TWO HEARTS BEAT AS ONE: EXPLORING COHERENCE, INTEROCEPTIVE AWARENESS, PRESENCE, RELATIONAL RESONANCE, AND SYNCHRONY IN THERAPEUTIC DYADS

by

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I certify that I have read and approved the content and presentation of this dissertation:

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Abstract

Two Hearts Beat as One: Exploring Coherence, Interoceptive Awareness, Presence, Relational Resonance, and Synchrony in Therapeutic Dyads

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This multiple case study explored various data streams within and among therapeutic dyads through exploration of relationships between coherence, interoceptive awareness, therapeutic presence, and physiological synchronization within eight therapeutic dyads and among five therapists and eight clients. Throughout this study, therapeutic dyads met regularly throughout a control phase and an intervention phase during which coherence-building interventions of Heart Lock-In (HLI) and Shift & Lift were implemented. Quantitative and qualitative data were collected and measured throughout the study. Pre and post data collection included skills acquisition assessment from therapists as well as subjective reports of Interoceptive Awareness (IA) gathered from therapists and clients before and after the study. Heart Rate Variability coherence (HRVC) of clients and therapists was measured continuously throughout all sessions. Therapists and clients completed therapeutic presence questionnaires after each therapy session throughout the study. Data analysis indicated successful coherence-building skills acquisition for therapists as a group, as well as increases in mean coherence and total interoceptive awareness post-study for both therapists and clients as a group. Quantitative data measurements indicated increased coherence during the intervention phase compared to the control phase of the study, as well as increased mean coherence during engagement with HLI and Shift and Lift interventions in therapy sessions compared to non-intervention time intervals. While case-by-case dyadic data analysis indicated discrepancies between quantitative and qualitative reports, assessment of

therapists and clients as a group indicated confirmation of the hypotheses that HRVC and IA increased during the intervention phase of the study as well as during intervention periods in therapy sessions. Physiological synchronization appeared to be present between therapists and clients during intervention time periods. These findings suggest that coherence-building techniques promote coherence, interoceptive awareness, and physiological synchronization.

Dedication

To All Beings and to All Hearts:

May you find compassion that eases suffering

along with gratitude and fullness in your hearts.

If ever you feel isolated,

May you find integration within and around you,

interconnections through heart-based living

coupled with attuned relational care and loving.

Deep Appreciation to All who have assisted me in

accessing my heart

in relation to myself, others, and the world.

Acknowledgements

Better to be blind and see with your heart, than to have two good eyes and see nothing

—Helen Keller

My gratitude and heartfelt appreciation to the many people who have been a part of this journey with me. Many have supported me and provided loving care along with attuned heart presence before, during, throughout and beyond this dissertation process. Engagement in this research has provided inner and outer explorations of heart coherence and synchronization within myself and with others in relationship that have opened pathways to deepening heart presence personally and professionally.

Firstly, I would like to acknowledge, honor, and recognize my parents for their endless, unconditional, and constant love. They have taught me how to live from my heart and modeled what it means to love and be loved. Thanks to my brothers and my family for their ongoing care and faith in me as well as their ever-present love that has given me hope to persevere in loving and to engage my heart in all I do. Deep appreciation for Anne Liebman Daum, and to Emily and Jim Liebman, for joining me in the wondrous miracles of life and love that transcend physical limitations.

As a child, I was in awe of Helen Keller and practiced feeling into the experience of how to "see with the eyes of my heart." Helen Keller and her story touched my heart in ways I continue to cultivate. The relationship between Helen Keller and her teacher, Annie Sullivan, touches my being and inspires further curiosity about this inquiry of individual heart coherence and relational resonance. Sincere appreciation and honoring of Helen Keller and Annie Sullivan for their lived experiences, challenges, and care that continues to awaken my soul to deeper

understanding. Another inspiring person in my life was Mother Teresa who modeled heart-focused care and whose messages have moved me into service and heart-based action in my life.

I would like to express my deep gratitude to and for the participants who engaged in this study. These therapists and clients vulnerably and courageously answered the call to participate in this study, deepening into their hearts in and through relational explorations. Their presence and willingness to embark on these new frontiers and pioneering uncharted territories within therapy sessions have served this research and clinical practice in its evolution. Sincere thanks to my committee chair, John Elfers, for his steadfast presence, patience, and attention throughout this process from the seedlings of ideas conceived on outdoor walks to the ongoing transformations throughout the entire process. Heartfelt thanks to Jeff McCullough for his encouragement, unconditional care, and never-ending faith in me to carry this process to completion. Our inspirational conversations, connected explorations, relational discoveries, and practices in coherence-building along with his dedication and trust helped me to persevere.

Great thanks to the HeartMath Institute for their ongoing research and support of heart-based living, which has provided me with a pathway to embark on this research as well as expand my clinical, research, and personal skills in heart-based, coherence-building practices. The interventions as well as the multiple collaborations have enriched my personal and professional presence in unforeseeable ways that I trust will continue to unfold. This completion demarcates a new baseline for me, a renewed horizon, as I continue to plant seeds for creative endeavors and cutting-edge advances in heart-based inquiry and practice.

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Go out into the world today and love the people you meet.

Let your presence light new light in the hearts of people.

—Mother Teresa

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Attention is love, even to listen requires a certain attention.
Attention is not of the mind, attention is love.
After all you give your whole heart and listen
fully to somebody whom you love.
Love is not of the mind and its quality is timeless.
—J. Krishnamurti

Occupational Risks, Regulation, and Self-Care

Research suggests that occupational risks such as stress-related issues, psychological problems, burnout, compassion fatigue, secondary trauma, and vicarious traumatization can affect psychotherapists (Bober & Regehr, 2005; Evans & Villavisanis, 1997; Figley, 2002; Killian, 2008; Shapiro et al., 2007). In addition to the threats of these psychological issues, Killian (2008) proposed that therapists experience bodily symptoms and physical health issues as indicators of job stress. The implications of occupational health risks for clinicians can be severe, as demonstrated in a study with psychiatric nurses that revealed suicide risks associated with burnout (Samuelsson et al., 1997). While people in the helping professions, particularly in the field of psychology, endure mounting personal costs that can present as diverse health-related issues resulting from work-related stress, escalating systemic economic cost burdens in the medical environment have also posed concerns related to consequences of job stress (Boles et al., 2004; Figley, 2002; Goetzel et al., 2004).

To diminish detrimental effects and risks related to stress-induced challenges for health care professionals and the global community, engagement in self-care practices incorporates regenerative mindsets, perspectives, and activities that support and enhance states of self-regulation. These states of self-regulation provide access to calm, clarity, and connectedness for the health care professional to include themselves in the caring situation. Self-care can be

understood as a caring relationship with oneself, which translates to health care providers being accountable to care for themselves and being cared for by others, in addition to their responsibilities and actions related to caring for others.

Given that the occupational hazards listed above can result in physical, emotional, and autonomic dysregulated states (Laverdière et al., 2019; Raquepaw & Miller, 1989), personal and professional risks can be quite high for therapists (Laverdière et al., 2019). Compromised self-regulation can present as "dysregulated psychobiological somatic process" (J. R. Schore & Schore, 2008, p. 15) evoked by "implicit unconscious intersubjective communications" (p. 15) within therapeutic relationship. These dynamic and ever-changing unconscious, or implicit, neurologically driven interactions are continuously present within therapeutic relationships, albeit often felt under the surface of awareness (Geller & Porges, 2014; A. N. Schore, 2001; J. R. Schore & Schore, 2008). Approaching therapy through a lens of regulation theory and a "bio-psycho-social-cultural perspective" (J. R. Schore & Schore, 2008, p. 17) supports recognition of dysregulated states that result in physical, emotional, and autonomic regulatory concerns that can influence therapeutic presence, which impacts both therapist and clients. Considering therapist and client in relationship, with individual and relational regulatory dynamics at play, offers exploration beyond the individual with discoveries amidst the relational *field*. The implicit underpinnings of interpersonal relating may be better understood through recognition of nonverbal physiological synchronization, or lack thereof.

Therapeutic Relationship and Coherence

Within therapeutic relationship, the relational alliance has been shown to be one of the most important indicators of effective therapy (Norcross & Wampold, 2018). Additionally, the presence, and regulatory capacity, of the therapist has been shown as an important factor in this

therapeutic alliance (Geller & Porges, 2014). Personal and professional risks can be mitigated through effective interventions and preventative strategies that successfully support therapists' ability to be present, regulated, and self-aware (R. L. Harrison & Westwood, 2009; McCullom & Gehart, 2010). The meaning of therapeutic *presence*, as proposed by Geller and Greenberg (2002, 2012), includes a state of being receptive to that which arises while holding dual awareness of the internal experience and maintaining contact with the client. This receptive state of therapeutic presence can be further understood as a state of "grounded, immersed, and expanded awareness" (Geller & Porges, 2014, p. 179).

In a study with therapists-in-training, McCullom and Gehart (2010) discovered that mindfulness meditation training was an effective tool in teaching therapeutic presence. McCraty and Zayas (2014) described their psychophysiological coherence model as an avenue for increasing self-regulatory skills and vagal tone, suggesting that psychophysiological coherence indicates optimal states of cognitive and emotional functioning. Additionally, in a qualitative study, R. L. Harrison and Westwood (2009) concluded that self-awareness and self-care are protective factors that diminish risks of vicarious traumatization among mental-health therapists. These studies demonstrated the importance of self-care and self-awareness for individuals and for individuals in relationship. Self-awareness and self-regulation serve as keys to unlocking healing potential within individuals, in relationship, and potentially throughout communities.

Bringing attention to physical, emotional, mental, and spiritual realms, self-care practices are essential for therapists' mental health and ability to be present with clients (Evans & Villavisanis, 1997; Figley, 2002; Shapiro et al., 2007; Valente & Marotta, 2005). Holistic and integrative advances to health, also considered mind-body approaches, incorporate transformation and regulation of imbalances in physiology, emotions, attention, and behaviors

(Sullivan et al., 2018). Furthermore, mind-body practices such as yoga, tai chi, and qi gong have successfully served as self-care tools for therapists and can influence therapeutic presence (Caplan et al., 2013; Mehling et al., 2011). The HeartMath Institute offers various interventions along with technology to assess heart coherence, integrative tools that can assist with transformation, healing, and regulatory capacities (McCraty, 2011; McCraty et al., 2009).

Coherence-building techniques such as Heart Lock-In (HLI) and Shift & Lift can serve as mind-body integrative practices to support self-care practices and therapeutic connections by increasing resilience and serving as a pathway to inner ease and regulation. Heart-focused techniques such as these can be likened to spiritual practices from ancient wisdom traditions. For example, HLI, a practice that incorporates accessing a regenerative emotion and radiating it throughout oneself and to others, follows a specific protocol that seems to parallel the Buddhist practice of *loving-kindness meditation* (LKM), or *metta*. In this ancient practice within the Buddhist tradition, LKM includes open-heartedness and intends good will, warmth, compassion, unconditional love and kindness toward self and others with a resultant connection with others (Fredrickson et al., 2008; Hofmann et al., 2011; Hutcherson et al., 2008). In a fast-paced world where unconditional loving and kindness is not always the norm, and particularly within the vulnerable setting of therapy sessions, quick and easily accessible techniques can provide efficient and effective (simple) self-care and clinical tools within a dynamic and complex interpersonal system. Thus, effective and efficient self-care practices incorporating coherence-building tools for therapists are essential in supporting and enhancing therapists' self-awareness, self-regulation, and therapeutic presence. For the purposes of this study, self-care is defined as the practice of providing care for oneself in a receptive and compassionate manner while holding qualities of therapeutic presence for self in addition to and in cooperation with care for others.

Coherence-Building Interventions as Internal Regulators and Interpersonal Co-Regulators

Physiological cardiac coherence models support mind-body healing and holistic health care. Coherence induction techniques, such as those developed by the HeartMath® Institute (HMI) and reflecting ancient wisdom practices, integrate mind-body healing philosophies and modalities. While these techniques include elements of meditation and co-regulation, healing philosophies such as these also incorporate interoceptive awareness (IA) and access to subtle integrative systems within the human being. Through these tools that build coherence capacity, self-regulation unfolds within individuals (McCraty, 2011, 2017) and potentially develops social coherence within relationship (McCraty, 2011, 2017; Morris, 2010).

Access to inner wisdom within individuals and within the interpersonal system becomes apparent and essentially reflects intra- and interpersonal connectivity. Inner wisdom has been explored in various traditions and reflects intuitive guidance in terms of the "intuitive heart" as well as a pathway to *interbeing,* a term developed by Thich Nhat Hanh to represent "interconnectedness with sentient beings" (Sieber, 2015, p. 5). Practical application of ancient wisdom practices applied to modern day stressors and challenges include this listening to intuitive heart guidance and holding mindfulness related to healing peace-inducing qualities of interbeing (Nhat Hanh, 2008). In therapeutic settings, and in work with high stress and trauma, this type of actively engaged listening and attunement to interconnections has been useful for enhancing the quality of therapeutic relationship. Engaging the social engagement ventral vagal system (Porges, 2001, 2003a, 2005), mind/body systems balancing coherence (Childre et al., 2016), the wisdom of the mindbody (Kabat-Zinn, 1990), and the neurovisceral integration model (Thayer, 2017), systemic connections happen within and among individuals in relationships. Hence, these practices seem to inevitably influence capacity for mindful presence.

Schneider (2015) asserted that the term *presence* includes mindfulness within relationships, expansion of the identity of self, and integration of suffering. Therefore, integrated processes such as coherence-building techniques like the HLI and Shift & Lift may serve therapists' ability to be regulated, present, and connected. Unique heart-based approaches such as HLI and Shift & Lift that are easily accessible in each moment can significantly contribute to assisting therapists, and clients, by fostering increased self-awareness, regulatory capacity, and therapeutic presence. Investigation of cardiac coherence and physiological synchronization provides physiological markers related to regulatory states and harmonization within interpersonal relationship.

Core principles of HMI echo their mission to bring harmony into internal systems through heart-based practices that align with intuitive guidance, or inner wisdom (Childre et al., 2016; McCraty, 2015). Application of specific heart-based practices incorporate psychophysiological considerations such as respiratory, cardiac, and visceral along with emotional connections. This research study investigated how these coherence-building endeavors might increase regulatory capacity, somatic intelligence, interoceptive awareness, and experiential elements of rhythmic cardiac and respiratory synchronization. It is posited that through these coherence-building techniques, therapists and clients tap into inner wisdom, innate intelligence, and intuitive guidance that could essentially be otherwise inaccessible. Furthermore, these practices potentially create a lens by which to awaken and explore the internal world of human experience, which often lies dormant as unexpressed or unconscious drives hidden within the autonomic nervous system. With an invitation to discovery, this conscious awakening during therapy likely influences regulatory capacity as well as inner awareness.

Neuroception, Interoception, and Relational Regulatory Resonance

Neuroception—constant tracking of the internal and external environment for safety or danger—transpires without conscious awareness and is ever-present in human interactions as a natural organic process that necessarily promotes security through autonomic survival defense mechanisms (Dana, 2018; Porges, 2004, 2009). Interoceptive awareness (IA), the ability to sense and feel internal bodily states (Cameron, 2001; Garfinkel et al., 2015), promotes the capacity of an individual to enhance embodied awareness that can lead to a sense of union between body and self, organized sense of self, and wholeness (Mehling et al., 2011). Further benefits of IA, as posited by Hanley et al. (2017), indicate an association between IA and psychological well-being.

This study explored the impact of coherence-building techniques on IA, self-regulation and the autonomic nervous system as measured by heart rate variability (HRV) and respiratory sinus arrhythmia (RSA), which is embedded in the HRV measure, both indicators of regulatory capacity (Shaffer et al., 2014); and cardiac coherence of therapists and clients during psychotherapy sessions. HRV, an indicator of physical, mental, and emotional health, can be understood through measures of interbeat intervals within heart rhythms (McCraty et al., 2009; Moss, 2004) and serve as an indicator of health or stress (Thayer et al., 2012). Taking this exploration a step further, relational resonance and interconnections between therapist and client were assessed and measured through physiological synchronization.

Personal practices that include coherence-building techniques can potentially enhance development of therapists' internal awareness and increase capacity for presence as "a holistic subjective experience" (Geller & Greenberg, 2002, p. 75) for therapists and clients. Phelon (2004) described this internal awareness of a psychotherapist as an ability "to attend to and be

informed by his or her own 'resonance and resistance' while differentiating between inner experience and intuitive experience of the client" (p. 348). Valente and Marotta (2005) further identified this differentiation and access to the wisdom of inner experience, asserting that psychotherapists' internal awareness affects self-regulation of the psychotherapist as well as the therapeutic alliance. Further, Dales and Jerry (2008) advocated for enhancement of the therapeutic alliance through mutual synchrony, which results in predictable rhythmic patterns in relationship. Mutual synchrony can also be understood as physiological synchronization which refers to the alignment of physiological signals between two individuals (Kleinbub et al., 2020). Moreover, self-regulation of the therapist can result from mind-body resiliency practices that incorporate ancient wisdom traditions with neurophysiological advances, which in turn support ongoing "integration of bottom-up neurophysiological and top-down neurocognitive mechanisms" (Sullivan et al., 2018, p. 1).

Problem Addressed by This Research

Given the susceptibility of psychotherapists to ongoing stress-related challenges, self-care practices are imperative (Figley, 2002; R. L. Harrison & Westwood, 2009). Effective self-care practices enhance therapists' sense of presence, enriching overall health and well-being of therapists as well as the therapeutic alliance (Richards et al., 2010). Specific self-care practices such as coherence-building techniques increase resilience and regulatory capacity (Childre et al., 2016; McCraty, 2015). Self-awareness, maintaining balance in life, and meditation have been shown to be effective regulatory tools for therapists (Valente & Marotta, 2005). Multiple coherence-building practices developed by the HeartMath Institute, based on science and spiritual traditions, provide innovative approaches that focus primarily on finding internal

rhythms and inner wisdom as forms of regulation and self-awareness (Childre et al., 2016; McCraty, 2015), which potentially lead to enhanced presence for therapists.

Moreover, this research offered an integrative approach to explore regulatory states using measures of HRVC (HRV coherence) and synchronization as well as subjective assessment of interoception and presence. Recent increases in psychophysiology research have produced studies exploring HRV as an indicator of cardiac vagal tone, the parasympathetic nervous system's influence on cardiac regulation, and related links with cognitive, social, emotional, and physical self-regulation (Laborde et al., 2017).

Thayer (2017) explored the relationship between the nervous system and the heart, indicating that HRV is associated with physiological, emotional, and cognitive regulation. Since research identifies regulation as a key component of therapeutic and relational presence (Geller & Porges, 2014), assessing and analyzing changes in IA, HRV, and RSA potentially provided information related to therapeutic presence. Additional research related to exploring associations of the heart and nervous system could offer more information regarding regulatory capacity and health (Shaffer et al., 2014). Further, physiological synchronization and organization across multiple systems in the body, including hormonal, neurological, and electromagnetic activity, can be encoded in the heart's rhythms (McCraty et al., 2009). This research study offers missing information in the field of psychology related to regulatory capacity and rhythmic flow states within therapists and influence on interpersonal physiology throughout interactions between therapist and client.

Statement of the Research Question

The research question for this study is as follows: What are the impacts of coherence-building techniques on HRV, coherence, interoceptive awareness, regulatory capacity,

therapeutic presence, and physiological synchronization during psychotherapy sessions? This research study explored the effects of coherence-building techniques on the neurobiological regulation and IA of therapists and clients, as well as self-reported subjective assessments of therapeutic presence after each session.

Additionally, physiological synchronization was measured as a reflection of the relational resonance within the therapeutic dyads. Measures that were used in this study include quantitative measures of HRV (which includes RSA) to assess coherence as a reflection of regulatory capacity, a subjective questionnaire of interoception, a self-report questionnaire after each session to assess therapeutic presence, and physiological synchronization continuously monitored throughout each session. Self-report questionnaires that were used in this study included the Multidimensional Assessment of Interoceptive Awareness (MAIA-2) to assess interoceptive awareness and the Therapeutic Presence Inventory (TPI), to evaluate therapist and client perceptions of therapeutic presence.

Geller and Porges (2014) recommended future research that monitors "changes in visceral components of the social engagement system during [therapy] sessions (i.e., vagal regulation of the heart by quantifying the respiratory sinus arrhythmia component of heart rate variability)" (p. 189). Hence, the cardiac coherence measures will provide elements of visceral tracking in addition to and in cooperation with subjective assessments of each participants' experiences.

Personal Significance

For this researcher, this study incorporated my interests in clinical practice and research, public health and individual holistic health care, and transpersonal dimensions within human relationships. Moreover, my belief is that best practice for self-care includes intentionality and

raising (or retraining) consciousness to incorporate transpersonal, psychospiritual, and neurophysiological domains of the human condition into personal and professional practices. Self-care practices for therapists, in particular, might include the aforementioned dimensions of personal and professional growth that further leads to increased therapeutic presence and subsequent relational resonance, reflecting forms of integration within the therapeutic container.

This researcher's training as a public health scientist, infant mental health specialist, transpersonal therapist and educator has been supported by psychospiritual trainings, relational and experiential practices, and heart-based living. Dedicated to principles of non-violence, organicity, intuitive guidance, and awareness of psychophysiological factors, this researcher holds curiosity about the unfolding processes of personal regulatory practices and attunement within an individual along with subsequent influences that individuals have on one another. Further, this researcher maintains enthusiasm in exploring the personal experiences seen and unseen, as related to relational resonance and physiological synchronization. Moving toward innovative discoveries, especially at this transformative time on the planet, could essentially lead to unveiling hidden messages within neurophysiological regulatory and relational systems. This study seems in alignment with the evolution of humanity and human relations, which could serve as a preliminary step toward unlocking an ever-unfolding human potentiality, peace, and harmony on the planet.

Significance of the Study

Indicators that this study could offer significant discoveries during this time of on the planet include increased need for regulatory practices and harmony within relationships as individual and societal stressors and traumas are mounting. Given the current public health crises and mental health implications of a pandemic at the time of this writing along with ongoing

occupational hazards for therapists in holding psychospiritual and practical challenges for others, regulatory practices that support collaborative relationships seem relevant and imperative at this time. Dysregulated states, conflicts, and polarities within and between individuals are being reflected in larger contexts, nationally and globally, as deep social and political divisions that are increasingly taking on a violent tone.

The need for peace and harmony seems significant in these times, given ongoing, amplified conflict and dysregulation. More specifically, with increased need for mental health support and resilience, this study contributes to understanding therapeutic relationships through exploration of data related to psychophysiological objective measures coupled with experiential self-report of therapists' and clients' lived experiences. These data points and analysis could enhance therapy practices and therapeutic relationship while shedding insights upon how internal physiological states impact regulatory and relational fields.

This study and its findings, with its focus on personal coherence and relational resonance that supports harmony within and between peoples, will potentially contribute to both clinical practice and ongoing research associated with human relationship and interactions. Contributions of this research study can serve as a preliminary step in better understanding human regulatory and dysregulatory states, specifically cardiac coherence states, as well as the influence of coherence-building techniques on regulatory capacity, interoceptive awareness, therapeutic presence, and physiological synchronization between individuals.

Further, this multiple case study, with each case represented by a therapeutic dyad, adds to the existing research related to physiological synchronization, therapeutic presence, cardiac coherence, and interoceptive awareness. This study offers preliminary research as the first known study to integrate and explore this constellation of elements as well as psychophysiological

factors and self-report of phenomenological data within therapeutic dyads. This combination of self-reported personal experiential data along with quantitative neurophysiological data offers abundant sources of information related to these multiple dyads upon which further studies can build. Hence, this study has been done in service to inform future research related to intra and interpersonal systems while also providing insights about integral clinical practices, the impact of personal regulatory capacity, and awareness of self as well as relational fields within therapeutic healing.

Creating Clarity: Term Definitions

Current scholarly literature notes inconsistency in defining terms related to physiological synchronization studies in particular (Kleinbub, 2017; Palumbo et al., 2017). In general, the importance in defining terms will assist the reader, researchers, and participants in building a coherent narrative to understand the study. Hence, this section describes terms related to the research study as delineated by various scholars and ultimately defined for the purposes of this study. To develop and create a coherent narrative to describe this research study, it is important to use terms strategically and with precision. The concepts and processes defined here will be addressed in more detail throughout the following chapter, in the literature review.

Cardiac Coherence (Also Known as Heart Coherence, Heart-Rate Variability Coherence)

McCraty (2015) has described the term *coherence* as "wholeness and global order, where the whole is greater than the sum of its individual parts" (p. 24) and further defined a coherent heart rhythm as "a relatively harmonic, sine-wavelike signal with a very narrow, high-amplitude peak in the low- frequency (LF) region of the HRV power spectrum with no major peaks in the very-low-frequency (VLF) or high-frequency (HF) regions" (p. 28). Further, "*Physiological coherence* [emphasis added], also referred to as *heart coherence, cardiac coherence* or

resonance [emphasis added] is a functional mode" (McCraty, 2011, p. 88). To follow, McCraty (2015) discussed measures of cardiac coherence as follows: "Specifically, *heart coherence* [emphasis added] (also referred to as cardiac coherence or resonance) can be measured by HRV analysis wherein a person's heart-rhythm pattern becomes more ordered and sine wave-like at a frequency of around 0.1 hertz (10 seconds)" (p. 26). McCraty's understanding and explicit definitions of coherence have been consistent within the literature across many studies.

Heart-Rate Variability (HRV)

HRV, a quantitative cardiac measure used in this study, defined as "the change in the time intervals between adjacent heartbeats, is an emergent property of interdependent regulatory systems that operate on different time scales to adapt to challenges and achieve optimal performance" (Shaffer et al., 2014, p. 1). McCraty et al. (2009) explored research and theoretical frameworks that incorporate a systems perspective of optimal psychophysiological states and the role of the heart, heart rhythms, HRV, and respiration.

Heart-Rate Variability Coherence (HRVC)

See the *Cardiac Coherence* section, in this paper, for a definition of HRVC. In this study, HRVC will be used to represent cardiac coherence, heart coherence, and coherent heart rhythms.

