chapter explores the methodologies employed in modeling the link between love and well-being, offering insights into how these approaches contribute to our understanding of love's impact on human flourishing. By focusing on diverse perspectives, the discussion will illuminate how love, in its various forms, influences overall well-being and quality of life.

Recent research on positivity resonance (Fredrickson, 2016) has highlighted the importance of love as brief moments of shared positive affect between two or more people in daily-life settings. This perspective contrasts with the more traditional portrayal of love as an intense and enduring connection found in strong, close relationships. Rather, it emphasizes the significance of momentary experiences of love that can occur in any relational context in everyday life. Specifically, positivity resonance approaches the experience of love as an emotion occurring during episodes of social connection between two or more people (Fredrickson, 2016; Zhou et al., 2022) characterized by three key elements: (1) shared positive affect, (2) caring synchrony in nonverbal actions, and (3) biological synchrony. This view challenges the notion that love must be intense or long-lasting to be meaningful, highlighting instead the importance of regular brief moments of shared positive affect—what we might call "everyday love"—which can have profound impact on health and well-being (Zhou et al., 2022).

A related conceptualization of everyday love experiences focuses explicitly on "felt love," which refers to the extent to which an individual feels loved in a given moment in their daily life (Barrett et al., 2019; Oravecz et al., 2020; Sasaki et al., 2023). This framework overlaps with positivity resonance in that both view love as an emotion that fluctuates over time and occurs in both romantic and nonromantic contexts. However, felt love differs from positivity resonance as it does not require the three specific components proposed by positivity resonance (Fredrickson, 2016). Instead, it offers a less restrictive approach, measuring love from the perspective of the receiver of a loving signal and focusing on their emotional experience. Research based on this conceptualization has explored individual differences in how loved people feel, as well as how the intensity of felt love varies in daily life (Oravecz et al., 2020; Oravecz & Vandekerckhove, 2020).

The systematic study of love within both nonromantic and romantic contexts underscores its multifaceted occurrence in everyday life and highlights the wide range of situations where love can manifest. Heshmati et al. (2019) found that people can feel loved in various everyday scenarios such as receiving a gift or being greeted by a pet. The conceptualization of love as an emotion, unfolding in many contexts within daily life (Fredrickson, 2016, Shaver et al., 1996, e.g., Hatfield et al., 2012; Hill & Collaborators, 2021; Lazarus, 1993; Shiota et al., 2010; Roseman, 1994), further supports its study in daily life. By collecting data from participants as they live their daily lives in their typical settings (i.e., experience sampling methodology,

see, e.g., Csikszentmihalyi & Larson, 1987; Trull & Ebner-Priemer, 2009), we can capture both stability and change in loving feelings, and study whether individual differences in these relate to well-being.

Loving experiences in daily life can influence psychological well-being. Oravecz et al. (2020) demonstrated that regularly feeling loved in everyday life is predictive of higher levels of well-being. Consistently experiencing love has been shown to yield beneficial outcomes, leading to better overall health and well-being (Major et al., 2018), as well as enhanced meaning in life through strengthened relationships (Prinzing et al., 2023). Within the context of weaker ties, Vacharkulksemsuk and Fredrickson (2012) found that when stranger dyads engaged in self-disclosure tasks, they displayed increased behavioral synchrony—one of the three pillars of love-as-an-emotion (i.e., positivity resonance). Moreover, Zhou et al. (2022) identified a connection between love and positive community outcomes, suggesting that everyday experiences of love not only impact individuals but also contribute to the well-being of the community as a whole.

What follows next is an overview of the methodologies and analytical techniques employed in the research of love as experienced in everyday life and its associations with psychological well-being.

Study Designs for Measuring Love in Daily Life

Love has predominantly been studied through cross-sectional research, which typically assesses participants' attitudes and feelings about love at a single point in time (Hatfield et al., 2012). These studies allow researchers to examine the relationship between measures of love and well-being at a specific moment. For instance, Kawamichi et al. (2016) investigated the neurological underpinnings of love in romantic relationships (see Acevedo's and Yadav's chapters ▶ "Love and Genetics" and ▶ "Study—The Impact of Listening to Love Songs on Learning and Memory: An EEG Study" in this book) and found that being in a romantic relationship is associated with increased subjective happiness and reduced gray matter density in the striatum, a brain region associated with reward and pleasure. This suggests an emotional and neurological connection between love and well-being. Deepak et al. (2019) conducted a cross-cultural study and found that participants who experienced love reported higher levels of life satisfaction and emotional stability, underscoring love's contribution to positive psychological outcomes. In another cross-sectional study, Diener et al. (2018) revisited their work on the happiest individuals, reaffirming that love—whether romantic or platonic—remains a significant predictor of subjective well-being.