Interoception / Interoceptive Awareness

Payne et al. (2015) defined interoception as visceral internal sensation and "non-verbal experiences of internal bodily sensation" (p. 3). Further, Mehling et al. (2018) described interoception and interoceptive awareness as follows:

> Interoception, the process by which the nervous system senses, interprets, and integrates signals originating from within the body, has become major research topic for mental health and in particular for mind-body interventions. Interoceptive awareness here is defined as the conscious level of interoception with its multiple dimensions potentially accessible to self-report. (p. 1)

Mehling et al. also contended that the term, interoceptive awareness, can be defined in many ways and argued that interoception can be accessed through self-report, which reflects careful understanding of interoception. Hence, in this study, interoception will be defined as self-awareness of internal bodily signals while interoceptive awareness will be measured using self-report questionnaires.

Intuition

McCraty et al. (2009) reported that conclusions from their studies related to "the electrophysiology of intuition" (p. 22) supported the proposal that "the heart acts as an antenna to a field of information beyond space and time surrounding the body that directly informs the heart and modulates its rhythmic patterns" (p. 22). Moreover, McCraty (2015) argued that "emotions are the primary language of intuition, and that intuition offers a largely untapped resource to manage and uplift our emotions, daily experience and consciousness" (p. 46). Other definitions of intuition describe subjective experiences and reflect subtleties involved in defining this term.

Advocating for and engaging in research related to clinical intuition and decision making, Fox et al. (2016) argued that "the foundation of social impressions and—by logical extension—clinical intuition consists in perceiving the subtle nuances of people's verbal and nonverbal patterns of communication" (p. 245). Moreover, highlighting the importance of both conscious and unconscious elements involved with understanding intuition, Eisengart and Faiver (1996) reported that

> the conscious awareness of an intuition is preceded by the following nonconscious processes: (a) perception of environmental cues, (b) recognition of patterns in a holistic context, (c) association to with what is already stored in memory, (d) recombination of this information in a unique way to produce a new awareness or conclusion, and (e) crossing over the threshold that separates nonconscious thought from conscious awareness. (p. 43)

For the purposes of this study, the concept of intuition will be held with all of its subtleties and broadly defined potential that continues to be discovered with research such as this study.

Mindfulness

Mindfulness is a term that has been used in ancient Buddhist practices and considered *the heart* of Buddhist practice. Kabat-Zinn (2003) developed a practical and operationalized definition of the term *mindfulness* to be understood and used in Western health settings. Recognizing that "Mindfulness is the fundamental attentional stance underlying all streams of Buddhist meditative practice" (Kabat-Zinn, 2003, p. 146). Kabat-Zinn's definition of mindfulness incorporates several components based on Eastern spiritual practices to support Western healing practices. The working definition, described by Kabat-Zinn (2003), is as follows: "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment" (p. 145). Additionally, Neves-Pereira et al. (2018) argued that, according to Buddhism, "mindfulness is the entrance or door to expanded states of perception and consciousness" (pp. 149-150).

Neuroception

Neuroception, defined as the constant tracking of the internal and external environment for safety or danger, transpires without conscious awareness and is ever-present in human interactions as a natural organic process that necessarily promotes security through autonomic survival defense mechanisms (Porges, 2004, 2009). Hence, neuroception represents the neural differentiation between safety, danger, and life threat and allows humans and other mammals to engage socially (Dana, 2018; Geller & Porges, 2014; Porges, 2004, 2009).

Personal Coherence

See the *Cardiac Coherence* section, in this paper, for a definition of personal coherence. Personal coherence will be synonymous with heart coherence, cardiac coherence, and HRVC. HRVC will be the term used to represent all of the personal coherence indicators.

Physiological or Physical—Coherence

McCraty (2015) identified characteristics of physiological coherence as follows: "high heart-rhythm coherence (sine-wavelike rhythmic pattern), increased parasympathetic activity, increased entrainment and synchronization between physiological systems, and efficient and harmonious functioning of the cardiovascular, nervous, hormonal and immune systems" (p. 28). Further, McCraty (2015) asserted,

> Physiological coherence is assessed by identifying the maximum peak in the 0.04 to 0.26 hertz range of the HRV power spectrum, calculating the integral in a window 0.030 hertzwide, centered on the highest peak in that region and then calculating the total power of the entire spectrum. The coherence ratio is formulated as (peak power / [total power - peak power]). (p. 28)

Physiological Synchronization (PS)—Synchrony, Interpersonal Autonomic Physiology (IAP)

The term physiological synchronization has been used in this study. Given the multiple terms used to represent this concept (Kleinbub, 2017; Kleinbub et al., 2020) and inconsistent working definitions (Palumbo et al., 2017), it is important to clarify and note the broad span of terminology and working definitions used to represent the physiological coupling between individuals. This study adopted the following definition of physiological synchronization.

Kleinbub et al. (2020) asserted,

> Physiological synchronization is defined as the shared temporal organization of the physiological signals of two (or more) inter-acting persons. Although the most common form of synchronization is "in-phase" (i.e., two people manifesting similar physiological activation at same moment), other forms of coupling are possible, including "antiphase" synchronization (e.g., simultaneous increase of heart rate in a person and decrease in the other, a sort of physiological turn taking) and other more complex patterns. (p. 421)

While the term *coherence* can be used to represent harmony or order, reflective of interrelated systems, the term *synchronization* has been identified to describe the measurement of interconnected coherence between individuals (McCraty & Childre, 2010).

Other terms that can be used synonymously include interpersonal physiology, autonomic interpersonal physiology, synchrony, social resonance, mimicry, attunement, chameleon effect, stress contagion, interactional synchrony, interpersonal coordination, therapeutic index, concordance, coupling, entrainment, linkage or physiological linkage, mutual responsiveness, contingency, mutual adaptation, dyadic affect regulation, coregulation, reciprocity, covariation, relational psychophysiology, interdependence, physiological influence, and the list goes on (Kleinbub, 2017; Kleinbub et al., 2020).

Tschacher and Ramseyer (2017) defined synchrony "as the coupling of two (or more) individuals in the here-and-now of a communication context that emerges alongside, and in addition to, their verbal exchanges" (p. 1). Synchrony is generally defined as social coupling of a group of individuals, two or more, in the context of present moment exchange of verbal and non-verbal interactions (Koole & Tschacher, 2016; Tschacher & Ramseyer, 2017).

Relational Resonance

For the purposes of this study, *relational resonance* refers to the relational attunement and rhythmic flow between two people. This, as with physiological synchronization, refers to a rhythmic flowing state of connectedness wherein a predictable dance of attunement occurs. This term is not synonymous with coherence, as a coherent state represents heart-brain connections and attunement within, whereas relational resonance refers to a rhythmic reciprocal interactive alignment between two individuals.

Resilience

The term *resilience* will be defined in this study as "the capacity to prepare for, recover from and adapt in the face of stress, adversity, trauma or challenge" (McCraty, 2015, p. 8). Further, McCraty (2015) has posited that the capacity for resilience is a dynamic process, changing over time and depending on various factors and that this capacity also relates to energy regulation within the physical, emotional, mental, and spiritual domains of human experience. Additional differentiation within these domains will be discussed in the literature review for this study.

Respiratory Sinus Arrhythmia (RSA)

RSA indicates modulation of the heart rhythm through respiratory rhythm, "dependent on the frequency and amplitude of respiration as well as the underlying autonomic state of the organism" (McCraty et al., 2009, p. 37). RSA, a component of HRV that incorporates respiratory rhythms (Ferri et al., 2013), was considered as a physiological measure embedded in the HRV measures in this study to assess the state of therapists' biomarkers for self-regulation.

Self-Awareness

The term *self-awareness* will represent inner perceptions about the sensory, emotional, somatic, and cognitive processes of an individual's inner world. Self-awareness, as defined for this study, refers to the ways that an individual's internal awareness is present and contributes to self-regulatory capacity. Self-awareness is one factor considered and related to interoceptive awareness. Further, self-awareness, in the broadest sense, could be considered synonymous to and/or an element of interoceptive awareness, for the purposes of this study.

Self-Regulation

Given therapists' risk of adversity due to occupational hazards of possible dysregulation, along with the importance of maintaining a state of TP in relationship, *self-regulation* is defined, for the purposes of this study, as autonomic regulation and "a conscious ability to maintain stability of the system by managing or altering responses to threat or adversity" (Sullivan et al., 2018, p. 2). Self-regulation includes regulation, or rhythmic connections, with the neurological, physiological, emotional, and all internal states. Self-regulatory capacity of an individual can be measured and estimated by cardiac coherence, as cardiac coherence can be used as an indicator of self-regulatory capacity for individuals and coregulation within a dyad.

Social Coherence

McCraty (2011, 2015) described social coherence as relational networks within groups or pairs of individuals that reflect harmony and stability within and among relationships, including efficiency of energy regulation and interactions that bring together groups of individuals in optimal collective presence and functioning. Within the dynamic state and variability of the human condition, social coherence demonstrates alignment and attunement within relationship. This term, social coherence, can be understood as a cooperative, collaborative, harmonized structure wherein individuals within the group attune and resonate with each other and as a collective group. Morris (2010) uses the term collective coherence, which will used interchangeably with social coherence, for the purposes of this study.

Social Engagement

Within the polyvagal theory, Porges (2009) asserted that adaptive states of physiology relate to development of "an integrated social engagement system through functional and structural links between neural control of the striated muscles of the face and the smooth muscles

of the viscera" (p. 6). Historically and evolutionarily, this integrated social engagement system evolved in mammals "when neural regulation of visceral states that promote growth and restoration (via the myelinated vagus) was linked neuroanatomically and neurophysiologically with the neural regulation of the muscles controlling eye gaze, facial expression, listening, and prosody" (Porges, 2009, p. 4). Hence, when a human or mammal activates the social engagement system, the neuroception of danger and life threat are dampened (Porges, 2005).

Further, Porges (2009) explained that the evolution and development of this social engagement system involved regulation of the heart through vagal pathways and connections between face and heart that developed to support visceral self-regulation along with social interactions and prosocial behaviors. Fundamental to this study, the integrated social engagement system may be considered as a coherent state within and between the therapeutic dyad. Each individual within the dyad has been considered in terms of their presence related to states of neuroception, interoception, and social engagement.

Therapeutic Presence

Geller and Porges (2014) asserted that *therapeutic presence,* an essential factor in effective therapeutic relationship and practice, "contributes to clients' neuroception of safety" (p. 179). Accordingly, therapeutic presence incorporates the following elements related to therapist's presence: a grounded, integrated, healthy state; immersion with moment-to-moment presence that includes receptivity and openness; expanded and spacious perceptions and awareness; intentionality to be "with and for the client in service of their healing process" (Geller & Porges, 2014, p. 179). Geller and Porges (2014) further claimed that "being grounded, immersed, and spacious, with the intention of being with and for the other" (p. 179) creates an invitation for clients into "a deeper and shared state of relational therapeutic presence" (p. 179).

Chapter 2: Literature Review

The insight of inter-being will help remove discrimination, fear, and the dualistic way of thinking. We inter-are—even suffering and happiness inter-are —and that is why the insight of inter-being is the foundation of any kind of action that can bring peace and brotherhood, and help remove violence and despair. That insight is present in every great spiritual tradition. We need only to go home to our own tradition, and try to reveal that, to revive that.
—Thich Nhat Hanh, "The Insight of Inter-Being"

This chapter includes a discussion of occupational hazards within the healing professions, specifically among psychotherapists, along with theoretical models and research that address self-regulation, self-awareness, therapeutic presence (TP), and therapeutic relationship. Additionally, the concepts of collective or social coherence will be addressed to explore connections within therapeutic relationship. This literature review will include theoretical and practical measures of self-regulation and self-awareness, including heart rate variability (HRV), respiratory sinus arrhythmia (RSA), and interoception. Examination of the literature related to coherence and synchronization will also be investigated. Moreover, this literature review includes inquiry into whether implementation of coherence-building techniques as integrative self-care instruments and therapeutic tool could potentially lead to enhanced interoceptive awareness (IA), self-regulation skills, and rhythmic connectivity within therapeutic relationship.

Therapist Health Problems and Dysregulation

Research studies have indicated increased occupational risks for psychotherapists that could result in stress-related conditions such as burnout, compassion fatigue, and secondary and vicarious traumatic responses (Bober & Regehr, 2005; Evans & Villavisanis, 1997; Figley, 2002; Killian, 2008; Shapiro et al., 2007). These stress-related conditions could manifest as dysregulation within individual therapists in the form of bodily symptoms such as sleep disturbances, challenges with focus, and mood changes (Killian, 2008), emotional challenges

(Laverdière et al., 2019; Raquepaw & Miller, 1989), and even suicidality for some health professionals (Samuelsson et al., 1997). Because of the nature of intimacy within the relational field of psychotherapy, therapists are inherently presented with potential risks to self-regulatory capacity unique to this profession (J. R. Schore & Schore, 2008).

A foundation of safety and security is essential for the grounded and receptive state of awareness necessary for self-regulation and TP (Geller & Porges, 2014). Therefore, psychotherapists could benefit from enhancing self-regulatory capacity to support self-care and prevent occupationally induced stress-related disorders that affect physical, emotional, and neurological well-being (Laverdière et al., 2019). Moreover, increasing capacity for self-regulation and IA can lead to enhanced TP (Geller & Porges, 2014) and personal coherence states can impact PS between individuals (McCraty, 2017; Morris, 2010).

The importance of personal and professional self-care practices that enhance stability, self-regulation, and TP could essentially influence personal and relational attunement for both therapist and client (Geller & Porges, 2014). Dysregulatory states could potentially create separation or division within relationships as well as health care issues for individuals. Within this perceived dilemma of dysregulation lies opportunity for increased resilience through amplified coherent states and through relational repair following a potential rupture. While the perceived duality of regulation and dysregulation might be understood as problematic, the underlying potential for increased regulatory capacity can be revealed through being present with the discomforts of dysregulatory states. Therapist well-being was central to this research study. In addition, identifying therapist self-care practices can enrich therapeutic presence and synchronization with the client to enhance the efficacy of the therapeutic encounter with positive gains for both.

The Importance of the Therapeutic Relationship

Norcross and Wampold (2018) demonstrated evidence and provided recommendations that indicated therapeutic relationship and relational responsiveness serve as a primary factor in therapeutic effectiveness. Their research explored the variables that appeared to contribute to therapeutic effectiveness across all types of therapy, from psychoanalytic to cognitive behavioral therapy. The single most important factor that contributed to the effectiveness of all psychotherapeutic techniques was the relationship between therapist and client.

Explorations into intersections between therapeutic relationship and social coherence invite reflection upon personal and collective health and well-being with consideration as to how individuals affect one another. Feldman (2006, 2009) investigated the relationship between biological and interactive rhythms in parent child dyads, concluding that the organization of physiological pulses create an environment that supports the infant's capacity for social engagement. These critical discoveries in early childhood inform understanding the organization of human experiences throughout various developmental stages and within the context of different relationships.

Morris (2010) asserted that increased *physiological coherence* of an individual has an impact on *physiological synchronization* (PS) within members of a group. Psychophysiological coherence has been correlated with increased capacity for self-regulation (McCraty, 2017), whereas co-regulation has been studied as an indicator and facilitator of PS between individuals (Feldman, 2006). The following review of research related to psychophysiological coherence, PS, and polyvagal theory will offer a framework by which to consider the potential impact of coherence-building techniques on self-regulation, psychophysiological coherence, interoception, TP, and PS among therapeutic dyads.

Relational Resonance: Rhythms Within and Between Client and Therapist

Given the importance of self-regulation, acknowledging the presence and self-awareness of the healer in the role of psychotherapist can support movement toward wholeness within individuals as well as more integrated connections between individuals in relationship. Shamanic healing has incorporated this wisdom into transformative processes, as shamans connect with expanded levels of consciousness and use these to enter the experience of others, thereby integrating multiple domains of healing (Jackson, 2004). These shamanic practices elicit movement toward wholeness on the part of the healer through accessing the essence of being and presence. Accessible states of wholeness within and between human relationships parallel integral approaches to healing within and through therapeutic relationship.

Integral approaches to healing encompass transformative practices within individuals and corresponding integrative potential within therapeutic relationship. Siegel (2020) demonstrated this notion with the term *Mwe* as a description of an identity form that represents integrated wholeness of the individual and the relational parts of human experience. This *Mwe*, considered a "symbol of mutuality" (Siegel, 2020, p. 500), potentially serves as a guide toward compassion, kindness, deeper meaning, and connections within a greater evolutionary shift on the planet (Siegel, 2020).

Similarly, the mission of the HeartMath Institute (HMI) assists in guiding and balancing alignment through heart-centered presence within individuals in service of caring for themselves, others, and the Earth (McCraty, 2015). Porges (2005) advocated for the importance of establishing social attachment bonds through a process of *social engagement*, which includes neurophysiological regulation along with connected and clear signs of safety in relationship.

Moreover, Siegel and Pearce-McCall (2009) defined integration as "linking together of differentiated elements of a system into a more complex whole" (p. 3). The authors went on to describe the importance of both individuation—the process of striving toward wholeness within the individual—and connection within relationship. Relationships serve as a foundational source in development and in service of ongoing health and healing. Siegel and Pearce-McCall (2009) argued that, from an Interpersonal Neurobiology (IPNB) perspective, relationships "are viewed as the sharing of energy and information flow" (p. 3). This shared rhythmic flow of internal and external factors occurs in phases, which might be considered coherent and incoherent, or regulated and dysregulated, within the multidimensionality of human experience.

McCraty (2011) described coherence as "the coupling and degree of synchronization between different oscillating systems" (p. 86). While synchronization occurs within many living systems, this study will focus more narrowly on the coherent rhythms that occur intra and interpersonally. These rhythms are biological, neurological, emotional, and psychological. Regarding human relationship, McCraty referred to personal, group, social, and global coherence as harmonization or synchronization within and between individuals. Further, it has been proposed that coherence within individuals potentially influences and adds to the coherence of others and in the global environment (McCraty, 2011; Morris, 2010). In contrast, personal and collective incoherence can be related to pathologies within individuals and stressful conditions in the environment, respectively. McCraty argued that dysregulation within individuals produces incoherence in social systems. The conditional states of coherence and incoherence within individuals affect the global coherence field and impact others within this field, extending the nature of coherence from intrapersonal to interpersonal to collective.

Integration of intrapersonal consciousness into wholeness, as defined by Siegel (2010) and Siegel and McNamara (2008), can be viewed as the beginning of the integrative process and includes expansion of mindful awareness intrapersonally, in an individual's relationship to self. Siegel and Pearce-McCall (2009) described nine domains of integration, which include intrapersonal and interpersonal integration within systems. Interpersonal integration emphasizes fostering integration in relationship as harmonization of autonomy and connection between two separate individuals maintaining individual identity while simultaneously coming together as an integrated unit. This interpersonal integration includes the "neurobiology of we" (Siegel & McNamara, 2008, 0:23), which represents a felt sense of two individuals connected and flowing rhythmically together.

Further, Siegel (2009) advocated that mindful awareness leads to coherent flow within a system, creating vitality and harmony within individuals and within relationship. Siegel argued that *attuned communication* occurs "when two systems are allowed to become a part of one resonating whole" (p. 138). Siegel maintained that this coherent information and energy flow results from an integrated state within and between individuals. Heart-brain synchrony along with heart-to-heart relational connections neurophysiologically reflect Siegel's attuned communication, Porges' (1995, 2003a, 2005) social engagement system, and McCraty's (2011, 2015) coherence and synchronization within and among systems. The hypothesis of this study posits that coherence-building techniques can be fostered through mindful awareness that potentially leads to integration within and between individuals, generating rhythmic flow within, among, and between systems of engagement.

Systems of Synchrony: Integrated Flow and Organization of Experience

The rhythms of interconnectedness have been explored in multiple capacities and from various perspectives with a common theme of synchrony evolving from coherent connections. A *flow state,* wherein experiences that embody this rhythm of connection, involves focused attention and contact with intuition that present as integrated states of internal awareness and discerned action (Csikszentmihalyi as cited in Palmer, 1998). The concepts of integration, flow, and connection within and between individuals are supported by Csikszentmihalyi's flow state, Siegel's (2009, 2010) concepts of coherence and synchrony, Porges' (1995, 2003a, 2005) social engagement system, Thayer's (2017) neurovisceral integration model, McCraty's (2011, 2015) coherence model, and Hanh's (2008) order of *inter-being.* These models as described below reflect and emphasize states of connected and autonomous interdependence. They embrace an expansion of opportunities for experience and discovery within integrated flowing systems, including neurophysiological systems within individuals and resonant relational systems between client and therapist.

Siegel and Pearce-McCall (2009) described researching "interconnections and interactional interdependences within and among living systems" (p. 23). Further, Siegel's (2006) construct of *interpersonal neurobiology* has been described as "a way of interrelated, interacting, and irreducible elements of human experience, creating a conceptual framework for understanding how the human mind develops from interactions of neurophysiologic processes and interpersonal relationships" (pp. 23-24). While early childhood relational experiences influence internal capacities for self-regulation, in much the same way therapeutic relationships can serve to enhance self-regulatory capacity and promote growth in the context of social connections (J. R. Schore & Schore, 2008). Processes of development emphasize the ongoing

importance of relationship throughout the life cycle, which includes maturation of relationship to self, other, and the world.

According to Ogden et al. (2006), through the body-centered trauma model of Sensorimotor Psychotherapy, psychotherapists work with present moment *organization of experience*, which offers distinctive foundations by which one navigates the world and relationships. Approaching client-therapist relationships with mindfulness and honoring bidirectionally synchronous ways of processing trauma in therapy, the therapist attends to moment-to-moment attunement with the client. Given the highway of communication pathways between various anatomical and physiological systems such as the brain, heart, nervous and cardiovascular systems, this bidirectional synchronous processing happens in relationship and also within individuals (Armour, 2003). Attending to the organization of experience offers information regarding an individual's present state and habitual patterns of navigating relationship to self, other, and the world. Increased awareness of one's organization of internal experience inspires movement toward enhanced connectedness, wellness, healing, and wholeness, or integration, with an added benefit of more fulfilling interpersonal relationships.

Physiological and Psychological Coherence

Opportunity within therapeutic relationship, therefore, lies in the self-regulatory capacity of the therapist along with the interconnected processes in relationship. Neurophysiological factors along with capacity for connection must be considered. Thayer's (2017) neurovisceral integration theory highlighted reciprocally interconnected physiological, cognitive, and affective systems as essential elements for self-regulation. Furthermore, McCraty (2015) described bidirectional flow within heart-brain interactions, describing efferent (top-down) and afferent (bottom-up) pathways between the heart and the brain. Within therapeutic relationship,

integrated flow along with contained interconnections provide the groundwork for establishing foundational safety and security along with exploratory avenues that in combination lead to coherent pathways.

McCraty (2011) indicated that "physiological coherence embraces several related phenomena—auto-coherence, cross-coherence, synchronization, and resonance—all of which are associated with increased order, efficiency, and harmony in the functioning of the body's systems" (p. 88). Further, McCraty (2011) described psychological coherence as increased "emotional and perceptual stability and alignment among the physical, cognitive, and emotional systems" (p. 88). Psychological and physiological processes are directly related to states of coherence and resilience, which can vary over time with the complex dynamic human system. Resilience relates to energy management and self-regulation within the physical, emotional, mental, and spiritual domains. While resilience presents as flexibility and strength within the physical, emotional, and mental domains, resilience often reflects "commitment to core values, intuition, and tolerance of others in the spiritual domain" (McCraty, 2011, pp. 88-89). Resilience and coherence appear to parallel the ongoing themes of centered attunement with self and resonance with other in therapeutic relationship.

Furthermore, incoherence within individuals can feed the field of global incoherence. From a global perspective and with increasing vulnerability on the planet, at the time of this writing during a pandemic, patterns of dysregulation and incoherence seem to present with increasing concern and challenge. For therapists, at this delicate time in particular, it is imperative to increase practices that support improved coherence and resilience, which can in turn enhance capacity for self-regulation and integrated authentic connections. As the world and

humanity evolve toward more complexity, humans are being presented with more opportunity for integration. Integration, as defined here, incorporates concepts of coherence and resilience.

Systems Theory and Complexity

Within the dynamics of evolving systems such as personal and relational experiences, it is essential to consider complexities within multiple domains, including physical, emotional, mental, and spiritual (McCraty, 2011) as well as interpersonal integration (Siegel, 2008) and complexity theory. From a systems perspective, the concept of integration as the linkage of differentiated parts (Siegel, 2020) can serve individuals and collectives alike with movement toward healthy rhythms, flow, and global coherence. Dynamic keystones of integrated well-being can be understood through an acronym, FACES, developed by Siegel (2006), to represent the following qualities of a living complex system: flexible, adaptive, coherent, energized, and stable. These descriptors parallel the concept of coherence, presented by McCraty and Zayas (2014), wherein flexible, adaptive, energized, and stable rhythms of the heart represent cardiac coherence.

Calling upon complexity theory, Siegel and Pearce-McCall (2009) argued that the process of integration within a system consists of dynamic and adaptive rhythms harmonizing ongoing shifts between stability and change that lead to resulting innovative flow that continues to present as a dance of combined familiar patterns and disorder. Such is the ongoing process within therapeutic relationship. More specifically, the system of each individual engages with these complexities within while relational rhythms between client and therapist create coherent or incoherent flow as part of the ongoing dance within the system of relationship. Opportunities for repair and reconnection always follow moments of disconnection, or disharmony (Siegel, 1999). Accordingly, Siegel and Pearce advocated that, even within the apparent incoherence or

instability within a system, the integrated flow can be accessed through a caring and safe relationship, a healthy mind, internal neurological networks, and external support systems.

Developmental and therapeutic relational experiences inform patterns within the physiological, neurological, and psychological systems. The stability of a system requires transformation through tension of the opposites or dualities. A stagnant system will not survive. Stability and security, a sense of safety, is required for autonomic regulation. Given that autonomic regulation is responsible for heart rhythms, it is not surprising that babies who do not receive any care die while babies who receive inadequate care in early childhood may develop pathologies. Stabilization and repair within a relational system, such as a contained and dynamic therapeutic relationship, can lead to stabilization within the system and within parts of the system. The client and therapist within the therapeutic relationship both bring a sense of regulatory capacity and can further develop regulatory capacity through coherence-building and synchronization.

Coherence and Synchrony: Vibrations of the Heart

Coherence-building practices can potentially initiate movement out of stagnant or unstable conditions into more stable patterns of ease and flow. Based on research on how individuals relate and influence the coherent field (McCraty, 2003, 2011, 2017; Morris, 2010) a therapist's ability to access this state of ease and flow influences their client and the relational field between therapist and client. These internal states of ease and flow within the therapist or client could be identified as psychophysiological coherence, and the relational field (or synchrony) between therapist and client can be studied through investigation of physiological synchronization (PS). Facilitating psychophysiological coherence can lead to increased self-regulation and potentially influence PS between individuals (McCraty, 2017; Morris, 2010).

While the term *coherence* can be used to represent harmony or order, reflective of interrelated systems, the term *synchronization* has been identified to describe the measurement of interconnected coherence between individuals (McCraty & Childre, 2010).

As (relational) systems move toward greater complexity, navigating the waters of ever-shifting dynamics, including potential rupture and repair, these interconnected relationships possess great potential to move toward healing (J. R. Schore & Schore, 2008; Siegel, 2010) through integration through heart-brain synchronization (McCraty, 2003; McCraty et al., 2009) and heart-to-heart synchronization. This study investigated the effects of coherence-building techniques on heart rhythms, both broken hearts and hearts in repair, during psychotherapy sessions. Coherence-building techniques will be used to track moment to moment physiological markers during sessions, which may include moments of rupture and repair.

Heart-Brain Rhythms, Neurovisceral Integration, and Heart-to-Heart Interconnections

The best and most beautiful things in the world
cannot be seen or even touched
—they must be felt with the heart.
—Helen Keller

Thayer and Lane (2000) advocated that sensitivity to internal and external factors may be reflected in measures of HRV and self-regulatory capacity. Variability of cardiovascular function, mediated by the autonomic nervous system, serves as an index of self-regulatory capacity and neurovisceral integration. This model of neurovisceral integration incorporates attentional, affective, and autonomic structural and functional systems that serves to offer insight about emotion regulation and dysregulation.

The rhythms of regulation and dysregulation continue to create pathways to navigating internal and external discoveries. Therapists can develop skills that can serve as an elixir for present moment experience of heart-brain rhythmic coherence that, when practiced and

integrated, can further function as an invitation to join in the heart field. In modern times, with a heavy focus on the brain, the inclusion of intentional awareness and connection to the heart can potentially get lost. Moreover, in ancient times and in modern day society, references to the heart are evident in diverse spiritual traditions and in popular culture through use of the word, *heart,* in the daily vernacular and in popular music. Some examples are phrases used in common language such as the following: "follow your heart," "heavy hearted," "out of the goodness of your heart," and many more. Similarly, somatic gestures such as a hand to the heart are commonly used in practices such as meditation and prayer to calm, reflect internally, and even to identify oneself and one's identity.

Furthermore, lyrics to various songs, sutras, and prayers from multitudes of traditions include the word, *heart.* For example, the song "Two Hearts Beat as One" was written by Irish singer/songwriter Bono; it was released on U2's 1983 album entitled *War*. The song's lyrics addressed the ongoing conflictual divisions and war between Ireland and Northern Ireland (Andrews et al., 2011). Hope for healing on a larger scale encompasses unifying divided systems, whether that be nations or individuals. According to Childre et al. (2016), "heart-based living" (p. 16) in modern times and everyday life has been increasing while understanding of the heart in modern day society has progressed toward a "realization of the heart as a dynamic, connecting, creative intelligence" (p. 16). Childre et al. (2016) go on to discuss heart intelligence and practical application of heart-based practices that can further support human evolution and global shifts to include peaceful interconnections and cooperation.

The power of the human heart has been recognized in many religions and spiritual practices throughout time. With advances in science and the development of a field called neurocardiology, the heart has come to be recognized in science as more than a simple pumping

organ (Armour, 2003). Appreciated for its electromagnetic properties, the heart has been recognized as having its own "little brain" (Armour, 2003, p. 1) and regulating cardiac function.

While self-regulation is encouraged for all humans, co-regulation is imperative during the rhythms of early life patterning. The early years of life set patterns in motion within the nervous system and in relationship. According to J. R. Schore and Schore (2008), attachment theory has shifted to regulation theory where caregivers provide co-regulation for the infant's developing central and autonomic nervous systems through attachment bonding. Additionally, Feldman (2006) argued that development of vagal tone plays an important role in regulatory capacity and social engagement which support *parent-infant synchrony* while external physiological regulation of caregiver toward infant "can facilitate the emergence of interactive synchrony between two separate timing systems within an attachment relationship" (p. 185).

Field (2012) argued that co-regulation served as a pathway to psychobiological attunement and synchronized physiological indicators in infant/caregiver dyads and marital couples, concluding that relationships serve as regulatory mechanisms and reflect rhythms in relationship. This interactive regulatory capacity within relationship also supports capacity for autoregulation, or self-regulation. Furthermore, therapists have been recognized as interactive psychobiological regulators for clients (J. R. Schore & Schore, 2008).

Given that co-regulation, along with self-regulation, remains an important factor throughout the lifetime, therapeutic relationships (and other relationships) offer healing potential through regulatory rhythms in relationship. A holographic model of counseling, proposed by Sprinkle (1985), incorporated the concept of *psychological resonance* along with practices of mutual exploration in therapeutic relationship and investigation of client's and therapist's shared experiences as co-participants in relationship. This collaborative style of relating, along with

therapist dedication to self-regulation and self-care, creates a safe environment in which neuroception of safety can be developed, regulatory states adapted (Dana, 2018; Porges & Kolacz, 2018) and authentic presence honored.

While attunement to the inner landscape facilitates calm and a sense of safety (Siegel, 2010), development of safety in therapeutic relationship results from therapeutic presence and creates foundations for therapeutic change (Geller & Porges, 2014). These authors described that a therapist's "present-centered engagement with the client also originates in the therapist through an internal preparation and intention for presence" (Geller & Porges, 2014, p. 185). Geller and Porges explored the mechanism and underpinnings of a client's sense of safety that results from a therapist's presence and reported that the *experiences* of therapeutic presence within and between therapist and client fosters development of *relational presence* that further supports an environment of safety, calm, and potential transformation. Geller and Porges (2014) further argued that changes in clients' physiology occur when clients "feel felt" (Siegel, 1999, p. 89) by an attuned, calm therapist and feelings of safety are evoked.

Humans' neurological experiences include bidirectional links between the brain and body, or head and heart as well as interconnected bidirectional communication between nervous systems of each other (Ogden et al., 2006; Porges, 2017; Siegel, 2010). Self-regulatory capacities are related to the rhythms of the nervous and cardiovascular systems within individuals. Further, relational and therapeutic presence, along with the physiology interconnected and dynamic rhythms within and between clients and therapists, will be further explored in the next section.

Personal Coherence: Cardiac Coherence to Self-Regulation and Therapeutic Presence

This study focused on therapists' internal stability, or rhythmic flow, in the form of autonomic regulation as measured by HRV coherence as well as measurements of PS of therapist

and client within relationship. Moreover, this study will investigate therapists' capacity to reflect internally through IA and subjective assessment of TP, as perceived by therapist and by client, before and after a period in which therapists and clients will be practicing a coherence-building technique together. Personal heart rate variability coherence (HRVC) and synchronization data will be gathered as indicators of personal and interpersonal coherence.

Sullivan et al. (2018) identified self-regulation as a condition that is dependent on the interpretation of internal data as illustrated through IA. Hence, this study considered the significance of relationships between self-regulation and IA as well as cardiac coherence and PS. Measurements of Heart Rate Variability (HRV) along with cardiac coherence and PS will be collected throughout therapy sessions, and therapists' and clients' subjective reports of IA and TP before, after, and during therapy sessions will also be gathered to assess correlations between these various measurements.

One of the challenges of research in the field of coherence and synchrony within intra and interpersonal relationships, is that measurement of these constructs depend upon objective physiological evidence from instrumentation as well as subjective self-report. Just knowing that HRV has shifted is meaningless unless correlated with a person's shared revelation of their subjective internal assessment of mental state, attentional focus, and psychological and physiological change. Trying to standardize internal self-report across participants and coordinating physiological data and self-report between therapist and client makes the process of investigation particularly challenging. Since physiological measurements in isolation have limited impact, this study has purposefully incorporated subjective measures of IA and TP to provide better triangulation of data and allow for more comprehensive understanding of coherence and synchrony and greater confidence in the conclusions of the study.

While the field of neurocardiology focuses on the intersections of cardiovascular and nervous systems (Tsioufis, 2017; van der Wall & van Gilst, 2013), current advances in the field include increased focus on the combined understanding of the anatomical features and physiological mechanisms of the heart-brain interconnections (Tsioufis, 2017). As an example of advances to the clinical and research branches of the field of neurocardiology, Porges and Kolacz (2018) offered insights and wisdom regarding the relational and regulatory elements between the nervous system and the heart by explicating the polyvagal theory. The next section will highlight underpinnings of polyvagal theory as a context for deeper understanding of the autonomic nervous system (ANS) and regulatory processes that can lead to enhanced interoception, TP, coherence, and PS.

Polyvagal Theory: Personal Rhythms and Social Engagement

The polyvagal model (Porges, 1995, 2001, 2003b, 2007) offers an expanded framework for understanding autonomic regulation and neurological responses to life stressors as well as regulatory opportunities. Porges (1995) maintained that a psychophysiological context combines processes related to psychological and neurophysiological systems, which encourages incorporation of theoretical, quantitative, and qualitative approaches to research on mind-body systems. In 3 decades of research and development of the polyvagal theory, Porges explored the vagus nerve and vagal pathways as related to cardiac rhythms and regulatory capacity of the ANS. According to Porges (1995), "The vagus, the 10th cranial nerve, contains pathways that contribute to the regulation of the internal viscera, including the heart" (p. 301). Consequently, cardiac vagal tone, along with psychophysiological measures of cardiac and respiratory rhythms, can be potential indicators of self-regulation and interoception as well as coherence and synchronization.

Historical perspectives related to psychophysiological research have been limited in understanding the ANS as a separate system, an outdated view of neurophysiological processes (Porges, 1995). Recent research holds a more "integrated view of the autonomic nervous system" (Porges, 1995, p. 302). Porges' (1995, 2007) polyvagal theory offers an updated and integrated assessment of the ANS that explains how vagal pathways regulate heart rate in response to environmental factors. Thus, the polyvagal theory provides a construct that elucidates the relationship between the ANS and self-regulation. The ANS and self-regulation could potentially serve as a foundational reflection of an interconnected dynamic relational field, or interpersonal nervous system. Building personal and relational or social coherence can possibly shift one's physiology and subsequently alter the relational field (McCraty, 2017; McCraty et al., 2009; Morris, 2010). In this study, neurological regulation and social coherence will be further explored through investigation of coherence, interoception, and synchronization.

Ongoing challenges of self-regulation can be addressed through application of effective interventions that support the process of accessing optimal states of TP. Various forms of assessment, treatment, and interventions have been used to address and modulate self-regulatory issues (Gard et al., 2014; Sullivan et al., 2018). One such healing intervention is the practice of HLI, a coherence-building technique developed by the Institute of HeartMath (IHM). HLI incorporates heart-focused breathing, activation of a regenerative emotion, and expansion within the practitioner and out to others. Shift & Lift is a technique that identifies a specific state of dysregulation, for example, with subsequent intentional shift to a more regenerative state, which theoretically lifts the dysregulation and shifts the state of the practitioner to a more regulated, coherent, and regenerative state.

This study employed HLI as a possible tool for therapeutic *presencing* that potentially leads to personal coherence which consequently activates a coherent field environment and potentially increases PS. The practice of HLI will be used to encourage self-regulatory skills and interoceptive awareness along within interpersonal dynamics and PS in therapeutic relationship. The heart of this inquiry poses curiosity about whether and how states of coherence of therapist influence PS within a therapeutic dyad relationship.

Presencing Neurobiology of Self-Regulation and Building Coherence

Ongoing stressors in the field of psychotherapy can lead to internalized states of dysregulation of the ANS and influences on the quality of TP (Geller & Porges, 2014). Thus, investigation of interventions to support autonomic regulation could prove relevant and necessary to resolve dis-integrated states that present as dysregulation and/or disturbances of health. Geller and Porges (2014) incorporated the concept of polyvagal theory with therapeutic elements such as safety and self-regulation, asserting that states of increased self-regulation and self-awareness support TP.

Telles et al. (2013) investigated autonomic changes occurring during two states of attention, *dharana* and *dhyana*, which are described respectively in ancient yoga texts as states of focusing and not focusing. These concepts of focusing and not focusing are directly related to components of IA, as described by Mehling et al. (2012). Telles et al. studied 30 healthy male volunteers who were living at a yoga center in India and met various inclusion/exclusion criteria including lack of chronic illness, psychiatric, and neurological conditions. Participants were assessed during four sessions and during four different mental states, two of which were *dharana* and *dhyana* as described in the ancient texts, and another two control states, focused thinking and random thinking. Data were collected using a polygraph that measured respiration, heart rate and

HRV, pulse amplitude, and skin resistance. Data analysis included extraction of data from the polygraph and statistical analysis using Statistical Package for the Social Sciences (SPSS) and analysis of variance (ANOVA). Changes in autonomic variables and respiration were noted, specifically during *dhyana*, described as a "state of effortless meditation" (Telles et al., 2013, p. 41), and revealed potentially augmented vagal modulation with decreased sympathetic activation. Significant findings included increases in skin resistance and pulse amplitude along with decreases in heart and breath rates during the state of *dhyana*.

Telles et al. (2013) examined the differences between qualitative and quantitative associations, reporting that "HRV provides a qualitative marker of cardiac parasympathetic regulation" (p. 40), and encouraged careful use of scientific methods in combination with yogic concepts that align with wisdom traditions. Limitations of this study included small sample size of experienced meditators, lack of control group, and limited number of sessions during the study, which indicates that the results may not necessarily be generalizable. The focusing and defocusing states identified in this study offer a framework by which to research meditative and coherence-building practices. Coherence-building practices such as HLI incorporate contemplation and regulatory practice while simultaneously holding intention to let go of effort and allow presence of *dharana* and *dhyana* states. Hence, relevant research conducted by Telles et al. (2013), combined with the MAIA-2 subjective assessment of IA (Mehling et al., 2012) and the systematic literature review conducted by Pinna and Edwards (2020), supports this study's consideration of the impact of coherence-building techniques on regulatory capacity, IA, HRVC, TP, and relational synchronization.

Qualitative Measures of MAIA-2 and TPI

Qualitative measures from the MAIA-2 and the TPI were collected by this researcher from therapists and clients via survey format online. Therapists and clients each completed the MAIA-2 questionnaire at three different times during the study: prior to beginning therapy sessions during the control phase, at the midway point after collecting control data and before engaging with intervention, and after the intervention phase of the study. Additionally, therapists and clients completed the self-report questionnaire called the Therapeutic Presence Inventory (TPI) after each therapy session. Clients completed the TPI-C which has been designed specifically for clients, and therapists completed the inventory designed for therapists, the TPI-T, after each therapy session. Semi-structured post-interviews were conducted by this researcher individually with each therapist as a follow-up assessment of the transformative impact of the use of coherence-building practices. These post-study interviews allowed for reflections upon each therapist's perception of their therapeutic presence along with any insights related to transformation and integration.

Qualitative measures were administered and gathered by this researcher during a private preliminary meeting with therapists as well as online through surveys with therapists and clients throughout the study period. Additionally, all information shared by participants has been safeguarded and uploaded to a confidential and secure location to protect privacy and participant identities. Post measures of TP were collected after each therapy session. Each therapist completed the TPI-T, and each client completed the TPI-C after each therapy session. All forms were provided electronically and questionnaire links provided for each therapist and each client prior to the study period. Clients and therapists completed and submitted the TPI questionnaires through Google Forms after each therapy session for each session during the study period. Pre

and post measures of IA were gathered using the MAIA-2 questionnaire, which was provided through Google Forms links shared with therapists and clients before and during the study period. Each participant submitted the completed MAIA-2 questionnaire through Google Forms prior to beginning the therapy sessions, at the midway point of the study, and after completion of research study therapy sessions. Data collection at midpoint of the study gave a preliminary window into trends. Pre and post measurements were used in data analysis.

Personal Coherence to Collective Coherence and Synchronization

Curiosity within many traditions surrounds the adventurous journey from personal coherence, which mirrors connections with self, to social coherence as understood through connections with others, and to global coherence representing connections with the Earth and within groups of people. Through a study that investigated the relationship between individual heart rate variability coherence (HRVC) and heart rhythm synchronization, Morris (2010) suggested that "a coherent energy field can be generated or enhanced by the intentions of small groups of individuals" (p. 62); moreover, Morris proposed the "possibility of heart-to-heart bio-communications" (p. 62) as evidenced by *heart rhythm synchronization* across participants. During this study, Morris (2010) attended to the ongoing issue of social incoherence, which can be demonstrated by lack of connection, understanding, and coordination among group members (or individuals in society). This study offered context by which to consider relational coherence and incoherence and the influence of such states on TP and PS within therapeutic dyads.

Morris (2010) conducted a quantitative study addressing collective coherence synchronization by studying group and individual HRVC effects on HRVC of others. Morris addressed the questions of how humans impact each other and how this process unfolds. This mystery of how one person affects another person lies at the heart of this study. Specifically,

based on the use of physiological measurements of HRCV and heart rhythm synchronization, further inquiry unfolds. For example, how do our hearts connect and how might we affect, and be affected by, each other through higher or lower states of HRVC? Morris (2010) leads us on a journey into unveiling the possibility of a coherent energy field by assessing the potential of "a pathway connecting a group's members that facilitate greater interpersonal understanding and group coordination" (p. 62) as well as how these variables might be measured.

Further, Morris (2010) discovered evidence for a heart-to-heart bio-communication mechanism. With these potential cardiac biorhythms at play, Morris (2010) proposed that "if we could understand how collective coherence is brought about then, perhaps, we could improve the coherence of those around us and extend coherence to a larger community" (p. 62). Morris' study marked an evolutionarily pivotal movement toward deeper understanding of relationships within therapeutic dyads as well as within social groups.

Based on this foundational study of collective coherence, Morris (2010) asserted that individuals in small groups affect each other's heart rhythms and subsequently affect the HRVC of each other. They went on to suggest that "overengaging the mind relative to the heart seems to impede rather than to enhance energetic interactions" (Morris, 2010, p. 72), and that "collective coherence can best be forged on the strength of personal coherence" (p. 72) given the weight of truth in taking care of oneself before others. Collective coherence/synchronization among small groups of individuals can be created or augmented by individually coherent participants intentionally sending facilitating coherence with target receiver (Morris, 2010). Morris details evidence of heart rhythm coherence among individuals in relationship to one another. These findings imply, highlight, and validate the relevance and integral significance of TP in relationship (Geller & Porges, 2014). Morris (2010) offered hope and inspiration for continued

research using physiological data to support essential principles of relationship-building and self-regulation in psychotherapy. Morris has provided a foundational steppingstone for future research to substantiate intentionality of interconnections and how humans (and human hearts) affect others.

Neuroception and Interoception

Porges (2004, 2009) described the process of neuroception as a mammalian neural response and automatic risk assessment of the environment. Neuroception, a neural process that occurs without conscious awareness, allows differentiation between cues of safety, danger, and life threat by scanning environmental signals. The polyvagal theory describes autonomic developmental processes of social engagement, mobilization, and immobilization as responses to environmental stimuli. While the mechanism of neuroception facilitates humans in social, visceral, and emotional realms, a neuroception of safety reflects vagally mediated processes between the nervous system and viscera. A neuroception of safety is required for social engagement. Neuroception involves ongoing bidirectional contact between viscera, heart, and brain that indicate signals of comfort or discomfort in relationship. Further, neuroception of safety can be enhanced in social connections with a familiar, caring individual who exhibits warmth through facial and vocal expressions (Porges, 2004, 2009).

As noted above, interoception has been defined as a process of internal awareness through sensing and feeling (Cameron, 2001; Farb et al., 2015; Garfinkel et al., 2015). Farb et al. (2015) described interoception as a "hidden sense" (p. 29) and defined it as "the process of receiving, accessing and appraising internal bodily signals" (p. 10). Further, Khalsa et al. (2018) asserted that interoception involves sensing, interpreting, and integrating information related to various systems within the inner world of an individual. In a review of the literature and research

related to interoception, Cameron (2001) proposed that interoception can be defined as "visceral sensory psychobiology" (p. 697), and further elucidated that interoception includes the acquiring of information from "anywhere and everywhere within the body" (p. 697). Moreover, Cameron (2001) asserted that "interoception of vascular and respiratory changes have been studied, but the number of reports is small, and conclusions are not yet warranted" (p. 705). Therefore, additional studies that incorporate cardiovascular and respiratory indicators of health are warranted to provide a more comprehensive understanding of interoception and the relationship between interoception and cardiovascular and respiratory indicators. This study assessed and correlated interoception along with cardiovascular and respiratory quantitative measures.

Research on Interoception

Pollatos et al. (2007) explored the correlation of interoceptive awareness and emotion on brain structures related to emotion processing. The goal of the study was to test the hypothesis that there was a positive correlation between interoceptive awareness (the perception of bodily states) and both the intensity of feelings as well as the brain structures involved in processing emotion. This study included 32 students who viewed pictures that served as emotional stimuli. Participants were divided into two groups, one group with high interoceptive awareness to be compared to another group with poor interoceptive awareness (Pollatos et al., 2007). Interoceptive awareness was measured via heartbeat counts reported by participants and subsequent heartbeat measures based on subjective heartbeat counting tasks. Electroencephalogram (EEG) and electrocardiogram (ECG) measures along with self-reported emotional states after viewing visual stimuli were gathered and evaluated. Self-reported feelings included three emotional criteria, which entailed report of pleasant, unpleasant, and neutral feeling. Data were gathered and analyzed, valence and arousal ratings calculated, and analyses of

variance (ANOVA) conducted with three emotional criteria and two levels of interoception, high and low (Pollatos et al., 2007).

Results included participants with higher interoceptive awareness reporting higher intensity feelings when viewing pleasant and unpleasant pictures, which supports the idea that feelings result from bodily perceptive states (Pollatos et al., 2007). Findings also included interoceptive awareness impacting psychophysiological reactions to emotions as demonstrated in certain brain structures. Through the study of specific first and second order brain structures related to emotional stimuli, Polattos et al. identified brain regions involved in the interconnectedness between interoception and emotions. The authors argued that this was the first study to identify that body state perceptions are related to emotions and to brain structure activity involved in processing emotions (Pollatos et al., 2007). Likewise, Mehling et al. (2012) proposed that interoceptive awareness offers information related to felt sense experience, which reflects body state perceptions. These studies offer information that encourages further exploration of the influence of perceived body states, interoception, on self-regulation and presence. This research investigated the relationship between perception of body states through interoceptive awareness, self-regulatory measures, and therapeutic presence.

Ferri et al. (2013) studied interoceptive awareness and autonomic response as measured through RSA. The aim of this research was to test the hypotheses that interoceptive sensitivity affects autonomic response of the participant toward social stimuli and that interoceptive sensitivity predicts RSA in social interactive tasks as compared to non-social tasks (Ferri et al., 2013). Twenty-four healthy volunteers were selected to participate in the study and to engage in two experimental sessions that included a social task and a nonsocial task, as well as a heartbeat-monitoring task to assess for interoceptive awareness. During the first experimental session,

participants also completed questionnaires to assess for anxiety, depression, and autism. Quantitative measures such as ECG and RSA were gathered and analyzed along with subjective data from questionnaires and the three completed tasks. The authors explored how heartbeat perception sensibility predicted autonomic response, as measured by RSA in each of the different tasks, and found that there was a significant correlation between heartbeat perception and RSA specific to the social tasks as well as a positive correlation between interoceptive sensitivity and autonomic response only for the social task. Limitations to this study, as suggested by Ferri et al. (2013), include the vulnerabilities related to RSA as a measure that reflects individual differences to experimental situations thus contributing to autonomic responses.

Given that only "good heartbeat perceivers showed higher autonomic response" (Ferri et al., 2013, p. 1), Ferri et al. concluded that interoceptive sensitivity could reflect inter-individual differences related to social interactions. Additionally, Ferri et al. (2013) identified this study as the first to address the links between interoceptive sensitivity and social interaction. Despite limitations related to small sample size and minimal experimental sessions, this research offers information related to interoception, social interactions, and autonomic response that can serve as impetus for future studies related to interoception, interpersonal interactions, and autonomic conditions. This study, related to coherence-induction techniques practice of therapists and clients, incorporated and investigated interoceptive sensitivity along with social engagement, polyvagal theory, regulatory capacity, autonomic regulation, and therapeutic presence through various measures of self-regulation.

Interoception and HRV

Through their systematic review of the current literature related to interoception and HRV, Pinna and Edwards (2020) reported that few studies address the relationship between

interoception and HRV. The authors specified an aperture in the literature related to associations between interoception and HRV, or vagal tone, as indicators of emotional regulation and predictors of mental health, and well-being. Hence, Pinna and Edwards explored the literature and narrowed down the initial 237 studies to 8 studies that were appraised in-depth. Pinna and Edwards (2020) proposed that study results demonstrate better emotional regulation (ER) to be positively correlated with greater interoception and HRV. Further, the authors concluded that inner awareness of the body appears to be related to emotional regulatory responses.

These findings are consistent with HeartMath's coherence-building techniques and concepts pairing increased awareness along with integrative regenerative and renewing emotions. Pinna and Edwards (2020) advocated that, due to the paucity of related studies, more studies are needed in the future to address associations of interoception and HRV with emotional regulation. Further, the authors encouraged evolution of a cohesive framework inclusive of integrative regulatory systems to further cultivate clinically applicable diagnoses and interventions. While findings based on this literature review potentially support self-regulation from a bottom-up perspective, future research might include exploration of causal effects in addition to the interconnections of parasympathetic nervous systems and interoception. In turn, these studies could possibly support psychophysiological interventions that incorporate holistic treatment and client-centered care.

Additionally, RSA has been described as a measure of respiration that indicates autonomic regulation (McCraty et al., 2009) and has an impact on HRV (McCraty, 2015). Using power spectral analysis and analyzing various frequency bands, HRV waveform rhythms can be studied and quantified over time (McCraty, 2015). The high-frequency (HF) spectrum of these rhythms over time, often referred to as the respiratory band, relates to HRV that links to cycles of

respiration and respiratory sinus arrythmia (RSA). This high-frequency band echoes vagal activity and the parasympathetic nervous system response (McCraty, 2015). These perspectives align with the construct of polyvagal theory and support the argument to study HRV and RSA as measures of autonomic regulation as they relate to coherence-building practices in particular.