Moreover, cross-cultural studies of love most often use cross-sectional designs. In cross-cultural research on love types and well-being, Kim and Hatfield (2004) found that while the experience of love universally enhances well-being, cultural differences shape how love is experienced as well as its subsequent effects on well-being. For example, individuals in collectivist cultures may derive well-being not only from romantic relationships but also from familial and community love, highlighting the cultural

variability in the love-well-being connection. Supporting this perspective, Heshmati and Oravecz (2022) demonstrated that cultural congruence in beliefs about love—specifically, the alignment between when "I" feel loved and when "others" feel loved—was positively associated with well-being. This further underscores the importance of shared cultural experiences in shaping the love-well-being relationship.

Recent technological advancements, including smartphone applications (Kubiak & Krog, 2012) have facilitated the longitudinal collection of data at predetermined times or in response to specific events (Conner & Lehman, 2012). Approaches such as experience sampling methodologies (ESM) have unlocked the possibility of measuring an individual's experience of love in daily life as it unfolds across moments, days, weeks, or even longer timescales (Heshmati et al., 2023; Scollon et al., 2003). This technique enables the collection of longitudinal data or intensive longitudinal data (ILD) in a participant's typical environment. This growing accessibility of ILD, along with the use of measurement burst designs (Sliwinski, 2008; Smyth et al., 2017) and innovative data collection approaches such as social media, text messages, and event-contingent sampling, has greatly expanded the potential for advancing our understanding of social relationships across diverse time scales.

Ecological validity is enhanced by measuring an individual's experience of love in their typical environment (i.e., during daily life; Shiffman et al., 2008). Conceptually, ecological validity refers to the extent to which experimental settings reflect and are generalizable to a participant's real-world experiences (Andrade, 2018; Kihlstrom, 2021; Ram et al., 2017). Kihlstrom (2021) argued that measurements obtained in artificial experimental conditions are only generalizable to those specific settings, limiting the applicability of findings to everyday life. To increase ecological validity, therefore, measurements must be collected in the environments that the researchers are aiming to understand. Techniques such as ESM and day reconstruction studies (Mehl & Conner, 2012) improve ecological validity by capturing data in naturalistic settings rather than controlled lab environments (Verhagen et al., 2016). By repeatedly gathering data from participants in their typical environments, these methods generate longitudinal datasets that enable the exploration of dynamic emotional characteristics, such as baseline levels and fluctuations over time.

There have been relatively few studies dedicated to disentangling the relationship between daily-life love dynamics and well-being. Major et al. (2018) used the day reconstruction method to demonstrate that feelings of love were associated with decreased loneliness and improved mental health outcomes. Prinzing et al. (2020) collected data from over 1000 participants across two samples to establish a link between loving feelings in daily life, measured through the day reconstruction method, and flourishing. Finally, Oravecz et al. (2020) conducted two studies in which participants were prompted to record how much they felt loved at the moment, six times daily, over periods of 2 and 4 weeks, respectively. In both studies, they found that the more participants felt loved in daily life, the higher their levels of well-being were.

We conclude that studying love across many contexts via repeated measures creates new opportunities to capture the experiences of love in everyday life. The links to well-being position love as a mechanism that positively impacts the lives of

participants through well-being. However, despite these promising findings, there remains significant untapped potential for further research in this field. The approach of repeated measurements across many contexts enables the exploration of more complex links between love and well-being.

Analytical Approaches to Study Associations Between Love and Well-Being

In this section, we provide an overview of the statistical modeling approaches designed to analyze the fluctuations in loving feelings over time and their relationship to well-being. A variety of methods exist for linking love to well-being using longitudinal data, all of which fall under the broader category of ILD analysis. ILD focuses on capturing the temporal dynamics and fluctuations in a construct across time (Kuppens & Verduyn, 2017), and has been widely applied to the study of emotion dynamics (Heshmati et al., 2024; Kuppens & Verduyn, 2017).