Coherence-building techniques improve autonomic regulation, use of vagal brake, and enhance cardiac vagal tone (McCraty & Zayas, 2014; Shaffer & Ginsberg, 2017). Based on their literature review, Tyagi and Cohen (2016) asserted that "HRV reflects the dynamic balance arising from the coactivation, co-inhibition, or reciprocal activation or inhibition of the sympathetic and parasympathetic nervous systems and provides a proxy for the health, adaptability, flexibility, and neural regulation of the cardiovascular system" (p. 97). This study includes hypotheses that coherence-building techniques increase HRV coherence, self-regulation, IA, and synchronization for and between therapists and clients during therapy sessions.

Self-Regulation and Interoceptive Awareness

Self-regulatory and interoceptive skills developed throughout embodied practice can be incorporated into the neurological imprint of the practitioner and carried through to affect therapeutic presence for psychotherapists (Geller & Porges, 2014). This study hypothesized that coherence-building techniques can be used as regulatory tools and mind-body integrative practices that could increase IA as well as psychobiological and neurophysiological regulation that then enhances therapeutic presence for therapists and physiological synchronization within therapeutic dyads.

Some HRV studies have focused on respiratory patterns and the effects on HRV (Beda et al., 2014; Bernardi et al., 2000). Beda et al. (2014) reviewed studies that continuously monitored

electrocardiogram (ECG) and respiratory signals in response to unique experimental protocols of breathing, mental effort, and attentional protocols. The purpose of these studies involved assessment of the correlation between respiratory and cardiac patterns. After reviewing these studies, Beda et al. (2104) analyzed the correlation between respiratory variables and HRV, concluding that respiration is related to HRV and autonomic regulation. Moreover, they asserted that further investigation of the effects of respiration on HRV and autonomic modulation is warranted. This study offered research that investigates RSA, HRV, and autonomic regulation as a result of a specific task, a coherence-building practice.

Bernardi et al. (2000) studied the effects of controlled breathing on HRV in 12 healthy male volunteers, finding that there is a relationship between mental activity and respiration, which in turn affects HRV. The purpose of the study was to investigate the relationship between breathing patterns and specific tasks. Bernardi et al. (2000) explored the variations of respiration during various mental, verbal, and breathing tasks and compared spontaneous breathing with controlled breathing. Participant selection criteria was not noted. Data collection included ECG, respiratory, and blood pressure measures that were analyzed by spectral analysis. This study incorporated measures of HRV, including RSA, cardiac coherence and synchronization, to assess autonomic regulation of therapists and collective coherence/autonomic regulation of the relational field between therapist and client.

Resonance and Rhythmic Flow: Psychophysiology Meets Psychotherapy in 2020

While Deits-Lebehn et al. (2020) argued that studies related to physiological measures in therapy process research could offer information about the mechanisms and processes involved in effective therapy, the authors also noted that there is limited evidence regarding how physiological elements are related to therapeutic process variables and outcomes. The authors

demonstrated application of principles and therapy process research methods through investigation of physiological measures and self-reports of therapeutic presence in couples' therapy. This case study included 23 sessions of integrated behavioral couples therapy (IBCT), delivered by a clinical psychology doctoral student, with a heterosexual couple over a 6-month period. Data gathered included physiological measures of HF-HRV and EDA, chosen to reflect parasympathetic and sympathetic nervous system activity respectively, as well as self-reported measures using the Therapeutic Presence Inventory (TPI) and the Couples Satisfaction Index (CSI) to measure clients' experience of the presence of the therapist and relationship satisfaction with their partner. Participants were trained on how to use physiological measures of biosensors which they connected prior to each session.

This case study, conducted by Deits-Lebehn et al. (2020), demonstrated experiential and physiological interconnections within the therapy process. Specifically, findings included positive associations between HF-HRV and therapeutic presence as well as between therapeutic presence and EDA, whereas EDA was shown to be negatively associated with CSI. Limitations to this study are in the case study format with data that cannot necessarily be generalized to a larger population. However, this study offers preliminary findings in the potential significance of physiological underpinnings within the psychotherapy process.

Deits-Lebehn et al. (2020) clearly articulated limitations along with the importance of purposeful next steps in exploration of physiology and psychotherapy, described as "a complex, multifaceted endeavor in which clients are responding to multiple internal and external cues, which are not always obvious to external observers or possible to measure without compromising the authenticity of psychotherapy itself" (p. 495). Reflective of neuroceptive and interoceptive processes, it is imperative to mindfully consider states of consciousness, including

neurophysiological and emotional underpinnings constantly occurring in moment-to-moment human experience. Additionally, the importance of relational dynamics and the influence of these underpinnings and shifting states within therapeutic relationship must not be overlooked. The essence of these psychotherapeutic explorations includes both clients' and therapists' responses to internal and external cues that need to be considered and validated, as the process of neuroception remains ever-present for individuals while relational resonance creates added elements to the psychotherapeutic dynamic.

Diets-Lebehn et al. (2020) employed research methods and data collection that included continuous physiological measures during the therapeutic process in a natural unfolding of in-vivo therapy processes with unobtrusive and easy-to-use instrumentation. The data gathering process and equipment offered ease within the process. Diets-Lebehn et al. (2020) proposed that further investigative research that incorporates psychophysiological methods along with continuous physiological monitoring of clients during psychotherapy sessions will promote clinical advances related to client transformative growth processes while advancing efficacy of clinical interventions. The authors lacked focus on physiological factors and phenomenological experience of the therapist, which is an important element in the relational resonance of understanding the wholeness of the psychotherapy process.

Similarly, following through with continuous monitoring of physiological data throughout the natural processes of psychotherapy, Tschacher and Meier (2020) conducted an observational case study with a convenience sample of 55 dyadic therapy sessions. This proof-of-principle study focused on assessing associations between self-report measures and physiological synchrony within therapeutic dyads. Physiological measures consisted of respiratory and cardiac measures such as ECG, HR, and HRV, gathered for both therapists and

clients in 15-second increments during therapy sessions. Data during psychodynamic therapy sessions was gathered for one therapist and four clients, with data analysis including measures of this one therapist and two clients, who met over a 15-month period in a university psychiatric hospital setting in Switzerland in the 1990s. Therapy sessions, with average session time of 51 minutes, were analyzed for physiological synchrony of respiration, ECG, HR, and HRV of client and therapist. Surrogate controls were included as part of this study.

Therapists and clients completed self-report questionnaires related to therapeutic alliance. While the therapist evaluated cooperation of the client, progress in therapy, and the quality of therapeutic alliance, clients completed assessments of self-evaluations related to well-being and progress in therapy as well as quality of therapeutic alliance. Data consisted of dyadic time-series measurements to estimate synchrony, and data analysis included multivariate regression models, windowed cross-correlations, and correlation of local slopes. Findings related to physiological data included significant synchrony for respiration, HR, and HRV yet no significant synchrony of ECGs present. Additionally, the study indicated associations between physiological synchrony and self-report measures such as that of therapeutic alliance (Tschacher & Meier, 2020).

Tschacher and Meier (2020) concluded that physiological synchrony between therapist and client was evident in this study, as indicated through assessments of physiological measures and self-report indices, and that statistical methodologies are feasible in assessing physiological synchrony during psychotherapy sessions. While recognizing the limitations of this study with small sample size along with the complexities involved with studying synchrony, Tschacher and Ramseyer (2017) claimed that it will be important to continue with efforts to further investigate and validate statistical measures in the field of physiological synchrony in psychotherapy. The

authors corroborated the necessity of additional research that will further substantiate generalization of these results.

Declaring that psychophysiological synchrony within therapeutic dyads has been understudied, especially with emotion-focused techniques, Bar-Kalifa et al. (2019) embarked on an investigation of physiological synchrony between clients and therapist during segments of therapy sessions using different techniques, namely imagery (IM) therapy and cognitive-behavioral (CB) therapy. The goal of this study was to evaluate correlations of physiological synchrony with self-reported experience of therapeutic alliance. Further, Bar-Kalifa et al. explored the role of IM therapy, as compared with CB therapy practices, in predicting therapeutic alliance. Bar-Kalifa et al. (2019) conducted a study with 31 dyads over 6 sessions to explore physiological synchrony within the therapeutic dyad and associations with perceptions of therapeutic alliance. Clients were recruited at universities in Germany and Israel and met the criteria for test anxiety, lack of suicidality, and no other therapeutic interventions at the time. The study included therapy sessions with 31 clients and 10 different therapists, each with 1-10 clients. The investigators hoped to test the hypothesis that EDA synchrony within the therapeutic alliance would be associated with the therapeutic alliance.

Physiological measures of electrodermal activity (EDA), an index of sympathetic nervous system activity and potential indicator of emotional arousal, for both therapists and clients were continuously collected during five therapy sessions and further evaluated to assess client-therapist synchrony during IM and CB portions of the sessions (Bar-Kalifa et al., 2019). Further, clients and therapists completed self-report measures of the Session Alliance Inventory (SAI). Dyad and session levels of synchrony were examined. Pre and posttreatment questionnaires were completed by clients before and after sessions, and continuous EDA measurements were

extracted for therapists and clients during each session. EDA measures were collected and recorded through electrodes placed on participants' hands during each session. Using time-series analysis and a multiple baseline design for this open-trial study, separate computations for client-therapist EDA synchrony were conducted respectively for the IM and the CB portions of the therapy sessions. Cross-correlations and statistical analysis followed.

Bar-Kalifa et al. (2019) found that client-therapy synchrony was "greater than chance" (p. 513) in both IM and CB portions of the therapy sessions. The unique contributions of this study include both the multisession design of the study along with comparison of physiological synchrony within two differing therapeutic approaches. This study indicated synchronization of physiology between clients and therapists during therapy and demonstrated that the effects of experiential work during therapy may enhance qualities of the therapeutic alliance such as the therapeutic bond. Findings from this study portend future research to address specific elements of therapy such as imagery work or other methods that potentially facilitate physiological synchrony in therapy.

Bar-Kalifa et al.'s (2019) research study offered preliminary information related to the critical topic of synchrony in psychotherapy. However, limitations of this study include client report only, with therapist self-report measures lacking. Given the relational elements of the dyad as a whole along with the important contributions and interactional participation of each member of the dyad, the lack of therapist report seems an important factor to consider in the broad scope of examining synchrony in relationship. Hence, this study offered therapist-client physiological data in addition to self-report data from both clients and therapists.

According to Kleinbub et al. (2020), counseling and psychotherapy research has recently opened up to the significance of physiological synchronization as a topic of study that exhibits

coregulation of physiology between clients and therapists. Existing literature indicates studies that have found associations between PS and therapists' empathy, client outcomes, attachment, and therapeutic alliance. Through review of the literature and an exemplary single case study, Kleinbub et al. (2020) strongly advocated that counseling and psychotherapy research with focus on physiological synchronization will benefit clinical and research practices through deepening and developing a broader understanding of how physiological elements play a part in human relationship.

Further, Kleinbub et al. (2020) provided guidelines for research related to physiological synchronization in clinical relationships. In addition to offering research design and considerations related to physiological measures, Kleinbub et al. presented a clinical case study that implemented data collection and analysis and demonstrated both longitudinal evaluations with median synchronization levels for each session as well as continuous moment-to-moment indicators of skin conductance, a physiological measure chosen for its simplicity of analysis. Data from the case study also included transcript analysis and assessment tools of the Patient Attachment Coding System (PACS) and the Therapist Attunement Scales (TAS). Is this case study, qualitative analysis combined with PS measures indicated that moments of higher synchronization were often preceded by moments of lower synchronization. This assessment aligns with studies related to rupture and repair and highlight the ever-present fluctuations in synchronization based on various factors. Further, the coregulatory rhythms of synchronization were demonstrated through this case study example (Kleinbub et al., 2020).

Relating the significance of co-regulation in relationship, and specifically within the therapeutic rhythms of relating, Kleinbub et al. (2020) define physiological synchronization as "the study of simultaneous changes in patients' and therapists' physiological activity" (p. 420).

The authors aimed to promote the significance of interpersonal physiology in clinical and research practices. Hence, Kleinbub et al. (2020) presented research design including data collection and analysis for a single case study. Additionally, the authors offer guidance for selection of research design and physiological measures along with statistical approaches to analyze synchronization.

Conclusion

Psychotherapists with associated occupational health risks could benefit from research that explores the impact of self-care practices that potentially strengthen self-regulatory capacity, interoception, therapeutic presence, interpersonal relationship, and synchronization. Examination of self-care and self-regulatory tools that are easily accessible in the moment, when with a client or in the midst of a challenge for example, could greatly benefit therapists' capacity for increased resilience, coherence, and regulatory skills. This study intended to fill some of the research gap and explore the impact of easily accessible and readily available practices on the nervous system and regulatory capacity of therapists. Physiological measurements of HRV, RSA, and PS was gathered along with personal accounts of self-reported experiential data. To date, as reported by Kleinbub (2017), Kleinbub et al. (2020), and Palumbo et al. (2017), there are only fragmented, inconsistent, and limited studies on physiological synchronization in therapeutic dyads, and literature reviews indicate a dearth of empirical studies related to these specific measures in clinical therapeutic dyads.

In summary, self-regulation and IA can be significant health resources accessible to individuals living in today's chaotic world, especially for psychotherapists whose professional and personal lives are inevitably affected by relational occupational hazards such as burnout, compassion fatigue, and secondary traumatic stress (Bober & Regehr, 2005; Evans &

Villavisanis, 1997; Figley, 2002; Killian, 2008; Shapiro et al., 2007). Moreover, the health and presence of psychotherapists impact clients and the relational field. Coherence-building practices, interventions that encourage internal reflection and increased awareness from the inside out, can potentially serve psychotherapists in minimizing occupational risks through developing and enhancing capacity for self-regulation and IA. This enrichment of self-regulation and IA could potentially serve to improve relational capacity, TP, and synchronization within interpersonal relating.

With present-day society welcoming diverse mind-body practices and the union of Eastern and Western philosophies, there is ample opportunity for further research and discovery of interconnections between HRVC, IA, and its health implications within a myriad of scientific fields (Gard et al., 2014; Sullivan et al., 2018). Emergence and practice of effective, efficient coherence-building skills and integrated mind-body practices encourage intrapersonal and interpersonal rhythmic flow and provide new neural pathways for mind-body integration as well as interpersonal connectivity that can serve as harmonization tools for individuals and society.

This study sought to blend scientific, contemplative, and wisdom traditions as a vehicle to understanding the impacts of coherence-building techniques such as HLI and Shift & Lift on therapists' ability to self-regulate and reflect upon internal states through IA. Given that practicing HLI and Shift & Lift simultaneously encourages interconnectivity within one's being and between individuals, this study aimed to assess these personal coherence-building practices with implications on IA and self-regulation through psychometric measures of coherence and synchronization along with subjective assessments and interviews related to therapists' and clients' perceptions of TP.

Investigation of HLI and Shift & Lift as therapeutic tools evaluated through psychometric measures related to cardiac and respiratory systems could offer health benefits for participants, future practitioners, clients, and relational pairs in general. Research on HLI, Shift & Lift, coherence-building techniques, and other integrative mind-body practices that focus on autonomic regulation within individuals and in relationship will illuminate a more holistic view of health and wellness. Research design and methods of investigation related to coherence-building practices as therapeutic tools in relationship will be explained and explored in the following chapter.

Chapter 3: Method

This chapter focuses on the chosen method of multiple case study, research design, data collection and analysis for this research study. Included in this focus are the rationale for the study, hypotheses, participant selection, data collection instrumentation and measures, ethical considerations, and the role of the researcher. The purpose of this multiple case study was to explore the potential transformative impacts of coherence-building practices on various measures of therapists' and clients' lived intrapersonal and interpersonal experiences. This exploratory study used quantitative measures, self-report questionnaires, and interviews with therapist and client participants who met regularly for therapy sessions.

Measures for this study included physiological and self-report assessments of continuous neurophysiological events throughout the natural rhythms of a therapy session along with self-report evaluations before, during, and after therapeutic interactions. Whereas physiological measures recorded HRV coherence during sessions and contributed to subsequent analysis of PS, self-reports of IA and TP were completed before, during, and after the study period. Questionnaires addressing IA were completed before, midway, and after the study period, and TP surveys were completed after each therapy session. The self-report questionnaire, MAIA-2, was used to measure IA before the beginning the study, midway through the study after control data were gathered and before the intervention was introduced, and after completion of the intervention period of the study. In addition, therapists and clients completed self-report indexes of therapeutic presence by completing the TPI-T and TPI-C respectively after each therapy session. For the purposes of this study, the terms therapist and client will be used to refer to participants in the study who conducted and engaged in the intervention.

Semi-structured interviews were completed with therapists after the study period to assess therapists' (and clients', where possible) subjective understanding of presence with self and with clients. Therapists were invited to engage in reflective journaling and art-making processes to assist with deepening into the reflective process. This invitation for reflective journaling was proposed at the initial meeting with therapists, encouraged as a self-care practice throughout the study, and re-visited during the active follow-up engagement during the post-study semi-structured interview. Part of the post-intervention interview included time for therapist and researcher to engage in reflective creative expression activities such as art-making and journaling together, using these reflections as a starting point for discussion about any transformative personal and professional experiences throughout the study. Physiological measures of HRVC and physiological synchronization (PS) were correlated and evaluated along with the aforementioned self-report measures.

Rationale for Multiple Case Study

Within the fields of social science, single and multiple case study designs have recently gained recognition and are more commonly used. Case study research, becoming more accepted and recognized for its contributions, includes depth of analysis within each case, which may consist of an individual, pair, or a group (Gerring, 2004). Through an article that addresses misunderstandings of case study research, Flyvbjerg (2006) advocated for the "execution of more good case studies" (p. 1) that will support and validate case study research as a scientific discipline in the social sciences. Flyvbjerg (2006) continued:

> the case study is a necessary and sufficient method for certain important research tasks in the social sciences, and it is a method that holds up well when compared to other methods in the gamut of social science research methodology. (p. 26)

A multiple case study involves more than a single case to be studied, which expands the research to include multiple units of study. Both multiple case studies and case studies offer rich detail reflecting actual lived experiences (Flyvbjerg, 2006). In this research protocol, the units of study were therapeutic dyads. Within therapeutic dyads comprising a therapist and a client, in-depth analysis of multiple variables was included within each relational dyad. The multiple case study format has been useful as it offers depth and breadth of data assessment and analysis, depth with multiple factors in each dyad and breadth in assessing multiple cases to offer more information than a single case study. Flyvbjerg (2006) argued that case study research offers opportunity to explore the unfolding lived experience of individual cases while also celebrating the subjective nature and humanity within research itself.

Hence, the multiple case study research format has been appropriate and aligned in this study, especially given the nature of subjectivity within therapeutic dyads. A multiple case study design offered the depth of multiple quantitative and qualitative variables within each dyad, including objective and subjective measures. Moving beyond the single case study, the multiple case study offered data from multiple dyads that potentially contributes to the fields of clinical practice and research within the field of psychotherapy and beyond. Furthermore, this multiple case study offered thorough analysis serving as preliminary research for a larger study that could include generalizability and impact the field on a greater scale. The multiple case study design can be understood as an in-depth analysis that offers insights and opens pathways to further research studies.

Theoretical and Philosophical Background of Multiple Case Study

Historically, researchers have approached case study methodology from various philosophical orientations and perspectives (H. Harrison et al., 2017; Yazan, 2015). While

H. Harrison et al. (2017) explored the diverse philosophies used in the case study format, including postpositivist and constructivist perspectives, Yazan (2015) explored epistemological underpinnings that included constructivism, positivism, and existentialism. Gerring (2004) proposed that the case study can include exploratory and confirmatory strategies. Further, the case study can be considered from the middle ground between nomothetic and idiographic ontological perspectives, falling between the boundaries and potentially incorporating both empirical and phenomenological approaches (Gerring, 2004).

While positivist and postpositivist philosophies hold objective and realistic inquiry paradigms, constructivist approaches incorporate multiple voices and include perspectives considered hermeneutic, dialectic, transformative, and subjective (Guba & Lincoln, 1994). Further, Guba and Lincoln argued that constructivism approaches potentially support transformation, dynamics of social change, and principles of empowerment. Guba and Lincoln (1994) advocated for the feasibility of both quantitative and qualitative within any research.

This research study, with its multiple case study design and multiplicity of focus on quantitative and qualitative data, combined philosophies of postpositivism and constructivism. The multiple case study incorporates multiple sources of data (Stake, 2006) within each case, which offers diversity within data streams and multiple perspectives. Further, Stake (2006) advocated that similarities between cases must be present in multiple case study design in which each unique case will have its own organization and plan as does the multiple case study design as a whole. H. Harrison et al. (2017) proposed components that both inform research processes and demarcate case study from other forms of research. These components include the *case*, or the object of study; a system bound by type of activity, time, and space; context of study in its natural environment; profound, intensive analysis; case selection aligned with aim of study;

depth and breadth of sources as indicated by multiple sources of data; and "descriptive, exploratory, explanatory, illustrative, evaluative case study design" (H. Harrison et al., 2017, p. 14).

Some theorists have critiqued the case study method as lacking validity and reliability (Flyvbjerg, 2006). However, multiple case studies offer data analysis and insights that could provide information and guidance related to future research directions for additional study with larger populations. Sources of data for multiple case study might include questionnaires, interviews, diaries, reflective self-report, and direct observations through recordings (Stake, 2006). Stake (2006) advocated for researchers to "seek the *ordinary* happenings for each case" (p. 29). In alignment with Stake's advocacy, data collection methods within this multiple case study included naturalistic data gathered throughout therapy sessions along with an integrated balance of quantitative and qualitative data collection within each therapeutic dyad. Morse et al. (2002) argued that central to high quality qualitative research lies reliability and validity. Further, Golfashani (2003) argued that triangulation of data can increase reliability and validity. Both the reliability and validity of qualitative measures used in this study and triangulation of data will be addressed later in this chapter.

The hypothesis driving this research was that there are positive correlations among a therapist's self-regulation, self-awareness, therapeutic presence, and intrapersonal as well as interpersonal synchronization. This research study investigated the impact of coherence-building practices within eight therapeutic dyads in the United States, mostly near and around Santa Fe, New Mexico. A multiple case study design was chosen, wherein mixed methods were utilized to gather multiple sources of data (Baxter & Jack, 2008; Creswell, 2007; Mertens, 2015). These multiple data sources included quantitative and qualitative data gathered with several individuals

over specified periods of time (Creswell, 2007; Mertens, 2015). This study demonstrated strengths of a multiple case study format to include objective and subjective data from multiple individuals and multiple relational dyads, or cases.

Given the benefits of multiple case study, participants offering diverse perspectives that add value to the research process (Creswell, 2007) were invited to engage in this research study. This multiple case study explored differences within and between cases with a goal of replication among cases (Baxter & Jack, 2008). The chosen approach offered opportunity for breadth and depth of study, enriching data that incorporates lived experiential information of several participants (Braud & Anderson, 1998; Creswell, 2007).

Research Design

This research study aimed to investigate the following hypotheses:

- Physiological Synchronization (PS) and Heart Rate Variability Coherence (HRVC) increases over time with practices of HLI and Shift & Lift.
- PS and HRVC increase during HLI and Shift & lift practices.
- Heart Lock-In practice increases HRV, *heart rhythm coherence*, and states of *psychophysiological coherence*.
- Heart Lock-In practice influences RSA and vagal tone, affecting the parasympathetic nervous system, relaxation response, and synchronization.
- Heart Lock-In practice informs and enhances IA and subjective observation and assessment of one's internal state.
- Heart Lock-In practice enhances therapeutic presence.
- Shift & Lift serves as a practice during therapy sessions for repair or recentering.
- Shift & lift practice indicates shifts in coherence and physiological synchronization.

- Shift & Lift enhances coherence levels: HRVC and PS.
- Shift & Lift during session increases relational resonance and perceptions of therapeutic presence, as indicated by the TPI.
- Shift & Lift along with HLI increases self-awareness and self-regulation as indicated by IA, HRVC, TPI, and PS.

For this study, a "case" has been identified as a therapeutic dyad. Further, a therapeutic dyad is defined as a client and a therapist in therapeutic relationship who engaged as participants in the study. This researcher gathered baseline data from therapists before beginning the study period of therapy sessions. This initial gathering of baseline data included demographic data and a pre-screening interview questionnaire from clients and therapists as well as gathering HRVC assessment data with each therapist individually. This researcher also trained therapists in the interventions that were included during the "intervention phase" of the study as well as the technology used to collect data. Therapists, in turn, trained clients in these interventions and technologies used to gather data during therapy sessions.

After the initial baseline individual data were gathered from therapists, these therapists invited and engaged with client participants in this research study. To follow, dyad participants engaged in therapy sessions for approximately 50 minutes to an hour per session for a number of control sessions and a number of intervention sessions. This researcher and therapist research participants gathered data with their respective clients during therapy sessions. Each dyad served as its own control, and the "control phase" encompassed therapy sessions during the pre-intervention phase wherein dyads engage in "therapy as usual" without introducing new interventions to the therapeutic process. The subsequent "intervention phase" included therapy sessions during which the HLI and Shift & Lift interventions were engaged. Moreover, the

control sessions included both members of each dyad collecting HRV data without any coherence-building intervention and involved completion of the TPI (TPI-T for therapists and TPI-C for clients) after each session. After completion of control phase sessions, ranging from two to six sessions depending on the dyad, therapists trained clients in the coherence-building techniques. Subsequent therapy sessions incorporated coherence-building techniques of HLI and Shift & Lift.

Quantitative data were acquired during weekly therapy sessions, survey data collected after each session as well as throughout the study period, and qualitative data gathered at the beginning and end of the research study period from individual participants. The rationale for collecting pre and post data from all participants, along with baseline assessment data from therapists, informed the inquiry into how the coherence-building practices are related to neurobiophysiological measures. Subjective assessment of IA was gathered from the MAIA-2 self-report questionnaire at three points in time: before the first therapy session of the study, after the control phase and before beginning the intervention phase of the study, and after the end of the study period. Quantitative data included HRVC data and PS. Survey data comprised of data from MAIA-2, TPI-T, and TPI-C questionnaires, and qualitative data incorporated thematic analysis and summaries of pre and post interviews.

Interviews included informal meetings with therapists as well as interview questionnaires completed by clients and therapists. Semi-structured interviews were conducted with each therapist participant in a private confidential space after the end of the study period, to connect and gather post-study HRV data assessment (that mirrored the assessment done prior to the study). This timeline allowed the therapist to integrate and continue to practice coherence-building techniques, if they chose, maintain journal entries, and create art reflecting on their

personal and professional experiences during the study period. During the post-interview, participants were invited to reflect upon personal and professional shifts and report any changes in self-awareness, self-regulation, and therapeutic presence that they had noticed over time.

Participants

Study participants were therapists and clients who were willing and able to participate in this research study and who engaged in therapy sessions for the duration of the study period. Multiple dyads were invited to engage in therapy sessions for a total of 6 to 13 sessions that included implementation of coherence-building practice at the beginning of and during each therapy session for at least three to six sessions of the total study sessions. The control period of the study included gathering control data during therapy sessions without the interventions. Prior to the beginning of the research study period, therapists engaged in coherence-building technique training. Part of the training included gathering HRVC baseline measures for these therapists. Due to several therapists' preferences, some therapists engaged in a review of the coherence-building interventions along with intervention training midway through the study, before introducing clients to the intervention. Therapists trained clients in coherence-building techniques during the first therapy session of the intervention phase of the study period.

Participant Selection Criteria

Inclusion criteria for this study involved conditions for both therapists and clients currently engaged in therapeutic work together. Therapeutic dyads were engaged in a clinical therapy relationship where they introduced new techniques and practices into their current therapy practices. All therapeutic dyads included therapists and clients who were working together in a professional relationship. Additionally, inclusion criteria for therapists included English-speaking psychotherapists who had been practicing for at least three years and their

clients who mutually agreed to engage in therapeutic sessions for the purposes of this study. Client criteria included clients who were experiencing high levels of stress and/or relationship issues. All participants completed an informed consent and disclosed that they were able and willing to engage in coherence-building practices for at least 6 to 13 therapy sessions, with the first phase of the study serving to gather control data and the latter phase of the study to gather data with use of the intervention at the beginnings and ends of each therapy session.

All therapists and clients participating in this study were screened at the beginning of the research period to ensure that participants met proposed criteria. While this researcher screened therapists through questionnaires and informal interviews, these therapists subsequently chose clients who met inclusion criteria and for whom participation in this research was clinically aligned. This researcher collected data from both therapists and clients to ensure that eligibility criteria were met. Excluded from this study were people with a known heart arrythmia and anyone who was taking medications, such as beta blockers, that affect the autonomic nervous system (ANS) or psychoactive medications. Clients experiencing conditions that impact their capacity for mindfulness were also excluded.

Additionally, exclusion criteria included any current mental health challenges or diagnoses that could render the client unable to report mindfully about current internal state as well as clients who hold current or past diagnoses of any personality disorder, psychosis, and schizophrenia. Past or present hospitalizations and mental health diagnoses were not included in exclusion criteria. The comprehensive screening process for this study led to exclusions of several therapist and client participants who did not meet eligibility criteria despite their interest in the study. While several potential participants were excluded due to ineligibility, mostly due to medications, some potential participants did not follow through after initial meeting whereas

others informed this researcher that they could not commit to the time commitment required for the study.

All participants, therapists and clients alike, were able to physically engage in coherence-building practices and connect physiological measure instrumentation on their own. Moreover, all participants were reportedly willing to participate in physiological assessment of HRVC data gathering, complete the MAIA-2 questionnaire for subjective assessment of interoception, complete therapeutic presence forms to assess quality of presence of therapist, and participate in a closing interview post-study after the therapy practice period. Furthermore, inclusion criteria consisted of psychotherapists who were licensed as mental-health providers, have practice psychotherapy that is person-centered, and were open to heart-centered practices. Therapists included in the study had been trained in and were practicing humanistic, transformational, and/or transpersonal psychology and had been in practice for at least 3 years.

Exclusion criteria for psychotherapists included therapists who practice only cognitive behavioral therapy and/or therapists who are opposed to heart-centered practices within the therapeutic dyads. Further, clients with diagnoses of psychosis, schizophrenia, or personality disorders were not eligible to be included in this study. Clients' presenting problems were limited to relationship issues, stress, anxiety, depression, grief, loss, attachment, or adjustment issues or disorders. Exclusion criteria also encompassed non-clinical therapists such as massage therapists and other healers; participants who were unable to provide consent for required research activities, who were unwilling to engage in study, those who failed to complete the entirety of the therapy sessions for the research study, and those with any physical limitations that prevented active engagement in coherent-building practices.

Participant Recruitment

Therapists were recruited through networking with online advertisements, word of mouth, and recruitment through social media networks. The study utilized purposive sampling, a common qualitative sampling technique that involves intentional sample selection that strengthens and explicates the inquiry being investigated (Creswell, 2007; Patton, 2015). Therapist participants recruited client participants with whom they were engaged in therapy. Supporting client privacy with respect to the therapeutic relationship, this process of client selection and engagement was encouraged to align with clinical integrity and client treatment goals. All participants were invited to engage in the study, signed an informed consent, and were notified about their rights to decline the invitation for participation and/or to voluntarily terminate their participation at any point during the research period. See Appendix A for therapist-informed consent and Appendix B for client-informed consent.

Demographic information, screening interview data, post-study survey questionnaires, and informed consent were collected from five therapists and eight clients who agreed to engage and completed the study. Several participants completed initial paperwork and dropped out of the study or were excluded from the study due to lack of availability, disinterest, and with several exclusions due to disqualification based on medication status prior to the beginning of the study. Informal screening interviews and trainings were performed with therapists before and after the study period, along with technology and intervention review/training after control phase and before the intervention phase of data collection.

Methodology

Engaging a transpersonal approach that values interconnectedness to self, others, and to the research as a research tool (Braud & Anderson, 1998), this researcher engaged in integral and

intuitive inquiry practices throughout the research process. Braud and Anderson (1998) suggested that integral inquiry offers expansiveness through complementary approaches of quantitative and qualitative research, multiple ways of knowing, and a "heartfelt and significant" (p. 58) focused area of inquiry, while intuitive inquiry invites intentionality, expression and transpersonal connections through "personal and social transformation" (p. 87) that values interactions between and among researchers, participants, and the intended readers of the research. This researcher engaged in weekly reflections and journaling to support the process of transpersonal research and presence. After challenges with participant recruitment, this researcher also engaged as a participant in the study with clients who agreed to the process and engaged in data collection. Furthermore, the multiple case study format invited depth of inquiry (Baxter & Jack, 2008; Gerring, 2004; Mertens, 2015) based on multiple therapists' lived experiences that offered insight related to the subjective experience of these therapists (Flyvbjerg, 2006).

Demographic and Service Information

This researcher provided an introductory form that both therapists (see Appendix C) and clients (see Appendix D) completed to indicate basic demographic information. This form included details such as age, gender, and ethnicity; requests for information regarding physical-health conditions such as heart or respiratory problems, current self-care practices; and an invitation to share any physical health challenges, spiritual practice, and personal or professional goals. This form was delivered along with the informed consent and served as a screening instrument to guarantee that participants qualify for the study. Further, screening questionnaires were developed and were administered through a pre-study screening interview with therapists

(see Appendix E) and with clients (see Appendix F). Post-study interviews were conducted to gather qualitative data from therapists (see Appendix G) and clients (see Appendix H).

To ensure and respect client privacy and confidentiality, I communicated directly with all therapists, and these therapists communicated directly with clients. For initial data forms, therapists returned completed forms from therapist and client to me via email. Post-session questionnaires (TPI), interoception questionnaires (MAIA-2), post-study questionnaires and surveys were created in Google Forms, completed, and submitted by therapists and clients online through Google Forms, accessed and scored by this researcher. Additionally, for data gathered by the HeartMath Institute, a confidentiality agreement was completed (see Appendix I).

Quantitative Measures and Data Collection

Mertens (2015) suggested multiple factors for selection of instrumentation during data collection. This researcher investigated instrumentation online and in personal consultation with professionals in the field to discern the most appropriate instrumentation to use for this specific study and with this population. With the chosen multiple case study design, multiple data collection options are possible and potentially enhance data collection (Mertens, 2015). Specific to this study were instruments that measure HRV, HRVC, and interbeat intervals (IBI), which were used for PS data analysis. Dunster (2012) proposed that collecting HRV data over time offers a practical self-reflective indicator to describe overall effectiveness of the intervention. Similarly, RSA data can be gathered using noninvasive measures to indicate regulatory capacity within an individual (Grossman et al., 1990), which has been included in the HRVC measure. Physiological synchronization data were analyzed based on the time stamps and HRVC data gathered during therapy sessions.

Quantitative physiological markers of HRV, cardiac coherence, and synchronization were collected to evaluate physiological regulatory capacity. While data were collected continuously during therapy sessions, analysis also focused on specific intervention intervals of HLI and Shift & Lift. See Appendix J for steps to the HLI protocol and Appendix K for the specific protocol for Shift and Lift. The MAIA-2, a questionnaire with 37 questions and eight subcategories, was administered to assess interoception. The therapeutic presence inventory for therapists (TPI-T) and clients (TPI-C) was administered to evaluate therapists' and clients' subjective report of therapeutic presence, and post-intervention semi-structured interviews were conducted with a focus on therapists' lived experience of regulation, IA, and presence. Physiological synchronization data and HRV data were gathered with the Inner Balance™ Trainer and uploaded through the Global Coherence Initiative (GCI) App to the server at HMI.

More specifically, quantitative measures of HRVC and IBI were uploaded to the GCI application server. All data was collected from the *Inner Balance*™ technologies and were uploaded with time stamps to a confidential and private server through the GCI application. Each participant was trained in the technology and connected the Inner-Balance sensor to an iPhone or Adroid device which linked to the GCI application. This Inner Balance, a biofeedback device that uses a non-invasive sensor placed on the earlobe of participants, delivers information on participants' heart rhythms and levels of coherence over time (McCraty & Zayas, 2014).

The technological instrumentation of the Inner Balance Trainer uses photo-plethysmographic (PPG) and has been indicated as less intrusive than other measures (Tschacher & Meier, 2020) and with easy data acquisition of heart rhythms (Kleinbub et al., 2020). Additionally, Russoniello et al. (2013) conducted a study that indicated PPG to be a reliable and valid measure of HRV and an indicator of autonomic activity.

Photoplethysmography sensors can be used to detect the interbeat interval, from which HRV measures are assessed (Shaffer et al., 2014). Furthermore, Laborde et al. (2017) described that photoplethysmography reads the heart's interbeat interval (IBI) by using light to illuminate an area of access to capillaries, in this case the earlobe, and the sensor then reads the reflected light, identifying blood volume and subsequently the heartbeat. McCraty et al. (2004) described photoplethysmography and its measures of blood volume and heart rate as indicators of autonomic activity. In discussing HRV technologies, Low and Wong (2018) advocated that these technologies translate heart data and emotions in present-moment to assess how emotions and thoughts affect a person's heart rhythms. Photoplethysmography is both valid and reliable in its use with HRV data.

The Inner Balance application on therapists' and clients' personal handheld devices was used to measure HRVC and further analyze PS; MAIA-2 was used to measure IA; and the TPI was used to assess therapeutic presence according to the client (TPI-C) and the therapist (TPI-T). Quantitative measures were collected and analyzed through data gathered from the Inner Balance sensor and uploaded to the HeartMath Global Coherence Initiative (GCI) application, which links to the cloud-based server that will read and translate data from each participant's smart device. The data were then extracted by a member of HMI at the HMI laboratory. Once extracted, the data were organized into dyads and analyzed by this researcher, with guidance from data analysis experts and the HMI team.

This researcher trained therapists to use instrumentation for measurements. Given the ongoing pandemic, these initial meetings were conducted in a private meeting on Zoom and data gathered on the GCI application. During the initial meeting time, this researcher gathered pre-study preliminary assessment of therapists' HRVC (see Appendix L for assessment protocol) and

provided training to therapists in how to use technological devices for data collection as well as how to engage in coherence-building techniques of HLI and Shift and Lift. This technology training protocol included detailed steps to download the GCI App, create an account, and join the private group, called Heart-Based Therapy Research, in the GCI App (see Appendix M for Technology Training Protocol). Therapists then trained clients on the use of this technology during the first or second therapy session of the intervention stage of the study. Given the research conditions of living in a pandemic, many of the therapy dyads were meeting online. By the time some therapy dyads engaged, some sessions occurred in person. Some dyads met in person for the entirety of the therapy sessions while others continued to meet virtually in a confidential online format for therapy sessions. Five dyads met virtually online for the entirety of the study, and three dyads met in person for the entirety of the study. Reportedly, one dyad that met regularly in person engaged in the virtual format once or twice.

During therapy sessions, therapists and clients connected the Inner Balance sensors at the beginning of session and linked to the private group in the GCI applications on their respective phones. While this researcher noted the specific date and times stamps of therapy sessions during which data are collected (according to data that therapists submitted to Google Forms), collaboration with the HeartMath Institute was essential in gathering physiological data that measures HRVC and PS. A Confidentiality Agreement between Sofia University and HMI, signed by both parties, ensured confidential and secure data acquisition through the GCI Application and the Amazon cloud server that were used to gather all data (see Appendix I for Confidentiality Agreement). The data remained private and anonymous as it was collected, with individual codes provided for each dyad and each participant. This researcher collaborated with HeartMath Institute and statisticians who also maintained confidentiality and privacy through

ethical and professional practice. A research partnership agreement can be found in Appendix I. A team at the HeartMath Insitute's Research Center assisted with data collection and analysis. This team included the Director of Research, the laboratory manager, and a principal data scientist—all who contributed to consultation, recommendations, and implementation of data collection and subsequent analysis. The laboratory manager assisted with translating raw data to data formats by which statistical analysis was conducted. Therapists were expected to conform to their agency and/or practice policies and protocols. Additionally, therapists reviewed these policies and practices along with research confidentiality forms with their clients.

The variables examined throughout the study included therapeutic presence, interoceptive awareness, and cardiac coherence as a quantitative physiological measure of self-regulation. Instruments utilized in gathering data included Inner Balance technology for HRVC measures as well as standardized questionnaires: TPI for therapeutic presence and MAIA-2 for interoceptive awareness. While variables of interoceptive awareness, therapeutic presence, and cardiac coherence were measured and analyzed for individual participants, physiological synchronization was assessed within the dyadic relationship using time series analysis of HRV cardiac coherence data over time.

HRV

This study utilized data collection instrumentation, similar to the *emWave* device, called the *Inner-Balance* application to measure HRV. Whited et al. (2014) studied the use of the *emWave* biofeedback device and physiological alterations to HRV before, during, and after stress events. In the aforementioned study, *emWave* treatment did not result in changes in HRV, and additional testing of physiological changes during HRV biofeedback training was suggested. In a systemic literature review, Oakes (2022) proposed that there is limited research on the efficacy

of the emWave technology and recommended that future research could include testing for this technology to be established as an evidence-based approach to therapy practice. In this study, HRV was measured using the *Inner Balance* device and GCI application on a smart phone, which was uploaded and collected to the server used at the HeartMath Institute. Further, by including these measures of regulatory rhythms within each participant, this study provided opportunity to explore and better understand physiological changes through HRVC and PS measurements within ongoing live therapy sessions. The *Inner-Balance* devices were purchased and acquired from the Heartmath Institute, distributed to therapists and clients, and used for all HRVC quantitative data measurements that subsequently led to PS data analysis based on HRVC measurements during therapy sessions. As Dunster (2012) demonstrated, the *emWave* developed by HeartMath LLC can provide effective measures of HRV that can be used as a biofeedback tool. *Inner Balance* is an application software for Android and iOS devices that offers data equivalent to the data acquired from the *emWave* ("emWave and Inner Balance," n.d.).

Shaffer et al. (2014) reviewed various theories, regulatory models, and physiological components of HRV as a measurement tool, indicating various forms of analysis for HRV. HRV is an indicator for regulatory systems. Thus, HRV serves as an ideal quantitative measure within this study since HRV can function as an indicator of regulatory capacity and can be measured with instrumentation that is accessible, non-invasive, and administered with ease. Baseline HRV measures were acquired from each therapist through a three-step assessment protocol at the beginning of the research study. This three-step assessment protocol included a resting phase (T1 Pre and Post), stress preparation assessment (T2 Pre and Post), and engagement with a coherence-building technique (T3 Pre and Post). During pre and post assessments, therapists were invited to do nothing during the resting phase and to engage in HLI in the coherence-

building phase. Before the study, the stress preparation phase included therapists preparing for a stressful situation in a way that they normally prepare for a stressful client or challenge. After the study, during the post-study interview, therapists were invited to use the coherence techniques they were taught during this study to prepare for a stressful client or situation. (See Appendix L for more details on this Three-Step Assessment Protocol Pre / Post).

Subsequently, HRV data were gathered from each participant continuously during each therapy session, thus providing naturalistic data that included meditative, silent, and internal attention as well as interactive moments wherein client and therapist were engaged with each other. While each member and all dyads used the Inner Balance sensor to gather data, there were missing data in the final HRV results for various reasons. Some participants reported technical difficulties and issues, and others reported that they forgot the Inner Balance sensor for the session. Hence, not all dyads were able to successfully submit data for some sessions while some dyads gathered inconsistent data. Further, for those who gathered data, not all data was successfully uploaded through the GCI Application to the HMI server. Based on the available data, four of the eight dyads submitted sufficient HRV data that was collected and analyzed.

RSA

Grossman et al. (1990) reviewed empirical literature and concluded that "respiratory sinus arrhythmia is a sensitive noninvasive index of parasympathetic cardiac control" (p. 1). Egizio et al. (2011) stated RSA to be "an index of cardiac vagal activity" (p. 1) and defined RSA as "the rhythmic fluctuation in heart rate at the respiratory frequency" (p. 1). In this study, RSA was used as an indicator of respiratory rhythms within participants and was addressed and assessed through the HRV measurements gathered during therapy sessions. RSA is embedded in HRV measures and incorporated as part of the overall coherence measurement.

Interoceptive Awareness

In this study, MAIA-2 questionnaires were completed by each participant prior to the study period, at midpoint, and after completion of research study therapy sessions. IA was assessed using the MAIA-2, the second version of a state-trait self-report questionnaire with 37 questions that measures interoception based on eight scales within the instrument (Mehling et al., 2018). The eight scales of the MAIA-2 consist of the following: Noticing, Not-Distracting, Not-Worrying, Attention Regulation, Emotional Awareness, Self-Regulation, Body Listening, and Trust. The original MAIA was refined and revised after a study that assessed internal consistency and improved reliability coefficients.

In 2012, Mehling et al. developed the final scales of the MAIA for research and collaboration related to interoceptive awareness. The first version, MAIA, incorporated a systematic review of the literature and evaluation of instruments along with development of a conceptual framework and criteria for the development of psychometric factors for the scale. Studies that incorporated field data and testing within various somatic therapies resulted in a 32-item instrument that addresses eight concepts related to interoception. Mehling et al. (2012) described the process of the development of the original multidimensional assessment of interoceptive awareness (MAIA) and concluded the preliminary validation of the MAIA through comparing the MAIA with multiple other measures. Further, Mehling et al. reported good internal-consistency reliability, which varied according to each of the eight scales within the measure. Reliability coefficients for each scale were assessed and reviewed with revisions from two scales in the original MAIA. Hence, Mehling et al. (2012) concluded increased consistency reliability with revisions to the MAIA instrument, indicating improved reliability for the MAIA-2 with proposed revisions related to two subscales.

A follow-up study (Mehling et al., 2018) and revision of the instrument included assessing, revising, and improving the MAIA-2 instrument due to low internal consistency reliability of two of the eight scales in the original MAIA. Accordingly, evidence of "improved internal consistency reliability" (Mehling et al., 2018, p. 1), the MAIA-2 (available to the public) was developed as a 37-item scale with eight categories of interoceptive awareness to further support research and clinical endeavors. Validation of this measure included "nine foreign-language validation studies, which generally confirm the original factor structure but also reveal important shortcomings" (Mehling et al., 2018, pp. 1-2). According to Mehling et al., reliable objective measures have yet to be identified and validated. Hence, the MAIA-2, a self-report measure can offer information related to interoceptive awareness, "defined as the conscious level of interoception with its multiple dimensions potentially accessible to self-report" (Mehling et al., 2018, p. 2). The MAIA-2 is available as a public domain document to support clinical and research endeavors related to studies of mind-body approaches and interoceptive awareness (Mehling et al., 2018).

Therapeutic Presence

While the original Therapeutic Presence Inventory-Therapist (TPI) scale consists of 32 items that include 16 positive statements and 16 negative statements presented on a 7-point Likert scale, the revised Therapeutic Presence Inventory-Therapist (TPI-T) consists of 21 items and the Therapeutic Presence Inventory-Client (TPI-C) scale includes three items (Geller et al., 2010). Geller et al. (2010) conducted a study with the aim to assess reliability and validity of the three-item TPI-C and the revised 21-item TPI-T. Conclusions from this study, which included comparisons to other measures completed by therapists, indicated good construct validity and reliability for both versions of the TPI. Further, Geller reported that reliability coefficients for the

TPI were calculated based on Cronbach's alpha. On the TPI-T, the Cronbach alpha was .94 across the entire sample and .82 on the TPI-C across the entire samples. Further, the TPI-C demonstrated good predictive validity whereas TPI-T revealed low predictive validity, and the authors noted that client's perceptions of therapist's presence influenced clients' report of positive relational resonance through therapeutic alliance. Therapeutic Presence Inventory (TPI) questionnaires can be found in Appendices F and G, for therapist (TPI-T) and client (TPI-C) respectively.

Physiological Synchronization Through Therapeutic Intervention: Heart Lock-In as a Coherence-Building Technique

The intervention used by therapists and clients at the beginning and end of each therapy session during the intervention phase of the study period was the coherence-building technique called Heart Lock-In. See Appendix J for detailed description of the intervention script. Research on the Heart Lock-In technique has indicated that the exact protocol included here, and in the trainings, indicates effective outcomes (S. Carr, personal communication, August 30, 2020). Hence, it is imperative that the exact script be used when utilizing this intervention. The Heart Lock-In technique includes heart-focused breathing, a quick coherence technique which calls upon regenerative emotion, and active engagement through radiating this regenerative felt sense of emotion to self and others.

Therapeutic dyads engaged in therapy sessions that lasted approximately 50 minutes, the standard time for a therapy session, regularly for multiple sessions. Psychophysiological measurements were gathered during each session. During the first phase of the study, the control phase, data were gathered during therapy sessions "as usual," without coherence-building interventions during therapy sessions. Midway through the study, therapists trained clients in the

coherence-building technique of HLI. For the subsequent therapy sessions, which will be called the intervention phase, therapists and clients began and ended each therapy sessions with a prescribed 3- to 5-minute HLI, with the amount of time depending on clinical integrity and how it fit into dyadic therapeutic process. The data revealed that the amount of time any given dyad engaged in HLI ranged from 2 to 9 minutes.

Technological training was offered to therapists by this researcher and to clients by their therapist. See Appendix M: Instructions for Technical Training that included instructions for research participants to download application to smartphone, create a user account, and join private group within the GCI Application. Advocacy to "add heart" to the globe has been part of the HMI mission and the GCI movement.

Intervention: Shift and Lift as a Coherence-Building Technique

The intervention that was used by therapists at times of dysregulation or distress during each therapy session was the coherence-building technique called Shift and Lift (see Appendix K). The purpose of this technique was to address rupture and repair while also tracking how a therapist identified potentially dysregulated moments and used the Shift and Lift protocol to self-regulate. Therapists were trained in the Shift and Lift protocol and encouraged to use this intervention when therapist was internally focused while also engaging with the client. This is a technique that the therapist used when feelings of dysregulation or incoherence arose, which intended to offer a recentering of sorts. This Shift and lift process is similar to the Heart Lock-In, yet it can be used with eyes open and while engaging in conversation or therapy. Therapists were encouraged to use the Shift and Lift tool throughout sessions, when noticing a decrease in therapeutic presence, and noted the timestamp as an indicator to record exact time of engagement in this intervention.

Quantitative Research: HRVC Data Collection and PS Data Analysis

Quantitative data (HRVC which incorporates RSA) was collected from therapists at the beginning of the research study for baseline information and post-study for comparison. Further, throughout each therapy session, ongoing and continuous HRVC and IBI data were gathered from therapist and client participants. During the intervention phase of the study, this HRVC and IBI data included the durations of active engagement with the Heart Lock-In and Shift and Lift interventions during therapy sessions. These data were gathered and analyzed to assess individual coherence, or HRVC, levels for entire sessions during pre and post intervention phases as well as coherence and physiological synchronization data during intervention and non-intervention time intervals. Mean coherence values were calculated for entire sessions pre and post intervention for all therapists and clients as well as during intervention and non-intervention time intervals during individual sessions of the intervention phase of the study. Further, physiological synchronization was explored by using HRVC and IBI data for each client and therapist. While HRVC data were gathered in 5-second time periods, IBI data represented the intervals between each successive heartbeat. Charting HRVC and IBI data for therapeutic dyads allowed for analysis of correlations between therapist and client during pre and post intervention sessions as well as during the intervention and non-intervention time intervals.

Qualitative Research / Interviews: Data Collection

After completion of the data collection period during which research participants engaged in therapy practice that included the Heart Lock-In and Shift and Lift interventions, the therapist research participants were encouraged to reflect upon their experiences. Suggested reflective practices included journaling, engaging in ongoing coherence-building practices, and/or art-making. During follow-up interviews, therapists shared about their active engagement in the

study as well as subsequent reflections upon interventions, presence, and self-awareness. This post-study interview included HRV assessment followed by an invitation to engage in journaling, visual creative expression, and/or narrative responses to participation in coherence-building techniques and subsequent personal transformation, or lack thereof, experienced by the therapist as it relates to therapeutic presence and the therapeutic process. Interviews were conducted with each individual therapist who participated in the study 2 weeks to 3 months, depending on therapist availability, after the study period ended.

Furthermore, this researcher participated in data collection with a spirit of curiosity, creativity, and wonder as suggested through integral inquiry while also practicing reflective listening, as indicated with intuitive inquiry, during interviews and throughout the research study (Braud & Anderson, 1998). Semi-structured interviews were conducted with each participant in a private setting, assessing the subjective experience of each participant's sense of therapeutic presence and related changes that have occurred through this process.

Reflective Practices for the Investigator

To address the possibility of instrumentation and researcher bias, I benefited from acquiring the perspective of the research participant by engaging in ongoing reflections through creative expression and journaling. I participated in journal writing, creative expression, and personal reflective inquiry (Anderson & Braud, 2011) to support the transpersonal and integral processes of research inquiry. My personal reflections and intentional practices supported the integrity of the research process. Given that I also engaged in training as well as ongoing, consistent application of these coherence-building practices in therapeutic relationships, engagement with coherence-building tools and personal reflections were part of my process

within therapy sessions and within personal reflective practices prior to, throughout, and after the research study period.