For example, Kuppens and Verduyn (2017) outlined three key aspects of emotional dynamics (1) **homeostatic baseline**: an average level where the emotion will return to over time, (2) **fluctuations**: the within-person variability in an emotion which occur across time, and (3) **regulation**: the speed of return to the baseline across time. These dynamics in the context of how much a person feels loved (y-axis: felt love) over time (x-axis: across the study) are illustrated in Fig. 1. Data displayed are momentary, repeated self-reports of felt love levels on a 0–100 scale. In this figure, the top two panels show two individuals with different felt love baseline levels, which could be labeled as medium and high. The two panels in the second row show the within-person variability in felt love: the person on the left shows little fluctuation, whereas the person on the right exhibits considerable variability over time. The third row illustrates regulation, with the person on the left taking longer to return to their baseline (indicating low regulation), and the individual on the right showing a faster return to baseline (indicating higher regulation). Regulation is also understood in relation to inertia, where higher inertia indicates a slower return to baseline, as seen in the person on the left, while lower inertia, seen in the person on the right, reflects a quicker reversion to the baseline level of felt love. These distinctions allow for a more nuanced understanding of how felt love dynamics play out in daily life.

When studying links between love and well-being, we might not have repeated daily-life measures of both. Therefore, we will first introduce data analytic approaches for the scenarios when we only have repeated measures of love but not well-being, and then expand to the more ideal scenario of having repeated measures of both.

Love as State, Well-Being as Trait

When we only have repeated measures of loving feelings (e.g., how much a person feels loved), we can extract the key dynamical features, such as those mentioned earlier (baseline, fluctuations, regulation), or calculate simple summary statistics

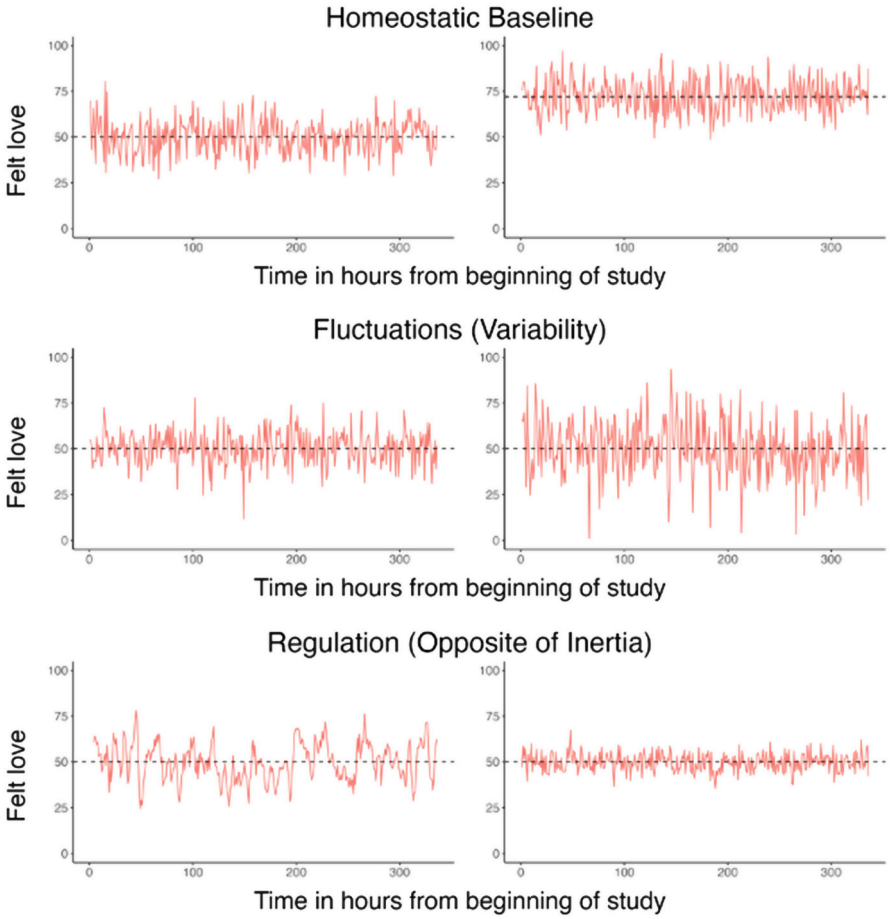

Fig. 1 Illustration of individual differences in dynamical characteristics in intensive longitudinal data. Examples of the dynamics of felt love (baseline, fluctuations, and regulation) are shown in the top three panels, while the bottom panel illustrates a cross-influence from felt love to well-being. The right panels show the results of higher values of the respective parameters

such as a mean value over time. These features can then be correlated with well-being, which, in this context, is typically treated as a trait-level variable. This approach assumes well-being to be a stable, unchanging characteristic of an individual, without capturing its fluctuations over time, whereas loving feelings are conceptualized as a "state," allowing for the consideration of individual differences in their stability and variability.