Further, given the nature of the study and some challenges with participant recruitment and retention for this study, I engaged in the study as a therapist participant with two clients who were open, willing, and eligible for the study. Direct engagement as a participant in the study offered the opportunity to deepen understanding of participant engagement and a lived experience of the research design. While I understood the risks of dual relationships, the experience further expanded and solidified my dedication to the research process as well as enhanced clinical integrity. As researcher and therapist, I embraced the dual relationship and shared transparently with clients as well as with other therapists participating in the study. Being a participant in this study provided a unique way of joining with other therapist participants and connecting intentionally with integrity and commitment to the heartspace created in and through heart-based therapy and heart-based research. Furthermore, the engagement of multiple therapists added to the validity of the study and findings

Statistical Analysis / Quantitative Data Analysis

All results were measured and statistically correlated with pre- and post-practice data for each participant and correlations within each dyad for each therapy session. Quantitative data included HRVC and IBI data for physiological synchronization as well as survey data from the MAIA-2 and TPI questionnaires to assess for emotional synchronization.

Survey Measures and Quantitative Data Analysis

Pre and post survey data from the MAIA-2 included eight subscales. *Z* scores for each subscale and for the measure as a whole were assessed to test for significance in difference between pre and post study scores. TPI questionnaire data were gathered, with the results

indicating little to no variance for most participants. This measure was not assessed quantitatively, however assessment of therapist and client TPI scores will be discussed and correlated in the individual dyad assessment section, entitled *Case Study Data by Dyad*, in Chapter 4.

HRVC and IBI Measures for Quantitative Data Analysis

Control and intervention data were gathered, and mean coherence (MC) values calculated for each client and each therapist during all sessions. Correlations were assessed for MC values during control period and intervention period for individual participants. Further, calculations of *Z* scores were conducted with all therapists and all clients to assess for significance in pre and post MC values. Similarly, MC values were calculated for reported intervention time intervals of HLI and Shift & Lift and compared to non-intervention time intervals before and after the intervention during each individual session in the intervention phase of the study. Significance was assessed using *Z* scores for each intervention interval and for each non-intervention interval phase for all therapists and for all clients. Physiological synchronization was assessed within each therapy dyad for which data were available. Assessment of physiological synchronization included plotting data mapped onto line charts for visual assessment of correlation between client and therapist values of HRVC over time during sessions pre and post as well as during intervention periods.

Intersections of Data Streams

Further, the MAIA-2 data were compiled to assess for significance between pre and post scores for all therapists and all clients using Excel. As stated above, given little to no variance in the TPI-T and TPI-C, TPI was not used as a measure for correlation with other data streams. HRVC values were used to correlate control and intervention periods as well as intervention time

intervals with non-intervention time intervals during therapy sessions. Finally, PS was analyzed based on HRVC and IBI data during intervention time intervals.

Statistical Analysis for Quantitative Data Analysis

Statistical software was used to clean up raw data gathered from the HeartMath Institute server. Excel (Version 16.66.1) was used for data organization and analysis, including calculated mean coherence values and using line plots to correlate coherence over time and compare client and therapist coherence values for PS analysis. Additionally, SPSS Version 28.0.0.0 (190) was used for correlations of HRVC data and PS analysis. SPSS and Excel were used to assess demographic data, create tables and charts for all data, and assess correlations of MAIA-2 subscales as well as correlations of HRVC values during control and intervention phases of the study as well as during individual sessions within the intervention phase of the study.

Further, HRVC values for therapist baseline assessment were compared using data for each of three assessment phases (T1, T2, and T3) pre and post study. Excel was also used for creating line graphs to assess for PS within dyads during intervention periods and throughout all sessions. HRVC and IBI data were received in a csv file and converted to Excel for analysis. PS was assessed using HRVC comparisons as well as IBI comparisons. HRVC and IBI data used quantitative measures and statistical software to support data analysis. Inter and intra subjective measures were compared, assessed for transformations within and between participants in the study. Similarities and differences were assessed, and correlations analyzed.

Data were collected and analyzed using statistical analysis software in alignment with valid HRVC measures and PS analysis. Correlation data were assessed using the appropriate statistical software. Statistical analysis used for HRVC and PS included analysis based on time data such as HRVC and IBI data. Further study based on frequency data analysis, power spectral

analysis, and regression analysis could be completed during future analysis for additional robust assessment of data. Correlations included assessment of PS between client and therapist over time as well as HRVC within individuals over time during therapy sessions.

Data Collection and Analysis Support

The laboratory manager at HMI extracted the data from the server, organized it into files, presented sessions plots and reported which dyadic data were accessible and sufficient for use, and sent the raw data files of HRVC and IBI data to this researcher. With ongoing consultation, HMI's principal data scientist advised me on steps to follow for quantitative data analysis along with various pathways by which to address the complex and new field of assessing physiological synchronization data. According to the principal data scientist, PS analysis continues to be a growth area and exploration of study in the field. Hence, the experimental nature of PS analysis is open and ongoing at this point.

The HeartMath Team, consisting of the Director of Research, laboratory manager, and principal data scientist maintained ongoing consultation and communication regarding data collection and analysis. This HMI Team consulted and advised this researcher with assessing time domain and frequency domain data as well as data analysis using appropriate statistical analysis. Correlations have been designed to address the above-mentioned hypotheses. The relationship of data to these hypotheses will be further evaluated and discussed in the conclusions of this dissertation study.

Qualitative Data Analysis

Similarly, data from the MAIA-2 and therapeutic presence inventory (TPI) questionnaires were reviewed, assessed, and analyzed by this researcher. These self-report questionnaires were scored by hand. After data were gathered through interviews with participants, a thematic

analysis was conducted based on data acquisition prior to and after the study period. For clients, survey questionnaires were completed and reviewed. Therapists completed survey questionnaires and engaged in an online semi-structured interview with this researcher. Thematic analysis was conducted to identify themes of transformation related to therapists' subjective lived experiences and sense of self-regulation, IA, and therapeutic presence.

Additionally, analysis of therapy session data was reviewed by this researcher to note the time sequence of therapist engagement in the Shift and Lift technique and any correlations to coherence and/or synchronization. Engagement by therapist and client in the HLI technique at the beginnings and ends of each session were also reviewed and correlated with coherence and synchronization data. Shift and Lift periods, albeit few, were also assessed for coherence and synchronization when both client and therapist data were available.

Control Group

Each therapeutic dyad, or case in this multiple case study, served as its own control group, participating in therapy sessions without the HLI and Shift and Lift interventions. Therefore, the control phase of the study included gathering of data from therapists and clients within the therapeutic dyad during therapy sessions without incorporation of the specific interventions of HLI and Shift and Lift. After the control phase of the study, therapists trained clients on the HLI technique and included use of interventions in cooperation with training during this therapy session. During the latter phase, the intervention phase, therapy sessions incorporated the use of the HLI interventions for therapists and clients as well as therapists' implementation of the Shift and Lift technique when indicated. In summary, the control group consisted of the initial therapy sessions prior to introduction of therapeutic interventions for each

therapeutic dyad, with each case functioning as a control that was then be compared to therapy sessions in which the intervention was used.

Case Study Analysis

Data from this study was triangulated and measured against the above-mentioned hypotheses and the research question. The specific impact of the coherence-building techniques on HRVC, PS, IA, and TP was assessed and correlated within each therapeutic dyadic case. Data from each dyad, which was treated as an individual case of two people, were collected and analyzed. These data included measures of HRVC, IBI, and data from questionnaires that revealed IA and TP self-report measures. The diversity of data within each case, or each therapeutic dyad, provided in-depth analysis regarding how the coherence-building techniques impacted self-regulatory capacity through heart coherence and relational resonance through physiological synchronization. Further, interoceptive awareness and therapeutic presence, as reported by clients and therapists within each dyad, offered information about the influence of coherence-building on interoceptive awareness and therapeutic presence and vice versa. Additional assessment of data also included correlating multiple data streams across and within the data streams of HRVC, IBI, IA and TP and the potential impacts on PS.

In describing multiple case study analysis, Stake (2006) described the definition of triangulation of data and discussed triangulation within cases and triangulation between cases. Triangulation of data, as described by Stake (2006), provides "confirmations and assurances that key meanings are not being overlooked" (p. 33). Finlay (2011) described triangulation as "using different methods, data sources or researchers in the investigation to help increase efficacy or validity of findings" (p. 195). In case study research, multiple sources and types of data can be triangulated and allow for phenomena to be understood from multiple perspectives (Baxter &

Jack, 2008; Gerring, 2004). Triangulation of data can increase validity and reliability of findings in research and can be used to combine quantitative and qualitative data streams (Golafshani, 2003), as in this multiple case study with diverse sources of data.

H. Harrison et al. (2017) argued that thematic analysis and triangulation can enhance the quality of a research study. H. Harrison et al. went on to note the dominant culture with quantitative studies in the 1960s and 1970s that led to divisions within the research community between positivist empirical approaches and qualitative methods associated with constructivist philosophies. Further, case study design provided opportunities for expansion into multiple research methods to incorporate quantitative and qualitative gathering and analysis of data (H. Harrison et al., 2017). While quantitative research relied on hard data in the form of empirical studies with a focus on the data being statistically relevant, objective, and measurable, qualitative research focuses on the context of real-life phenomena, lived experiences, and naturalistic, observational, subjective data (Golafshani, 2003). Gerring (2004) asserted that quantitative researchers prioritize concerns about cause-effect relationships and probabilities, whereas case studies allow a researcher to assess interrelationships between variables along with complexities and patterns within the data. According to Gerring, the case study can be quantitative and/or qualitative, providing rich possibilities within the in-depth analysis of data from diverse and multiple sources.

Validity and reliability are important elements of quantitative and qualitative studies (Golafshani, 2003) and can be used as supportive and essential constructs in advocating for rigor in qualitative research (Morse et al., 2002). By definition, validity can be understood as the accuracy by which results are measured and assessed. Reliability can be defined as the degree to which results are consistent over time (Golafshani, 2003). Morse et al. (2002) further advocated

that reliability and validity inform qualitative research as well as quantitative research to advocate both rigor and trust in the research paradigm.

These concepts can be applied to multiple case study design in that this research methodology incorporates diverse data sources along with depth and breadth of data analysis, combining data streams in a unique way that accounts for personal experiences along with empirical data. The quantitative physiological measures combined with data gathered from self-reported questionnaires as well as interviews and thematic analysis offered depth of understanding to each dyad. Hence, complexities within triangulation of data from multiple sources offered this researcher distinctive insights with multiple perceptions which clarified meaning of the multiplicity and multidimensionality data for each therapeutic dyad.

Ethics

Part of responsible research includes ongoing and clear communication with research participants. To clearly embark on an ethically sound research journey, Mertens (2015) proposed guiding principles that include inquiry, honesty, competence, respect, and responsibility. This research project followed ethical guidelines and incorporated these guiding principles that hold participants, researchers and coresearchers, and the data itself in high regard that maintains integrity for clean and clear participant selection and engagement, data collection and analyses, and report writing. Participant selection and engagement incorporated commitment to do no harm and followed ethical guidelines proposed by the American Psychological Association (2017).

Informed consent was provided for participants to review, complete, and return. All participants completed and signed informed consent to engage in this study. Participants were informed and supported in their choice to volunteer as a participant in this study and to stop

participating at any time if they chose (see Appendix A). Further, this researcher acknowledged ethical responsibility to track and identify any assumptions and biases that may interfere with or inform the process, maintaining a sense of neutrality along with passion throughout the research process (Anderson & Braud, 2011). This research incorporated intentionality with application of a mixed-methods approach to studying the impacts of the use of Heart Lock-In and Shift & Lift, coherence-building techniques used during therapy sessions, on HRV, RSA, PS, IA, and TP. While HRV, RSA, and PS data were collected through physiological measures, IA and TP measures were indicated through self-assessment recorded as subjective reports. I maintained commitment to the evolutionary process and emergence of new information while also following the multiple case study design and honoring research participants, study design, application, data collection and analysis, and contributions that have resulted from this study.

Conclusion

In summary, this research design and study explored the transformation of regulatory capacity and IA of psychotherapists and clients as well as perceptions of therapeutic presence. The research design included implementation of Heart Lock-In and Shift and Lift coherence-building practices during therapy sessions and investigated how these techniques related to therapist's self-care, regulatory capacity, cardiac coherence, and therapeutic presence, as well as physiological synchronization between therapist and client during therapy sessions. Through a multiple case study design and a mixed-methods approach, this research project used quantitative and qualitative measures of assessment in combination. Hence, an integrated assessment of quantitative and qualitative data provided humanistic and objective data to represent the various elements of this study more fully while also honoring the lived experiences of each participant as valuable in itself.

Participants were selected through purposive sampling, data acquired through instrumentation that measures HRV, RSA, and PS, as well as questionnaires that measure IA and TP. Additionally, a closing interview was conducted with each therapist who participated in the study. This research study offered therapists an alternative intervention that can enhance self-awareness and self-regulatory capacity, along with a window into understanding physiological synchronization within therapeutic relationship, subsequently offering therapists personal and professional insights along with enhanced therapeutic presence. Further, this study has contributed missing scholarly advocacy to enhance clinical and research integrity related to coherence, inner awareness, therapeutic presence, and physiological synchronization within therapeutic dyads. Global advances in the field of psychotherapy and in various healing traditions can best serve individuals and societies through integrated mind-body practices along with supportive research that promotes advocacy for the incorporation of holistic, psychophysiological studies within clinical and research domains.

Chapter 4: Results

This chapter provides descriptions of data findings related to this exploratory multiple case study that investigated potential transformation of participants' lived intrapersonal and interpersonal experiences and the impact of coherence-building practices on various measures. The quantitative measures within therapy dyads included HRVC and IBI, with survey measures of IA and TP as well as qualitative data from interviews and questionnaires and demographic information. To follow are descriptions of demographic data as well as results from data collection and analysis within each dyad and subjective reports of client and therapist experiences. Furthermore, this chapter includes presentation of qualitative and quantitative data analysis of HRVC, PS, therapist and client perceptions of therapeutic presence, and interoceptive awareness for individuals and dyads. Themes emerging from pre and post questionnaires and interviews also reflected subjective experiences of therapists and clients in relation to the study and use of coherence-building techniques.

This chapter also provides data in response to said hypotheses; individual, dyadic, and group demographic descriptions; and presentation of findings based on multiple data streams for each dyadic pair. Additionally, descriptions of data analysis for therapists as a group and clients as a group will be presented. Study participants included five therapists and eight clients, to total eight dyadic cases. Demographic data and correlations of survey questionnaire data were analyzed using Excel and SPSS. To follow are overviews of group demographics, data analyses based on therapists as a group and clients as a group, and case study data analyses by dyad.

Quantitative data analysis included examination of HRVC and IBI data gathered by HMI. Missing data with the HRVC and IBI data collection led to inconsistencies in data acquisition, with some entire sessions missing for several participants. Hence, the quantitative data analyses,

to follow, include HRVC, IBI, and PS data analyses for only four of the eight dyads given inconsistencies and lack of good quality data with the other four dyads. Data analyses for all eight dyads were completed for survey measures and qualitative data as well as an overview of the HRVC data that was available, when possible.

Multiple data streams for participants and for dyads were collected and analyzed according to the following data forms. These data streams included combinations of qualitative and quantitative information. All participants completed demographic information, screening interviews, and informed consent as well as survey questionnaires before, during, and after the study period. Further, all participants gathered HRVC data during each session. Additionally, quantitative data were gathered by therapists during an assessment process before and after the study period.

Participants

Participants who engaged in this study included five therapists and eight clients, which encompassed eight total therapeutic dyads since three of the five therapists engaged with two clients in this study. Demographic information can be found below.

Demographic Information

A total of eight English-speaking individuals participated in this study. These eight clients interacted with five therapists. See Tables 1-3 in the next section on *Demographic Data Analysis* for information about demographic data of participants.

Client Demographic Data

Client ages ranged from 18 to 62 years old, and clients have been engaged in therapy from 8 months to 14 years. Most clients resided in the state of New Mexico and one client in the Eastern United States. Seven clients were female, and one client was male.

Therapist Demographic Data

Therapist ages ranged from 42 to 61 years old. Therapists have been practicing therapy for 14 to 24 years. All therapists identified as female. Most therapists resided in the state of New Mexico with one therapist in the Eastern United States. All therapists reported graduate-level education, clinical licenses including clinical counselors, art therapists, and a social worker, and clinical specialties such as trauma, addictions, grief, loss, attachment, chronic illness, and integrative body-centered holistic therapies. Two of five therapists reported no clinical specialty.

Demographic Data Analysis

The tables on the following pages show the data distribution (see Tables 1-7). Data analysis includes clients (N = 8) and therapists (N = 5). Some therapists and some clients reported more than one marital status (Table 5) and/or religious/spiritual practice (Table 7), which led to a total percentage larger than 100%.

Table 1

Therapist Participants Demographics, Summary

Age			Gender			Years receiving therapy		
	Freq.	%		Freq.	%		Freq.	%
18 - 24	0	0%	Male	0	0%	< 1	0	0%
25 - 40	0	0%	Female	5	100%	1 to < 5	0	0%
41 - 55	4	80%	Transgender	0	0%	5 to < 10	0	0%
> 55	1	20%				10 or more	5	100%

Table 2

Client Participants Demographics, Summary

Age			Gender			Years receiving therapy		
	Freq.	%		Freq.	%		Freq.	%
18 - 24	3	37.5%	Male	1	12.5%	< 1	1	12.5%
25 - 40	4	50%	Female	7	87.5%	1 to < 5	5	62.5%
41 - 55	0	0%	Transgender	0	0%	5 to < 10	1	12.5%
> 55	1	12.5%				10 or more	1	12.5%

Note. Some clients reported more than one status, which led to a percentage > 100%.

Table 3

Age of Participants

Years	18-24	25-40	41-55	> 65
Therapist	0%	0%	80%	20%
Client	25%	62.5%	0%	12.5%

Table 4

Gender of Participants

Gender	Male	Female	Transgender	Other
Therapist	0%	100%	0%	0%
Client	12.5%	87.5%	0%	0%

Table 5

Marital Status of Participants

Status	Single	Domestic partner	Married	Divorced	Widowed	Separated
Therapist	40%	20%	20%	20%	0%	0%
Client	25%	0%	75%	0%	12.5%	0%

Note. Some clients reported more than one status, which led to a percentage > 100%.

Table 6

Years Practicing or Receiving Therapy

Years	< 1 year	1-5 years	>5-10 years	> 10 years
Client—receiving therapy	12.5%	62.5%	12.5%	12.5%
Therapist—practicing therapy	0%	0%	0%	100%

Table 7

Religion and Spiritual Practice

Religion / practice	Therapist	Client
Non-religious secular	20%	50%
Atheist	0%	12.5%
Christianity Protestant	20%	12.5%
Judaism	20%	0%
Buddhism	20%	0%
Unitarian-Universalism	0%	12.5%
Wicca Pagan Druid	20%	0%
Native American	20%	0%
Spiritualism	0%	25%
Other / non-specified	60%	0%

Note. Some therapists and some clients reported more than one religious/spiritual practice, which led to a percentage > than 100%.

Summary of Therapist Quantitative Analysis: HRVC Pre and Post Study Assessment Data

Baseline assessment results revealed HRVC mean coherence values pre and post study for therapists who engaged in this study. Three assessment intervals included the resting phase (T1), stress preparation phase (T2), and the coherence-building phase (T3). Overall, in looking at pre and post mean coherence values for therapists, there was a mean HRVC increase for three and decrease for two of the therapists. An increase of HRVC values indicated movement in the direction of self-regulation and confirmed the hypothesis that coherence, and self-regulation, would increase with coherence-based interventions, whereas a decrease in HRVC indicated movement away from the expected, or hypothesized, direction.

When assessing the data strand of therapists as a group and clients as a group, based on *Z* score analysis for significance, therapist coherence as a whole seemed to indicate a significant increase from T2 Pre to T2 Post. This implies that the coherence-building technique taught in this study gave therapists skills to increase regulatory capacity based on this increase in coherence. See Table 8 for mean coherence scores for each therapist, and Table 9 for results based on mean coherence values for all therapists combined.

Table 8

Therapists Baseline Assessment Pre and Post HRVC Averages

Therapist pseudonym		CareBear	Jill	Illona	Vera	Lucy
Pre study						
Baseline	T1 Pre	3.022	1.578	1.614	1.668	2.881
Stress Prep	T2 Pre	2.058	1.055	1.344	1.122	1.811
Coherence	T3 Pre	3.383	1.768	0.716	3.404	4.214
Post study						
Baseline	T1 Post	1.001	4.288	0.984	2.965	2.028
Stress prep	T2 Post	1.668	5.547	1.135	2.574	4.233
Coherence (HLI)	T3 Post	3.092	4.088	0.996	2.82	5.565
HLI reflect	Post	1.352	4.83	1.402	1.389	2.668

Table 9 indicates mean coherence values for the group of therapists as a whole, computed by calculating all therapists' mean HRVC during each phase of the assessment before the study and after the study.

Table 9

Therapists Baseline Assessment Pre and Post HRVC Averages, All Therapists

Mean coherence summarized for skills acquisition training, mean HRVC summary for all therapists		
Time sequence	Pre	Post
T1	2.147	2.115
T2	1.478	2.893
T3	2.654	3.216

Summary of Dyadic Quantitative Analysis: HRVC, IBI, and PS, Pre and Post Intervention

Based on HRVC and PS data analysis for dyads, HRVC mean values seemed to increase from the control phase to the intervention phase of the study for most therapists and clients individually and for therapists as a group as well as clients as a group. See Tables 20 and 21 for data summaries. Correlating HRVC over time, PS seemed present within dyads at certain times during the therapy sessions. Focused PS during intervention periods of HLI and Shift and Lift indicated correlation of coherence over time between therapists and clients. See charts in Appendices N through Q for more information on PS based on correlations of coherence over time and correlations of IBI data.

Summary of HRVC, Therapists: Pre and Post Intervention

Data analysis of pre and post intervention mean coherence scores indicated an increase in mean coherence values for all therapists from the control phase to the intervention phase of the

study. This finding supports the hypothesis that there was an increase in coherence during sessions that included the interventions of HLI and Shift and Lift.

Summary of HRVC, Clients: Pre and Post Intervention

Data analysis of pre and post intervention mean coherence scores indicated an increase in mean coherence values for two clients from the control phase to the intervention phase of the study and a decrease in mean coherence values for two clients. This finding partially supports the hypothesis that there was an increase in coherence during sessions that included the interventions of HLI and Shift and Lift.

Summary of HRVC Dyads: PS Pre and Post Intervention

Given the significant number of data points (thousands per session) for HRVC and IBI data (for the four dyads whose data was successfully gathered), line plots were created to show PS between clients and therapists during each session as a visual indicator of PS. Line plots for PS assessing coherence over time, using HRVC values and IBI data points, were analyzed and assessed. Line plots indicating PS for pre and post intervention phases can be found within each dyadic case study section below. Additionally, line plot charts based on IBI data points can be found within each dyadic data analysis summary below.

Summary of Dyadic Quantitative Analysis: HRVC, IBI, and PS, Within Intervention Phase

Correlations of HRVC, or coherence over time, for clients and therapists within interventions phases were assessed and reviewed based on scatter plots with straight lines. See discussion of plots within each dyadic summary below and Appendices N through R for images of line plots. Overall, increased PS between therapists and clients was noted during intervention phases of the study. These interventions included HLI at the beginnings of each therapy session during the intervention phase of the study and HLI at the ends of each therapy session during the

intervention phase of this study. Additionally, Shift and Lift was conducted internally by the therapists at times when the therapist felt a coherence-building technique was indicated. It seems important to note, even though there were only a few Shift and Lift data points, that *both therapists' and clients'* coherence values increased and were synchronized during these interventions. This finding validates the hypothesis that coherence increases with interventions of HLI and Shift and Lift.

Summary of HRVC, Therapists: HLI and S&L

In general, therapists' mean coherence values seemed to be higher during intervention times than the time preceding and following. See Tables 22-24 in the upcoming sections that indicate mean coherence (MC) values before, during, and after intervention time intervals. Tables include mean coherence values for each participant during intervention and non-intervention time intervals as well as an overview of therapists and clients overall increase in coherence during intervention time intervals compared to non-intervention time intervals.

Summary of HRVC, Client: HLI and S&L

Overall, client's mean coherence values seemed to be higher during intervention times than the time preceding and following. Given the minimal data and analysis, this is not a perfect match although may be suggestive of effect. See Tables 22-24 that indicate mean coherence values before, during, and after intervention time intervals. Tables include mean coherence values for each participant during intervention and non-intervention time intervals as well as an overview of therapists and clients overall increase in coherence during intervention time intervals compared to non-intervention time intervals.

Summary of HRVC Dyads: PS during HLI and S&L, In/Out of Phase PS?

PS analysis using coherence values and IBI data indicated therapist and client synchrony during intervention periods. See below, with each of four dyads, in the section *Case Study Data by Dyad*, for more information and see Appendices N through R to view dyadic PS visual line plots based on HRVC and IBI data.

Summary of Survey Data Analysis, Therapists: MAIA-2

Data analysis for all therapists based on the average totals of the MAIA-2 questionnaire results indicated a *Z* score of 5.055, which suggests an increase in interoception from pre to post study. There are not enough data points to determine statistical significance, although there is a clear increase in scores post-study. Further analysis with more data might be valuable to further assess this relationship.

Summary of Survey Data Analysis, Clients: MAIA-2

Data analysis for all clients based on the average totals of the MAIA-2 questionnaire results indicated a *Z* score of 4.862, which suggests an increase in interoception from pre to post study. Again, that there are not enough data points to determine statistical significance. However, a clear increase in scores post-study was observed. Further analysis with more data might be valuable to further assess this relationship.

Summary of Qualitative Data: Pre and Post Interviews and Questionnaires / Qualitative Thematic Analysis: Participant Themes From Pre and Post Interviews

Qualitative data were gathered from therapists and clients through survey questionnaires submitted through a link in Google Forms before and after participation in the research study. In addition to the survey questionnaires, therapists engaged in a semi-structured interview to reflect upon and share their lived experiences and perceptions of their participation in the study and how

the study has influenced their therapeutic presence, interoceptive awareness, and therapeutic practices. Themes were identified based on client and therapist responses before and after the study, summarized next.