This methodology has been used to explore the connection between well-being and positivity resonance. For instance, Prinzing et al. (2020) explored positivity resonance as a mediator between resilience as a trait-level variable and mental health outcomes. This study collected two waves of data on occurrences of positivity resonance in the previous day and used the mean values to explore the mediation between average positivity

resonance and trait level measures of mental health and resilience (Prinzing et al., 2020). Additionally, the authors found that increased positivity resonance was linked to increased positive mental health outcomes and decreased negative mental health outcomes. Major et al. (2018) found a correlation between trait level perceived positivity resonance over seven consecutive days and flourishing mental health. As another path to well-being, Prinzing et al. (2023) found a correlation between positivity resonance and meaning in life on both the daily and trait level.

Higher levels of felt love have been linked to well-being in two ESM studies described by Oravecz et al. (2020), where a dynamical systems theory approach was used to estimate parameters such as baseline, fluctuations, and regulation of felt love. These love dynamics were then correlated with trait-level measures of well-being, including emotional well-being, revealing a positive relationship between baseline felt love and emotional well-being. One of the studies found a correlation between felt love inertia (i.e., slower return to baseline) and emotional well-being. Another study using the same approach found greater daily fluctuations in felt love were associated with better sleep quality (Dickens et al., 2021). Oravecz and Vandekerckhove (2020) further demonstrated that individuals who were more willing to interpret daily situations as conveying loving signals experienced more intense feelings of love in their daily lives.

Love and Well-Being Both as State Variables

Psychological well-being (PWB) has also been modeled as a dynamical process. This approach allows researchers to ask questions about PWB in a similar manner as emotions, enabling the exploration of fluctuations of PWB in response to interventions. Heshmati et al. (2024) outlined the advantages to approaching PWB with a dynamical systems approach such as capturing mechanisms of change for interventions and exploring individual differences in these dynamical changes. Considering well-being as a state allows for exploring the dynamics of both love and well-being as well as their cross-influences across time. This approach models the dynamics of well-being as well as the dynamics of love, through utilizing the longitudinal measurements of both. Additionally, the cross-influences between love and well-being are also estimated to capture how these two constructs may influence one another.

Figure 2 illustrates the cross dynamics between felt love and well-being. The panel on the left shows a hypothetical scenario where there is no relationship between felt love and well-being—regardless of the level of felt love, well-being remains unaffected, and vice versa (i.e., felt love is not predictive of well-being, nor is well-being predictive of felt love). In contrast, the right panel illustrates a scenario where felt love and well-being are interrelated, with changes in felt love leading to corresponding changes in well-being over time. Influence in the opposite direction is also possible (not illustrated).

Within this approach, there are two categories for modeling the dynamics of two variables across time: continuous- and discrete-time models. Intensive longitudinal data often results in unequal spaced intervals, and this property must be considered when selecting an appropriate modeling approach. Unequal intervals can arise due to the design of the sampling process or missed data collection prompts (Conner & Lehman, 2012), and specialized modeling approaches have been developed to account for this.

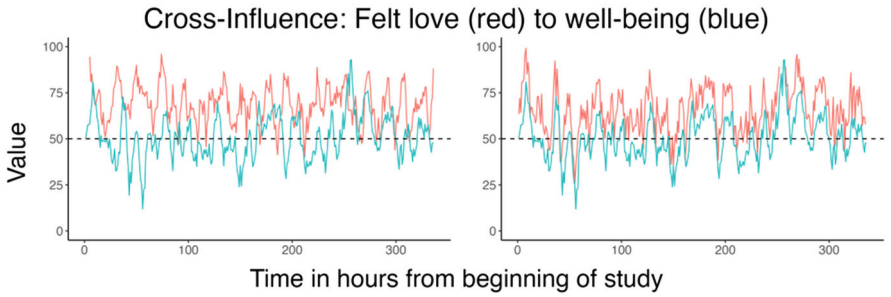

Fig. 2 Across time influences between felt love and well-being

In the discrete-time framework, vector autoregressive models (VAR) have been developed to model these processes (Loossens et al., 2021), including a multilevel extension (Li et al., 2021). Within this framework, studies have used Kalman filters to account for unequally spaced intervals (McNeish et al., 2021). On the other hand, continuous-time models naturally accommodate unequally spaced data as they do not rely on equal intervals to model autocorrelation between measurement (Vogelsmeier et al., 2019). Comparisons between continuous-time and discrete-time models have found that each performs better under different study designs in terms of prediction accuracy (e.g., Loossens et al., 2021). However, researchers have emphasized the conceptual difference between the two approaches. Continuous-time models may be more appropriate for processes that evolve continuously over time, even between the intervals at which measurements are taken (de Haan-Rietdijk et al., 2017; Loossens et al., 2021; Vogelsmeier et al., 2019).