Therapist Data Themes From Pre / Post Interviews: Pre-Study Interview Summaries

Therapists reported themes such as interest in spiritual practices and mysticism, connection to self, intuition, and love. All therapists reported some sort of heart-informed practice that influences and informs their therapy practice as well as their personal health. All therapists reported strong support network as well as regular engagement in self-care and self-regulatory practices such as meditation, body-centered activities, and creative processes. Four of the five therapists reported daily self-care practices while one reported practices of self-care during several days per week. All therapists reported an openness to learning new self-care and self-regulatory practices.

With regard to interoceptive awareness and reporting levels of self-awareness, all therapists reported high levels of self-awareness with some explicitly mentioning transformative potential, various factors, and willingness to improve. Therapeutic presence was understood by therapists as a process of being connected to oneself while also in attuned relationship. One participant reported inconsistency with their therapeutic presence when "flooded, anxious and distracted." Another participant described their perspective of therapeutic presence as "intrapersonal, interpersonal, and transpersonal." All therapists noted that they perceived therapeutic presence as essential to healing and transformation, reporting their experiences of this therapeutic presence affecting clients' level of safety and acceptance, increasing ease and depth as well as connection and flow in session and with clients.

Therapist Data Themes From Pre / Post Interview Questionnaires: Post-Study Interview Summaries

Thematic analysis conducted for the therapist post-study interview questionnaire included themes related to lived experiences of therapists during the study as well as personal and professional transformation related to interoceptive awareness, therapeutic presence, and relationships. Most therapists reported increases in embodied presence, connections to heart wisdom, and appreciation for an easy and accessible tool with a tangible metric. One therapist reported that implementation of the intervention "added intimacy and depth of connection" while another reported "deepened trust, spontaneity, and care" and yet another therapist noted a "*we're in this thing together* kind of energy." Additionally, a therapist revealed a felt sense of the Shift and Lift, noting "emotional warmth and a literal physical lift" whereas another mentioned "adding rhythm and awareness to session" as well as effective resilience and regulation in more challenging moments.

Two therapists reported that they wished they would have engaged more with these tools outside of session, one recounting that "it was difficult to fully engage in the practices during sessions." All therapists described intentions of continuing to use these coherence-building techniques in personal and professional settings. All therapists also reported deepened self-awareness, presence, and new ways of accessing and connecting with self, expansion of inner resources and reference points of optimal functioning. While some therapists described increased confidence, safety, grace, ease, and support in therapeutic relationships, others reported more fluidity with transitions including returning "to the moment more quickly and easily than before the study" and deeper presence moment to moment, "increased capacity for presence" and arriving "in a much deeper way into the therapeutic space." Opening up to new possibilities

along with a renewed sense of "hope during these crazy, chaotic times" along with a "tolerance for the unknown" seemed to be themes shared by therapists through the post-study interview questionnaire responses.

Therapist Themes From Semi-Structured Interviews: Pre and Post Study Interview Summaries

Prior to the research study and data collection, each therapist met with this researcher for initial baseline HRV data collection as well as informal semi-structured interviews related to the research study. Three of the five therapists reported no training in HeartMath techniques and little knowledge about the interventions. Two of the five therapists had trained with HeartMath and been practicing interventions personally and professionally. All therapists reported interest in learning more heart-based interventions, increasing access to self-care practices and to therapeutic tools to help build coherence and connection within therapeutic relationships.

Post-study questionnaire responses revealed themes of transformation and palpable changes, or reminders in some cases, for most therapists in terms of access to more self-care and therapeutic tools that allow, support, and encourage deeper presence, awareness, and connection. In relation to therapeutic presence, therapists reported more ease in connection with clients as well as heart-based tools to assist with being more authentically present in relationship while also gaining resilience to return to present-moment connections in session. Regarding IA, therapists' post-study reports revealed transformation in terms of somatic awareness, "being aware of what is happening internally, in ways I had never experienced before," increased access to inner resources and self-awareness.

Moreover, interviews conducted with therapists virtually after the study period included gathering assessment data that were correlated with pre-study assessment data for all therapists.

See section entitled *Case Study Data by Dyad* for more information. During this post-study interview, assessment data were gathered from each therapist. See Appendix L for summary of pre/post assessment guidelines and script. This process included therapist and researcher engagement in HLI followed by reflective listening to heart guidance and inner wisdom. Subsequently, therapist and researcher spent time engaging in journaling and creative expressions as a reflective tool. Most therapists engaged in reflective journaling and shared reflections with me. One therapist reportedly engaged in intuitive journaling, which included writing and creative expression. This researcher engaged in response art and shared the image with each therapist at the end of the interview. The therapist who engaged in intuitive journaling during this process reported inspiration to share the image they had created during the process, which appeared visually similar to the image created by me. Art response images along with narrative descriptors that I created during the post-study interviews can be found with each respective Dyad summary below.

Themes that emerged from these post-study interviews included appreciation for additional therapeutic tools as well as reported transformation for clients throughout the study. All therapists, including this researcher, reported deeper somatic awareness and presence in relationship with intentions to continue coherence-building practices, personally and professionally, as supportive tools and inner resources for self-care as well as increased relational presence and connections with self and clients during therapy.

Client Data Themes From Pre / Post Interviews: Client Pre-Study Interview Summaries

Clients reported interest in spiritual connections through various modalities including yoga, meditation, connecting with nature, life purpose and being of service to others through positive energy. Other clients reported that they were "still figuring out who/what I am." Clients

reported the most important factors in therapy to include connection, trust, kindness, support, and understanding while qualities in a therapist included connection, relatability, nonjudgment, compassion, empathy, acceptance, trustworthy, and accepting. Core values reported by clients included connection, love, integrity, compassion, understanding, adventure, trust, and service. Clients' greatest needs in therapy included being seen and heard, "being truly understood and challenged to grow," and to learn skills to "manage daily stresses of life and relationships."

Therapeutic presence, as defined by clients, included "ability to listen beyond what is being said," openness, reflective capacity, "relational resonance" with a base of trust and respect that allows transformation and growth, and shared space with "an air of unconditional acceptance, authenticity, and empathy." Six of eight clients responded to a question about how their heart informs their life. Three reported heart-awareness as guidance and related to emotions, one reported "I have no idea," another reported reflection upon choices based on feeling and thinking, and another reported "My heart races a lot due to my anxiety, so it tells me when I am uncomfortable." Additionally, all clients reported that the therapeutic relationship is extremely important to them.

All clients reported a strong, broad, or good support network. Five of seven participants reported engagement in regular self-care practices that were body-oriented, related to breath and to nature while one reported self-care and self-regulation in therapy only and another noted that they "somewhat" engage in self-care/self-regulatory practices. Five of seven clients reported daily engagement in self-care practices, another client reported 3-4 times per week, and another reported a couple of times a month.

Client Data Themes From Pre / Post interviews: Client Post-Study Interview Summaries

Four of the eight client participants completed the post-study interview questionnaires. Review of these interview reports revealed themes that emerged from participation in the study. Two of these clients reported shifts in deepening therapeutic relationship as well as transformed awareness of spirituality and access to inner resources such as somatic awareness and emotional regulation. One client reported increased hope in challenging times along with increased clarity and care, whereas another client reported that the research study and coherence-building techniques did not impact him nor the therapeutic process. Two clients also reported that these coherence-building strategies have helped to find calm, centered awareness amidst stress. Three of these four clients reportedly gained skills that have been helpful in navigating challenging times and deepening relational connections and/or self-care resources.

MAIA-2

All therapists and clients completed MAIA-2 questionnaires and TPI surveys throughout this study. Eight clients completed the MAIA-2 questionnaire prior to the study, and six clients completed the MAIA-2 questionnaire post-study. All therapist participants completed the MAIA-2 before and after the study period. All therapists completed the TPI-T and all clients completed the TPI-C after each therapy session during the study period. Data analyses related to the MAIA-2 and TPI correlations are to follow.

MAIA-2 Pre / Post Correlations for Each Participant

The MAIA-2 survey includes eight subscales: Noticing, Not-Distracting, Not-Worrying, Attention Regulation, Emotional Awareness, Self-Regulation, Body Listening, and Trusting. Noticing refers to noticing body indicators. Not-Distracting is related to distraction from body sensations. Not-Worrying refers to not experiencing emotional distress related to discomfort or

pain sensations. The subscale, Attention Regulation, relates to "the ability to sustain and control attention to body sensations" (Mehling et al., 2012, p. 16). Emotional Awareness refers to awareness of connections between emotional states and body sensations. Self-regulation refers to "the ability to regulate distress by attention to body sensations" (Mehling et al., 2012, p. 16). Body listening is an active process that involves listening to the body for increased understanding. Lastly, Trusting refers to trusting one's body as safe. Each subscale offers information related to specific domains of interoceptive awareness.

The MAIA-2 questionnaires were scored by hand for each participants' scores prior to the study (pre-study) and after completion of the study (post-study). Each subscale was scored according to scoring guidelines. Data were input and analyzed with SPSS software. Below are tables with pre and post scores for therapists and clients. See Table 10 for Pre and Post scores for Therapists and Table 11 for pre and post scores for clients. Additionally, Tables 12 and 13 offer information on Total MAIA-2 scores for all therapists and for all clients, respectively. Tables 14-17 represent means and standard deviations for each subscale for therapists and clients, respectively. One client participant did not complete one question on the subscale of Not-Distracting, hence data were recorded for seven rather than the eight client participants. Similarly, two clients did not complete post-study MAIA-2 surveys, hence the table will note that the data were analyzed for six rather than eight client participants.

See Dyad summaries for information regarding each dyad and individuals in the dyads. Overall, in reviewing data for the MAIA-2, most therapist participants' scores either increased or stayed the same for all/most subscales. Client participants' results conveyed increases, decreases, and no change in some subscales.

Table 10

Therapist MAIA-2 Pre and Post Scores for Eight Subscales

	Noticing	Not-distracting	Not-worrying	Attention regulation	Emotional awareness	Self-regulation	Body listening	Trusting
CareBear Pre	4.25	3.17	3.80	4.14	4.40	4.25	4.00	4.33
CareBear Post	4.75	3.67	3.80	4.29	4.40	4.50	4.67	5.00
Jill Pre	2.75	3.83	2.20	4.00	4.00	4.00	4.00	3.33
Jill Post	4.25	3.83	3.20	3.57	4.60	4.25	5.00	4.67
Illona Pre	4.25	3.50	4.00	3.71	4.00	4.50	4.67	4.00
Illona Post	5.00	3.67	4.00	4.57	4.80	4.50	5.00	4.00
Lucy Pre	3.50	2.67	2.80	3.29	4.00	3.75	3.67	4.00
Lucy Post	4.00	3.83	3.80	4.43	4.40	4.50	4.67	4.33
Vera Pre	3.50	3.17	3.00	3.43	4.20	4.25	2.67	3.33
Vera Post	3.75	4.17	3.60	3.57	3.60	4.00	2.67	3.33

Table 11

Client MAIA-2 Pre and Post Scores for Eight Subscales

	Noticing	Not-distracting	Not-worrying	Attention regulation	Emotional awareness	Self-regulation	Body listening	Trusting
Jimmy Pre	4.00	4.67	2.60	3.28	4.00	2.75	2.67	4.00
Jimmy Post	4.00	4.17	2.60	4.00	4.00	4.50	4.00	4.33
Luz Pre	3.75	4.00	4.20	4.28	4.40	4.50	5.00	4.67
Luz Post	4.50	3.67	3.40	3.86	5.00	4.50	4.33	3.67
Betty Pre	3.75	1.83	2.60	3.00	4.20	3.00	2.67	3.33
Betty Post	4.25	3.00	3.00	3.86	4.60	4.25	3.67	4.00
Aelin Pre	4.00	1.17	1.20	2.57	3.80	2.75	3.67	2.33
Aelin Post	–	–	–	–	–	–	–	–
Norah Pre	3.75	3.83	3.60	3.71	4.80	3.75	3.67	4.00
Norah Post	4.50	3.83	3.80	4.00	5.00	4.75	3.67	4.00
HZ Pre	3.50	-	1.40	1.71	4.60	1.75	3.67	3.67
HZ Post	3.75	3.00	1.80	2.14	5.00	2.75	4.33	3.33
Leigh Pre	3.25	1.83	2.80	3.14	4.00	4.75	2.33	4.00
Leigh Post	4.25	4.83	3.60	4.00	4.60	5.00	4.00	5.00
KC Pre	4.00	3.00	3.20	3.00	4.00	4.00	3.00	3.67
KC Post	–	–	–	–	–	–	–	–

Note. Dashes (–) indicate missing/incomplete data.

Table 12

Total MAIA-2 All Therapists

Therapist	MAIA total mean pre / post therapists
CareBear Pre	4.041
CareBear Post	4.385
Jill Pre	3.514
Jill Post	4.171
Illona Pre	4.079
Illona Post	4.443
Lucy Pre	3.460
Lucy Post	4.245
Vera Pre	3.444
Vera Post	3.586

Note. Z Score 5.06.

Table 13

Total MAIA-2 All Clients

Client	MAIA total mean pre / post clients
Jimmy Pre	3.50
Jimmy Post	3.95
Luz Pre	4.35
Luz Post	4.12
Betty Pre	3.05
Betty Post	3.83
Norah Pre	3.89
Norah Post	4.19
HZ Pre	2.90
HZ Post	3.26
Leigh Pre	3.26
Leigh Post	4.41
KC Pre	3.48
KC Post	

Note. Z Score = 4.86.

Using the Frequencies procedure in SPSS, the means and standard deviations were calculated for each subscale of the MAIA-2, as indicated in Tables 14-17.

Table 14

Pre-Study MAIA-2 Mean and Standard Deviations, Therapists, per Subscale

		Noticing	Not-distracting	Not-worrying	Attention regulation	Emotional awareness	Self-regulation	Body listening	Trusting
N	Valid	5	5	5	5	5	5	5	5
	Missing	0	0	0	0	0	0	0	0
Mean		3.65	3.27	3.16	3.71	4.12	4.15	3.80	3.80
Std. Deviation		0.63	0.43	0.74	0.36	0.18	0.29	0.73	0.48

Table 15

Post-Study MAIA-2 Mean and Standard Deviations, Therapists, per Subscale

		Noticing	Not-distracting	Not-worrying	Attention regulation	Emotional awareness	Self-regulation	Body listening	Trusting
N	Valid	5	5	5	5	5	5	5	5
	Missing	0	0	0	0	0	0	0	0
Mean		4.35	3.83	3.68	4.09	4.36	4.35	4.40	4.27
Std. Deviation		0.52	0.20	0.30	0.48	0.46	0.22	0.98	0.64

All mean values increased for the group of five therapists on each subscale of the MAIA-2, as indicated in Tables 14-15.

Table 16

Pre-Study MAIA-2 Mean and Standard Deviations, Clients, per Subscale

		Noticing	Not-distracting	Not-worrying	Attention regulation	Emotional awareness	Self-regulation	Body listening	Trusting
N	Valid	8	7	8	8	8	8	8	8
Mean		3.75	2.90	2.70	3.09	4.23	3.41	3.34	3.75
Std. Deviation		0.27	1.33	1.02	0.76	0.36	1.02	0.85	0.71

Table 17

Post-Study MAIA-2 Mean and Standard Deviations, Clients, per Subscale

		Noticing	Not-distracting	Not-worrying	Attention regulation	Emotional awareness	Self-regulation	Body listening	Trusting
N	Valid	6	6	6	6	6	6	6	6
Mean		4.21	3.75	3.03	3.64	4.70	4.29	4.00	4.06
Std. Deviation		0.29	0.70	0.74	0.74	0.39	0.80	0.30	0.57

All mean values increased for the group of eight clients on each subscale of the MAIA-2 questionnaire, as indicated in Tables 16-17 above. The pre-study MAIA-2 questionnaires were completed by all clients. However, one client did not answer one question on the "Not-Distracting" subscale, so this client's data were not included in results for the "Not Distracting" subscale. Two clients did not complete the post-study MAIA-2 questionnaire, hence $n = 6$ for the post-study questionnaire results. Below, correlation tables are provided for the group of participants. Additional information is included with each dyad summary—MAIA-2 Pre Score, Post Score, and Difference. See Tables 18-24 for individual and group scores for participants on various measures, including TPI and HRVC.

TPI Pre / Post Correlations for Each Participant

Table 18

Therapist TPI-T Pre and Post Intervention Mean Scores

Therapist with client(s)	Pre-intervention	Intervention
CareBear with Jimmy	6.50	6.74
CareBear with KC	6.82	6.75
Illona with Luz	5.71	5.16
Jill with Leigh	5.01	5.11
Lucy with Norah	6.46	6.57
Lucy with HZ	6.02	6.70
Vera with Betty	4.75	5.03
Vera with Aelin	5.15	5.79
Couples CareBear with Jimmy and KC	5.74	6.83

Table 19

Client TPI-C Pre and Post Intervention Mean Scores

	Pre-intervention	Intervention
Aelin	7.00	7.00
Betty	7.00	7.00
Norah	6.92	6.87
HZ	7.00	7.00
Jimmy	7.00	7.00
KC	7.00	7.00
Leigh	7.00	7.00
Luz	6.95	7.00

Table 20

HRV Pre / Post Mean Coherence Scores for Each Participant, per Dyad

Dyad	MC pre intervention	MC post intervention	Difference
CareBear	1.616	1.651	0.035
Jimmy	1.592	2.162	0.570
Lucy	2.423	2.558	0.135
Norah	1.836	1.789	-0.047
Vera B	1.458	1.517	0.059
Betty	2.077	2.378	0.301
Vera A	1.384	1.388	0.004
Aelin	1.438	1.384	-0.054

Table 21

All Sessions Pre / Post Intervention Mean HRVC Values, All Therapists and All Clients

Mean coherence summarized for all sessions pre / post intervention, mean HRVC summary for all therapists and clients as groups		
	Pre	Post
Therapists	1.747	2.007
Clients	1.743	1.889

Table 22

HRV Mean Coherence Scores for Each Participant, Intervention Phases HLI and S&L

	Therapists Mean HRVC during HLIs and SLs				
	MC HLI Begin (HLI B)	MC HLI End HLI E	SL1	SL2	SL3
CareBear Mean HRVC	1.481	1.251	-		
VeraB Mean HRVC	2.092	1.902	1.291		
VeraA Mean HRVC	1.602	1.683	-		
Lucy Mean HRVC	3.230	3.288	4.495	2.778	2.099
Mean HRVC for ALL therapists per activity period	2.101	2.031	2.893	2.778	2.099
	Clients Mean HRVC during HLIs and SLs				
	MC HLI Begin (HLI B)	MC HLI End HLI E	SL1	SL2	SL3
Jimmy Mean HRVC	2.115	2.018	-		
Betty Mean HRVC	3.574	3.251	2.835		
Aelin Mean HRVC	1.470	2.279	-		
Norah Mean HRVC	2.230	2.346	2.489	0.827	
Mean HRVC for ALL clients per activity period	2.347	2.474	2.662	0.827	

Note. Dash (-) indicates missing/incomplete data.

Table 23

HRV Mean Coherence Scores for Each Participant, Non-Intervention Phases HLI and S&L

	Therapists Mean HRVC during HLIs and SLs					
	Pre HLI B	Btw HLIs	HLI B and SL1	SL1 and SL2	SL and HLI E	Post HLI E
CareBear Mean HRVC		1.684				1.424
VeraB Mean HRVC	1.064	1.444	1.478		1.500	1.446
VeraA Mean HRVC	1.482	1.351				1.773
Lucy Mean HRVC	1.726	2.248	2.613	2.090	2.075	2.384
Mean HRVC for ALL therapists per activity period	1.424	1.682	2.046	2.090	1.788	1.757
	Clients Mean HRVC during HLIs and SLs					
	Pre HLI B	Btw HLIs	HLI B and SL1	SL1 and SL2	SL and HLI E	Post HLI E
Jimmy Mean HRVC	0.997	2.173				2.195
Betty Mean HRVC	1.983	2.236	2.205		2.372	1.719
Aelin Mean HRVC	1.806	1.261				1.560
Norah Mean HRVC	1.638	1.727	1.153	1.360		1.845
Mean HRVC for ALL clients per activity period	1.606	1.849	1.679	1.360	2.372	1.830

Table 24

Summary HRV Mean Coherence Scores for Clients and Therapists, Intervention and Non-Intervention Phases

Mean coherence values, all clients and all therapists per activity period intervention and non-intervention		
Activity period	Clients mean HRVC	Therapists mean HRVC
Pre HLIB	2.002	1.736
Post HLIB	1.823	2.059
HLI B	2.419	2.753
Pre HLI E	1.900	1.672
Post HLI E	1.720	2.121
HLI E	2.559	2.730
Pre SL	1.795	2.245
Post SL	1.531	2.021
SL	2.149	3.793

Case Study Data by Dyad

This section includes data analysis of each case study by dyad, with a "case" defined as the dyadic pair of therapist and client. Each dyad data report includes summaries of qualitative data acquired through survey questionnaires and interviews, survey data acquired through the MAIA-2, TPI-T, and TPI-C questionnaires, and HRVC quantitative data gathered from therapists and clients. Quantitative analysis for each participant includes correlations of pre and post intervention HRVC data as well as correlations of HRVC during sessions, specifically during the interventions of HLI and S&L as well as during sessions between the intervention periods of each session. Correlation data will be included within dyadic reports for MAIA-2 and TPI pre and post measures as well.

HRV data only came through for four of the eight dyads, so HRVC and PS analyses were only completed for Dyads 1, 3, 4, and 5. Dyads 2, 6, 7, and 8 completed survey data as well as all other processes in data collection. The HRVC data gathered to the HeartMath/Amazon Cloud was not successfully uploaded for all dyads, hence the data presented represents only data that were successfully gathered with enough data points to be used for analysis. Each dyad is treated as a separate case. The following dyadic summaries will include triangulation of data wherein all strands of data were brought together for each individual, and for each dyad where appropriate. This triangulation of data provided more power while data for each person contextualizes analyses. Subsequently, summaries of the relatedness of the various strands of data will be reviewed and integrated to create a synopsis of reported findings.

Dyad 1: Therapist CareBear and Client Jimmy

Dyad 1 consisted of a 61-year-old female therapist and a 31-year-old male client. CareBear reported ongoing therapy with Jimmy individually and in couples' work. Jimmy

reported the most important factor in therapy as connection and trust in the therapist with his greatest need in therapy being trauma work.

Dyad 1 met in person for a total of 10 sessions, 5 for control phase and 5 for the intervention phase over a course of almost 5 months. Given that two of these sessions, one during the control phase and one during the intervention phase, were couple's sessions, the total number of individual dyadic sessions was eight, with four during control and four during intervention. Further research on the data from these eight sessions led to exclusion of some sessions due to incomplete or partial data for some sessions. Therefore, the various strands of data will reflect different numbers of sessions used for analyses. For the PS analysis, where both therapist and client HRVC data were successfully and consistently collected throughout sessions, two pre-intervention session and one post intervention session were assessed.

Most HRVC data for Dyad 1 was successfully uploaded and extracted. This included three control sessions and two intervention sessions. Upon analysis, however, partial sessions were excluded. In the end, HRVC data for CareBear included four sessions pre-intervention and two sessions post-intervention whereas HRVC data for Jimmy included two pre-intervention sessions and two post-intervention sessions. HRVC and PS analysis will be summarized below.

The following tables (Tables 25-26) summarize Mean HRVC for control and intervention phases of entire therapy sessions as well as mean HRVC values during intervention and non-intervention intervals from therapy sessions during the intervention phase. Additionally, average TPI scores from control and intervention phases are listed.

Table 25

Dyad 1, CareBear and Jimmy, HRVC and TPI

	CareBear	Jimmy
Mean HRVC pre intervention	1.616	1.594
Mean HRVC post intervention	1.651	2.162
TPI Pre	6.50	7.00
TPI Post	6.74	7.00

Table 26

Dyad 1, CareBear and Jimmy, HRVC during HLI and Shift and Lift

	CareBear	Jimmy
Mean HRVC HLI Begin	1.481	2.115
Mean HRVC HLI End	1.251	2.018
Mean HRVC Shift and Lift	-	-
Mean HRVC Pre HLI Begin	-	1.997
Mean HRVC Between HLIs	1.684	2.173
Mean HRVC Post HLI End	1.424	2.195

Note. Dash (-) indicates missing/incomplete data.

CareBear Demographics

CareBear, a licensed clinical counselor and art therapist, has been practicing as a therapist for 24 years and participated in this research study with two clients. CareBear describes a therapeutic approach of "somatic, creative/expressive, and cognitive behavioral therapy (CBT)" with a clinical specialty of "trauma and addictions, sex addiction."

Although most of the data gathered were for individual therapy sessions, CareBear also gathered HRVC data and survey data for two couple sessions, one during the "control phase" and another during the "intervention phase." This information offered an interesting glance at couples' sessions, which included data gathered successfully from one control session and one intervention session. See below for charts and graphs from these couple sessions.

Table 27

CareBear Pre / Post HRVC Skills Acquisition Assessment Data and Analysis

		Pre-study	Post-study	Difference
Baseline	T1	3.022	1.001	-2.021
Stress prep	T2	2.058	1.668	-0.390
Coherence	T3	3.383	3.092	-0.291
Post Reflect			1.352	1.352

Baseline and Stress Preparation Assessment data were gathered with CareBear pre and post study. Carebear's baseline assessment indicated a decrease in HRVC mean values for each phase of the assessment, including coherence scores for resting phase (T1) of 3.022 pre study and 1.001 post study, stress preparation phase scores of 2.058 pre-study and 1.668 post-study, and for the coherence-building phase scores of 3.383 pre-study and 3.092 post-study. This difference could be attributed to many factors, including a rushed pace of the post-study interview/assessment and possible dysregulation due to scheduling and location challenges.

CareBear Quantitative HRVC Results

Based on data from four pre-intervention sessions and two post-intervention sessions, CareBear's HRVC mean values for pre-intervention was 1.616 and 1.651 for post-intervention. This demonstrated a 0.035 increase in mean coherence values during the intervention phase of

the study from the mean coherence value during the control phase of the study. Data were missing for two post-intervention sessions.

CareBear Survey Results: MAIA-2

CareBear completed MAIA-2 questionnaires before and after the study period. CareBear's scores on all eight subscales either increased or stayed the same, with an increase on six scales and an equal score on the subscales of Not-Worrying and Emotional Awareness. See Table 28 for summary of CareBear's pre/post MAIA-2 scores.