We recommend the use of continuous-time models to capture the dynamic evolution of feelings of love and well-being over time, especially when data collected from experience sampling studies in daily life. These studies tend to yield a highly unstructured, unbalanced ILD dataset, in which people provide self-reports at irregular time points, resulting in unequally spaced time intervals. Unlike discrete-time models, which require the specification of a fixed "lag" or elapsed time between measurements, continuous-time models can naturally accommodate the uneven structure of the data. However, analytical approaches that simultaneously capture the key dynamical properties—such as baseline, fluctuations (intraindividual variation), regulation, and cross-influences—in a continuous-time framework are more complex and less commonly used. To address this gap, we provide a concise example of such analysis using data on felt love and well-being from a daily-life study.

Demonstration on Analyzing Dynamical Influences Between Felt Love and Well-Being

Methodology

By treating both love and well-being as state variables measured with ILD, researchers can explore how these experiences dynamically change over time. A recent software package, ctsem (Driver & Voelkle, 2018), available for use in R

(R Core Team, 2023), offers a user-friendly approach to implementing these analytical methods. For example, ctsem has been applied to examine the relationship between daily emotions and exercise (Ruissen et al., 2022) and to study practice effects in individuals with mild cognitive impairment (Bender et al., 2022). Below, we provide a concise overview of how to conduct such an analysis, with additional details and resources available on an Open Science Framework (OSF) page (https://osf.io/5fwp7/) linked to this chapter.

Data. One hundred and sixty participants were recruited to participate in a daily-life ESM study on well-being at a university in the northeastern region of the United States. Each participant was prompted to respond to the survey up to six times a day. The surveys were given to participants at random times within six intervals during their waking hours. For this demonstration, we use a subset of 2 weeks from a larger parent study that consisted of a total of 8 weeks. The first 2 weeks were selected for analysis because an intervention was introduced starting in week three. Further details on the parent study can be found in Oravecz et al. (2020).

Measures. Felt love was assessed by asking participants "How much do you feel loved right now?" on a sliding scale from 0 (not at all) to 100 (extremely), with these values directly serving as the measure of felt love. Well-being was measured through the PERMA model (Seligman, 2018), which captures well-being through five components: positive emotions, engagement, relationships, meaning, and accomplishment (Seligman, 2018). Each aspect of PERMA is measured through three items to which participants responded on a sliding scale from 0 (not at all) to 100 (extremely). At each time point for each individual, the average of all components was calculated to create a single value to capture well-being.

Data analysis. A continuous-time dynamical model (Driver et al., 2017) was specified in ctsem to analyze the dynamics of love and well-being in addition to their cross-influences across time. Such model specification is relatively straightforward in ctsem—a step-by-step tutorial is provided on the OSF page for this chapter.

Findings and Discussion

The model was fit in a Bayesian framework (Gelman et al., 2013). The group-level estimates for the felt love and well-being dynamics are shown in Table 1. This table includes the point estimates (means) for the dynamic characteristics as well as the 95% credible intervals for the estimates. The credible intervals can be interpreted as the central intervals that contain the respective estimates with 95% probability given the data and priors specified. Typical dynamics for felt love and well-being, based on the group-level estimates, are shown in Fig. 3.

The baseline estimates of felt love and well-being show that the average (across people) homeostatic baseline for felt love was slightly higher ($b = 72.51$, CI = [70.20, 74.76]) than for well-being ($b = 70.37$, CI = [68.48, 72.15]). The average intraindividual variability estimate for felt love in terms of standard deviation was around 4 ($b = 4.07$, CI = [3.31, 4.92]) and for well-being around 3 ($b = 2.99$, CI = [2.54, 3.48]), showing that the fluctuations for felt love were somewhat higher

Table 1 Group-level parameter estimates for dynamical features

Dynamical feature	Variable	Mean	95% Credible Interval
Baseline	Felt love	72.51	[70.20, 74.76]
	Well-being	70.37	[68.48, 72.15]
Variability	Felt love	4.07	[3.31, 4.92]
	Well-being	2.99	[2.54, 3.48]
Regulation	Felt love	−0.10	[−0.14, −0.07]
	Well-being	−0.09	[−0.12, −0.07]
Cross-influence	Felt love to well-being	−0.00	[−0.02, 0.01]
	Well-being to felt love	−0.00	[−0.01, 0.01]

Note. Mean estimates and 95% credible intervals are shown for baseline, variability (fluctuations), and regulation (opposite of inertia) for both felt love and well-being and the cross-influences between the two

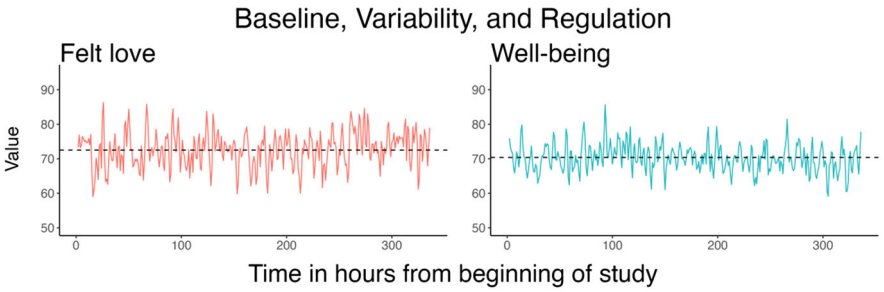

Fig. 3 Generated felt love and well-being dynamics based on the estimated dynamical characteristics

than well-being. The regulation estimates were similar for felt love and well-being ($b = -0.1034$, CI = [−0.1419, −0.0687] and $b = -0.0935$, CI = [−0.1225, −0.0686]). For easier interpretation, we can translate these to inertia characteristics (i.e., autocorrelation in felt love and autocorrelation in well-being states). Felt love levels were very similar over time when looking at 1-hour time windows ($b = 0.9018$ in terms of correlation) and this was also true for well-being ($b = 0.9107$ in terms of correlation). They remained similar even after 4 h ($b = 0.6613$ and 0.6880, respectively, in terms of correlation) but started to show less correlation after 10 h ($b = 0.3556$ and 0.3926, respectively). This suggests that felt love and well-being levels change slowly over time, and do not quickly regulate back to baseline. Their cross-influences were both practically 0 and included zero in the credible intervals ($b = -0.00$, CI = [−0.02, 0.01] and $b = -0.00$ CI = [−0.01, 0.01]), meaning that these data do not provide evidence for felt love and well-being impacting one another over time.

We note that the analysis also yielded person-specific estimates for each dynamical parameter—that is, every person had their own felt love and well-being baselines, intraindividual variations, regulations, and their cross-effect parameters. While these are not discussed here, individual differences in these parameters could be further explored by regressing them on predictors (e.g., age, gender, relationship status, attachment style, emotion regulation, etc.).

In this study, we did not find evidence for a link between felt love and psychological well-being as measured by the PERMA model. While literature suggests a relationship between certain components of PERMA, such as meaning in life (Prinzing et al., 2023) and experiences of love, averaging the PERMA components may have obscured specific connections between these components and felt love. Nevertheless, further insights may be gained by modeling both felt love and well-being as dynamic state variables rather than felt love alone. This approach allows for the examination of baseline levels, variability, regulation, and cross-influences between the two measures, providing a more nuanced understanding of whether love and well-being, as measured by PERMA, influence one another over time.

Conclusion

In this chapter, we explored the complexities of studying love and its connection to well-being through a variety of methodological approaches. We reviewed key theoretical perspectives on love, examined how both philosophical and scientific frameworks have shaped its conceptualization, and discussed recent advances in measuring love in daily life using experience sampling methodologies. By modeling love and well-being as dynamic, fluctuating state variables, we were able to capture their evolution over time and uncover more nuanced relationships between these constructs. We also demonstrated modeling the dynamics of love and well-being in continuous-time and interpreting such results. These modern, model-based approaches, such as continuous-time modeling, hold transformative potential for unlocking our understanding of well-being, fostering psychological health, and enhancing human flourishing.

Needs for Further Research

We suggest that more data-intensive, longitudinal studies are necessary to investigate feelings of love within the context of daily life. Ideally, well-being should also be assessed in the context of daily life, allowing for an exploration of the intricate dynamics between the two. By modeling these dynamics, we can gain insights into the temporal interplay between love and well-being. Consequently, we recommend that intervention studies aimed at understanding mechanisms of change should consider the methodology outlined in this chapter.

Competing Interest Declaration The author(s) has no competing interests to declare that are relevant to the content of this manuscript.

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