Table 28

CareBear MAIA-2 per Subscale, Pre / Post

	CareBare pre	CareBare post
Noticing	4.25	4.75
Not-distracting	3.17	3.67
Not-worrying	3.80	3.80
Attention regulation	4.14	4.29
Emotional awareness	4.40	4.40
Self-regulation	4.25	4.50
Body listening	4.00	4.67
Trusting	4.33	5.00

CareBear Survey Results: TPI-T

TPI results were assessed and compared between the control phase and the intervention phase. CareBear's TPI-T average pre-intervention was 6.5 and mean score during intervention

sessions was 6.74, with an increase in perceived therapeutic presence between the control and the intervention phase.

CareBear Post-Study Interview Themes and Summary

During the post-study interview, CareBear engaged in gathering of assessment data, HLI, and reflective journaling. CareBear and this researcher met for final post-study interview and to gather post-study assessment data almost 3 months after completion of data collection with clients. CareBear reported that Jimmy had been a cooperative client and willing to engage in therapy, individually and in couples therapy with his wife. CareBear also reported that Jimmy has made some big changes and wondered if it may be related to the integration of consistent heart-centered coherence-building interventions during therapy sessions.

Additionally, CareBear has reportedly received training in HeartMath techniques in the past and conveyed appreciation for this study as a reminder of the importance of rituals and regular use of coherence-building techniques for herself and also in sessions with clients, especially couples' sessions with clients who often want connection yet fall into patterns of getting stuck in figuring out or fixing problems. CareBear acknowledged that the use of these techniques at the beginning of session allowed access to a heartspace where wisdom can guide and support connection, the underlying need that can be unconscious. This study has offered opportunity for CareBear to expand the work to use with clients who have not engaged in the study and as a complement to other modalities.

This researcher engaged in reflective art response (Figure 1) accessing heart qualities from the heartspace while CareBear engaged in reflective journaling. The heart qualities and reflective narrative noted on the art image included the following: Heart-centered wisdom presence practice.

Figure 1

Researcher Art Response Reflection From Post-Study Interview With CareBear

Jimmy Demographics and Post-Study Questionnaire Summary:

Jimmy is a 31-year-old married male client of CareBear and reports to have been in therapy for 14 years. Jimmy reported engagement in therapy for "trauma work" and a strong therapeutic relationship with a solid support network. In the post-study questionnaire, Jimmy reported that the research study has not had an impact on him nor on the therapeutic relationship and these interventions during therapy were a "waste of time and not useful," given that he already practiced mindfulness and meditation. Additionally, Jimmy reported that he has not used the interventions nor coherence-building techniques since engaging in them during therapy and that he already uses a device to track HRV data daily.

Jimmy Quantitative HRVC Results

Based on data from four pre-intervention sessions (with only partial data recorded from one session), and three post-intervention sessions (with only partial data recorded from one session), Jimmy's HRVC mean values for pre-intervention was 1.490 and 1.788 for post-intervention. This demonstrated an increase in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. Data were missing for one post-intervention session. Upon further exploration of data, sessions wherein only partial data were collected (with partial data defined as less than half the session) were excluded from final analysis. With removal of two pre-intervention sessions and one post-intervention session, full data from two pre and two post intervention sessions were used to assess pre and post HRVC for Jimmy. Resulting HRVC mean values were 1.594 and 2.162, pre and post intervention respectively. The increase in HRVC from pre to post study was 0.568.

Jimmy Survey Results: MAIA-2

Jimmy completed MAIA-2 questionnaires before and after the study period. Jimmy's scores increased on four subscales, stayed the same on three subscales, and decreased on one subscale (Not-Distracting). See Table 29 for summary of Jimmy's pre/post MAIA-2 scores.

Table 29

Jimmy MAIA-2 per Subscale, Pre / Post

	Jimmy pre	Jimmy post
Noticing	4.00	4.00
Not-distracting	4.67	4.17
Not-worrying	2.60	2.60
Attention regulation	3.28	4.00
Emotional awareness	4.00	4.00
Self-regulation	2.75	4.50
Body listening	2.67	4.00
Trusting	4.00	4.33

Jimmy Survey Results: TPI-C

TPI results were scored, assessed, and compared between the control phase and the intervention phase. Jimmy's average TPI-C score was the same during the control phase of the study and during the intervention phase of the study. Similarly, during couple's sessions, Jimmy's mean TPI-C score for the pre-intervention phase and intervention phase of the study remained the same. This score was 7.00.

Dyad 1 (CareBear and Jimmy): Quantitative HRVC and IBI, PS Results for Dyad 1 / Intervention Period Plots, HRVC during HLI and S&L

HRVC line charts indicate PS between therapist and client during intervention periods of HLI at the beginnings and ends of intervention sessions. See Appendix N for line charts graphing coherence over time during intervention phases of therapy sessions.

Intervention Period Plots, IBI during HLI and S&L

IBI line charts indicate PS between therapist and client during intervention periods of HLI at the beginnings and ends of intervention sessions. See Appendix N for line charts graphing coherence over time during intervention phases of therapy sessions.

Dyad 2: Therapist Illona and Client Luz

Dyad 2 consisted of a 51-year-old female therapist and a 62-year-old female client. Luz describes her greatest need in therapy as "being truly understood and then challenged to grow" and the most important factor for Luz in therapy is "feeling understood, reflected, challenged in a gentle way."

Dyad 2 met virtually online for a total of 13 sessions, 6 for control phase, 1 for client training of technology and intervention, and 6 sessions for intervention phase over a period of almost 5 months. Dyad 2 consisted of a female therapist and female client

Recorded data for HRVC was not successful for Dyad 2, so full HRVC and PS analyses were not completed given the limited data for this dyad. Pre and Post intervention data were collected and analyzed based on the partial data that were collected. The following tables (Tables 30-31) summarize Mean HRVC for control and intervention phases of entire therapy sessions as well as the skills acquisition summary for Illona. Additionally, average TPI scores from control and intervention phases are listed.

Table 30

Dyad 2, Illona and Luz, HRVC and TPI

	Illona	Luz
Mean HRVC Pre Intervention	1.365	1.135
Mean HRVC Post Intervention	1.435	1.435
TPI pre	5.71	6.95
TPI post	5.16	7.00

Illona Demographics

Illona, a licensed clinical counselor, has been practicing as a therapist for 14 years. Illona described her therapeutic approach as informed by attachment theory, interpersonal neurobiology, and non-violent communication with no reported clinical specialty. Illona reported regular self-care practices and indicated that coherence-building techniques have helped her with self-regulation, self-awareness, somatic understanding, and focus during therapy sessions.

Table 31

Illona Pre / Post HRVC Skills Acquisition Assessment Data and Analysis

		Pre study	Post study	Difference
Baseline	T1	1.614	0.984	-0.630
Stress Prep	T2	1.344	1.135	-0.209
Coherence	T3	0.716	0.996	0.280
Post Reflect			1.402	1.402

Skills acquisition data, assessed through the baseline assessment included resting, stress preparation, and coherence phases. Data from this assessment were gathered from Illona pre and post study. While Illona's baseline assessment indicated a decrease in HRVC mean values for the resting and stress preparation phases of the study each phase of the assessment, the HRVC mean value increased during the coherence phase of the assessment.

Illona Quantitative HRVC Results

Based on data from six pre-intervention sessions (three of which included only partial data) and four post-intervention sessions, Illona's HRVC mean values for pre-intervention was 1.365 and 1.435 for post-intervention. This demonstrates an increase in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. Full data were missing for two pre-intervention and three post-intervention sessions. Partial data were missing for three pre-intervention sessions.

Illona Survey Results: MAIA-2

Illona completed MAIA-2 questionnaires before and after the study period. Illona's scores on all eight subscales either increased or stayed the same, with an increase on five scales and an equal score on the subscales of Not-Worrying, Self-Regulation, and Trusting. See Table 32 for summary of Illona's pre/post MAIA-2 scores.

Table 32

Illona MAIA-2 per Subscale, Pre / Post

	Illona pre	Illona post
Noticing	4.25	5.00
Not-distracting	3.50	3.67
Not-worrying	4.00	4.00
Attention regulation	3.71	4.57
Emotional awareness	4.00	4.80
Self-regulation	4.50	4.50
Body listening	4.67	5.00
Trusting	4.00	4.00

Illona Survey Results: TPI-T

TPI results were assessed and compared between the control phase and the intervention phase. Illona's TPI-T average during the control phase/pre-intervention phase was 5.71 and mean score during intervention sessions was 5.16, with a noted decrease (based on mean scores) in perceived therapeutic presence between the control and the intervention phase.

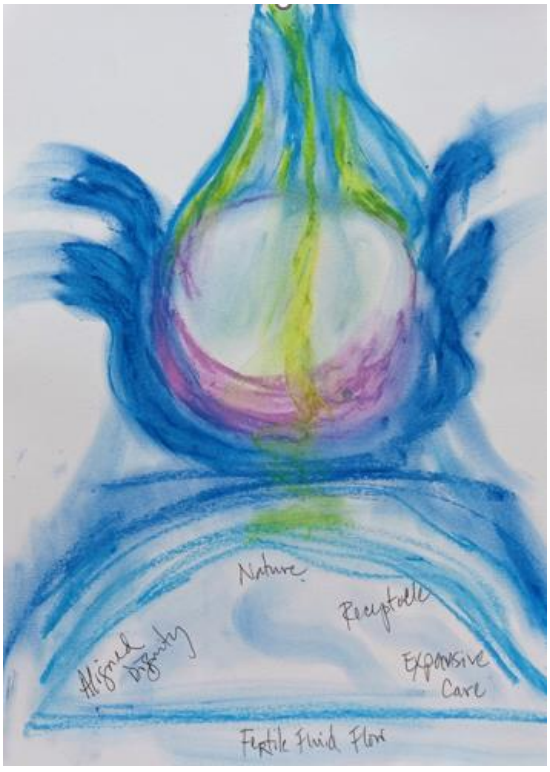
Illona Post-Study Interview Themes and Summary

Illona and this researcher met for a final interview discussion a month after data collection was complete. This allowed the therapist some time to reflect upon the study and its impact on their practice. During this meeting, post-study assessment was conducted and followed by the HLI then reflective time and discussion. Illona reportedly journaled as a reflection upon the use of this intervention, self-care practices, relational integrity, and the ease of heart-based

technologies. Gratitude was expressed for the use of the Inner Balance instrument to offer live and easy feedback related to coherence levels as well as a motivator to practice coherence-building practices regularly. While Illona reportedly practiced coherence-building techniques outside of session and prior to implementing the intervention into therapy sessions, they also reported that they wished they would practice more and stated an intention to do so. While Illona was engaged in reflective journaling after HLI, I engaged in reflective creative expression as an art response to this therapist and this therapeutic dyad's engagement in the study (see Figure 2). Reflective words accompanied the art response with key heart qualities arising during reflective process that included the following: Aligned Dignity, Fertile Fluid Flow, Expansive Care, Receptacle, and Nature. After sharing this image and words with Therapist 2T, Illona responded that nature is very important to Client 2C.

Figure 2

Researcher Art Response Reflection From Post-Study Interview With Illona



Luz Demographics and Post-Study Questionnaire Summary

Luz is a 62-year-old married female who has been engaged in therapy with Illona for 3 years. In the post-study questionnaire responses, Luz revealed that the practice of these coherence-building techniques helped "to center and find calm" when under stress. Additionally, Luz reported improvement in setting boundaries and "learning how to be engaged and caring, while also protecting [her] energy" as a result of these coherence-building practices. Finally, Luz reported that learning the interventions and engaging in coherence-building techniques have provided "optimism in these difficult times we are all facing."

Luz Quantitative HRVC Results

Based on data from seven pre-intervention sessions (one of which included only partial data), Luz's HRVC mean coherence value for pre-intervention was 1.135. Unfortunately, no data were recorded for post-intervention since all post-intervention data were missing. and 1.435 for post-intervention. Full data were missing for one pre-intervention and all post-intervention data. Partial data were missing for one pre-intervention session.

Luz Survey Results: MAIA-2

Luz completed MAIA-2 questionnaires before and after the study period. Luz's scores increased on two subscales (Noticing and Emotional Awareness) with a decrease on the other five subscales. See Table 33 for summary of Luz's pre/post MAIA-2 scores.

Table 33

Luz MAIA-2 per Subscale, Pre / Post

	Luz pre	Luz post
Noticing	3.75	4.50
Not-distracting	4.00	3.67
Not-worrying	4.20	3.40
Attention regulation	4.28	3.86
Emotional awareness	4.40	5.00
Self-regulation	4.50	4.50
Body listening	5.00	4.33
Trusting	4.67	3.67

Luz Survey Results: TPI-C

TPI results were assessed and compared between the control phase and the intervention phase. Luz's average TPI-C score was 6.95 during the control phase of the study and 7.0 during the intervention phase of the study.

Dyad 2 (Illona and Luz): Quantitative HRVC and PS Results

Given missing data for this dyad, HRVC correlations and PS analysis was not completed.

Dyad 3: Therapist Vera and Client Betty

Dyad 3 consisted of a 44-year-old female therapist and a 29-year-old female client. Betty described the most important factor in therapy as feeling heard, seen, and respected with inherent trust in therapist and an environment where she can "express herself fully and openly without fear of judgment." Additionally, Betty stated that her greatest need in therapy is "to learn to

manage the daily stresses of life and relationships, and the resulting anxiety, without placing unrealistic expectations and harsh judgments on herself."

Dyad 3 met online for a total of eight sessions, three for control phase, one for client training of technology and intervention, and four sessions for intervention phase. This dyad met consistently over a period of 9 weeks. Dyad 3 consisted of a female therapist and female client. Analyses for HRVC and PS included data gathered from HMI and use of coherence and IBI data from each session, which was successfully collected and downloaded for Dyad 3.

The following tables (Tables 34-35) summarize Mean HRVC for control and intervention phases of entire therapy sessions as well as mean HRVC values during intervention and non-intervention intervals from therapy sessions during the intervention phase. Additionally, average TPI scores from control and intervention phases are listed.

Table 34

Dyad 3, Vera and Betty, HRVC and TPI

	Vera	Betty
Mean HRVC Pre Intervention	1.458	2.077
Mean HRVC Post Intervention	1.517	2.378
TPI pre	4.75	7.00
TPI post	5.03	7.00

Table 35

Dyad 3, Vera and Betty, HRVC during HLI and Shift and Lift

	Vera	Betty
Mean HRVC HLI Begin	2.092	3.574
Mean HRVC HLI End	1.902	3.251
Mean HRVC Shift and Lift	1.291	2.835
Mean HRVC Pre HLI Begin	1.064	1.983
Mean HRVC Between HLIs	1.444	2.236
Mean HRVC Between HLI B and SL	1.478	2.205
Mean HRVC Between SL and HLI E	1.500	2.372
Mean HRVC Post HLI End	1.446	1.719

Vera Demographics

Vera, a licensed clinical counselor, has been practicing as a therapist for 18 years and engaged in this research study with two clients. Vera described her therapeutic approach as "mindfulness, somatic experience, and cognitive behavioral therapy (CBT)" with no reported clinical specialty.

Table 36

Vera Pre / Post HRVC Skills Acquisition Assessment Data and Analysis

		Pre study	Post study	Difference
Baseline	T1	1.668	2.965	1.297
Stress prep	T2	1.122	2.574	1.452
Coherence	T3	3.404	2.820	-0.584
Post reflect			1.389	1.389

This assessment conducted pre and post study reflects skills acquisition of coherence-building techniques. Skills acquisition, assessed through the baseline assessment included resting, stress preparation, and coherence phases. Data from this assessment were gathered from Vera during pre and post study meetings. While Vera's baseline assessment indicated a decrease in HRVC mean values for the coherence-building phase, T3, from pre to post study, HRVC mean values indicated an increase during resting and stress preparation phases of the study. Skills acquisition is a primary way to assess for skills acquired from this study, with pre-study HRVC reflecting use of pre-study skills for stress preparation and post-study assesses for attainment of new coherence-building skills. Given the T2 was the primary means to assess for skills acquisition, the increase in HRVC for Vera during T2 indicates increased coherence and suggests increased self-regulation when Vera used the new coherence-building skill during the post-assessment.

Vera Quantitative HRVC Results

Based on data from three pre-intervention sessions and five post-intervention sessions, Vera's HRVC mean values for pre-intervention was 1.458 and 1.517 for post-intervention. This indicated an increase in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. Full data were gathered for Betty during all sessions pre and post intervention.

Vera Survey Results: MAIA-2

Vera completed MAIA-2 questionnaires before and after the study period. Vera's scores on four subscales increased, stayed the same on two subscales (Body Listening and Trusting), and decreased on the subscales of Emotional Awareness and Self-Regulation. See Table 37 for summary of Vera's pre/post MAIA-2 scores.

Table 37

Vera MAIA-2 per Subscale, Pre / Post

	Vera pre	Vera post
Noticing	3.50	3.75
Not-distracting	3.17	4.17
Not-worrying	3.00	3.60
Attention regulation	3.43	3.57
Emotional awareness	4.20	3.60
Self-regulation	4.25	4.00
Body listening	2,67	2.67
Trusting	3.33	3.33

Vera Survey Results: TPI-T

TPI results were assessed and compared between the control phase and the intervention phase. Vera's TPI-T average pre-intervention was 4.75 and mean score during intervention sessions was 5.03, with an increase in perceived therapeutic presence between the control and intervention phases.

Vera Post-Study Interview Themes and Summary

Vera met with this researcher for final post-study interview and reflective time about 5 weeks after the last therapy session where data was gathered for this study. Vera engaged in collecting assessment data, HLI, and reflective processing through intuitive journaling. Vera reported that reflective journaling includes writing and drawing as a reflective process. During this meeting, Vera reported that one of the biggest take-aways, simple yet profound, is noticing

and feeling more deeply in their body as a result of this study while also experimenting with sharing these somatic experiences with a client in session. Vera discussed engaging in new challenges within therapy and spoke about paying attention in a new and different way, potentially modeling embodiment for clients. Paying attention to information in the body and discernment about how or whether to speak about this non-verbal awareness seemed significant for Vera and their process in the study.

This researcher engaged in art-making after HLI with therapist and created an image along with reflective insights arising from heart wisdom during the process (see Figure 3). The narrative insights that arose intuitively for this researcher in reflection included the following: Expansion, Beauty of Imperfection, Containment, Depth, Structure, Genuine Gentle, Care, Nested Feminine, Anchored Movement, Flow, and Spacious. At the end of the time together, this researcher shared the image and words with Vera. Vera responded by sharing an image they created that seemed to mirror the shapes of the image this researcher created when creating art together virtually in the online Zoom format.

Figure 3

Researcher and Therapist Art Response Reflections From Post-Study Interview With Vera

This therapist participant also created an image during the post-survey interview reflective connections. The image is shown above, in Figure 3, with similar lines and movement.

Betty Demographics and Post-Study Questionnaire Summary

Betty is a 29-year-old female who has been engaged in therapy with Vera for 8 months. In the post-study interview questionnaire, Betty reported that this research study experience has led her to use coherence-building techniques to assist with transitions in life along with increased awareness of "somatic experiences of various emotions." This client reported feeling "more in tune with spirituality" and finding "more spiritual grounding" as well as deeper connection with nature and with others. Additionally, this client reported transformation that prevents emotional overwhelm and involves a greater sense of somatic awareness that leads to more clarity in expression and discernment of self-care moment to moment. To this client, this shift occurred

with increased awareness of heart and breath that allows inner processing of emotions and thoughts related to relationships with others. Further, "a deepening of the therapeutic alliance and attunement" with therapist was reported along with "an increase in shared energy between [client and therapist] despite the fact that our sessions were conducted via telehealth." Finally, Betty stated "I feel I can trust my heart more to guide me in making decisions regarding my body as it relates to my emotions."

Betty Quantitative HRVC Results

Based on data from two pre-intervention sessions and five post-intervention sessions, Betty's HRVC mean values for pre-intervention was 2.077 and 2.378 for post-intervention. This indicates an increase in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. Full data were missing for one session during pre-intervention.

Betty Survey Results: MAIA-2

Betty completed MAIA-2 questionnaires before and after the study period. Betty's scores indicated increases on all eight subscales. See Table 38 for summary of Betty's pre/post MAIA-2 scores.

Table 38

Betty MAIA-2 per Subscale, Pre / Post

	Betty pre	Betty post
Noticing	3.75	4.25
Not-distracting	1.83	3.00
Not-worrying	2.60	3.00
Attention regulation	3.00	3.86
Emotional awareness	4.20	4.60
Self-regulation	3.00	4.25
Body listening	2.67	3.67
Trusting	3.33	4.00

Betty Survey Results: TPI-C

TPI results were assessed and compared between the control phase and the intervention phase. Betty's average TPI-C score was the same during the control phase of the study and during the intervention phase of the study. This score was 7.00.

Dyad 3 (Vera and Betty): Quantitative HRVC and IBI, PS Results for Dyad 3 / Intervention Period Plots, HRVC during HLI and S&L

HRVC line charts indicate intermittent PS between therapist and client during intervention periods of HLI at the beginnings and ends of intervention sessions. Shift and Lift intervention periods seem to indicate more consistent PS than the HLI intervention time intervals. See Appendix O for line charts graphing coherence over time during intervention phases of therapy sessions.

Intervention Period Plots, IBI during HLI and S&L

IBI line charts indicate intermittent PS between therapist and client during intervention periods of HLI at the beginnings and ends of intervention sessions. Additionally, these line plots indicate client's wider range of IBI and more apparent consistency of PS between therapist and client. See Appendix O for line charts graphing coherence over time during intervention phases of therapy sessions.

Dyad 4: Therapist Vera and Client Aelin

Dyad 4 consisted of a 44-year-old female therapist and an 18-year-old female client. Aelin described her greatest need in therapy is "to talk about stuff" and the most important factor in therapy as "understanding, listening, and kindness."

Dyad 4 (Vera and Aelin) met online for a total of nine sessions, three for control phase, one for client training of technology and intervention, and five sessions for intervention phase. This dyad met consistently over a period of 10 weeks and consisted of a female therapist and female client.

Analyses for HRVC and PS included data gathered from HMI and use of coherence and IBI data from each session, which was successfully collected and downloaded for Dyad 4.

The following tables (Tables 39-40) summarize mean HRVC for control and intervention phases of entire therapy sessions as well as mean HRVC values during intervention and non-intervention intervals from therapy sessions during the intervention phase. Additionally, average TPI scores from control and intervention phases are listed.

Table 39

Dyad 4, Vera and Aelin, HRVC and TPI

	Vera	Aelin
Mean HRVC Pre Intervention	1.428	1.609
Mean HRVC Post Intervention	1.388	1.437
TPI pre	5.15	7.00
TPI post	5.79	7.00

Table 40

Dyad 4, Vera and Aelin, HRVC during HLI and Shift and Lift

	Vera	Aelin
Mean HRVC HLI Begin	1.602	1.470
Mean HRVC HLI End	1.683	2.279
Mean HRVC Shift and Lift	None	None
Mean HRVC Pre HLI Begin	1.482	1.806
Mean HRVC Between HLIs	1.351	1.261
Mean HRVC Post HLI End	1.773	1.560

Vera Demographics

See above, Dyad 3, for information about Vera's demographics.

Vera Quantitative HRVC Results

Based on data from three pre-intervention sessions (with only partial data for one session) and six post-intervention sessions, Vera's HRVC mean values for pre-intervention was 1.428 and 1.388 for post-intervention. This indicates a decrease in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. After exploration of data, a pre-intervention session was excluded due to partial data with resulting pre-intervention HRVC mean value of 1.384 and post-intervention HRVC mean value of 1.388, indicating an increase in mean coherence values during the intervention phase of the study.

Vera Survey Results: MAIA-2

See above, in Dyad 3, for summary of Vera's MAIA-2 assessment results.

Vera Survey Results: TPI-T

Vera's TPI-T average pre-intervention was 5.15 and mean score during intervention sessions was 5.79, with an increase in perceived therapeutic presence between the control and the intervention phase.

Vera Post-Study Interview Themes and Summary:

See results noted in Dyad 3 for this therapist.

Aelin Demographics and Post-Study Questionnaire Summary:

Aelin is an 18-year-old female who reports diagnoses of depression and anxiety and has been engaged in psychotherapy with Vera for "just under 2 years." Aelin did not complete the post-study survey.

Aelin Quantitative HRVC Results

Based on data from three pre-intervention sessions (with partial data for one session) and six post-intervention sessions, Aelin's HRVC mean values for pre-intervention was 1.609 and 1.437 for post-intervention. This indicates a decrease in mean coherence values during the intervention phase from the mean coherence value during the control phase of the study.

Aelin Survey Results: MAIA-2

Aelin completed MAIA-2 questionnaires before and after the study period. Aelin did not complete the post-study MAIA-2 questionnaire, so scores were not correlated.

Table 41

Aelin MAIA-2 per Subscale, Pre / Post

	Aelin pre	Aelin post
Noticing	4.00	—
Not-distracting	1.17	—
Not-worrying	1.20	—
Attention regulation	2.57	—
Emotional awareness	3.80	—
Self-regulation	2.75	—
Body listening	3.67	—
Trusting	2.33	—

Aelin did not complete the post-study MAIA-2 questionnaire, hence the pre-session scores could not be compared with post-session scores.

Aelin Survey Results: TPI-C

TPI results were assessed and compared between the control phase and the intervention phase. Aelin's average TPI-C score was the same during the control phase of the study and during the intervention phase of the study. This score was 7.00.

Dyad 4 (Vera and Aelin): Quantitative HRVC and PS Results / Intervention Period Plots, HRVC during HLI and S&L

HRVC line charts indicate somewhat consistent PS between therapist and client during intervention periods of HLI at the beginnings and ends of intervention sessions. See Appendix P for line charts graphing coherence over time during intervention phases of therapy sessions.

Intervention Period Plots, IBI during HLI and S&L

IBI line charts indicate somewhat consistent PS between therapist and client during intervention periods of HLI at the beginnings and ends of intervention sessions. Additionally, these line plots indicate client's wider range of IBI than therapist's IBI range. Appendix P for line charts graphing coherence over time during intervention phases of therapy sessions.

Dyad 5: Therapist (and Researcher) Lucy and Client Norah

Dyad 5 consisted of a 53-year-old female therapist and 39-year-old female client who had been engaged in therapy for several years. Norah described her greatest need in therapy as "help processing" and the most important factor in therapy as "feeling supported."

Dyad 5 met online for a total of 14 sessions, 4 for control phase, one for client training of technology and intervention, and 9 sessions for intervention phase. This dyad met consistently, sometimes twice a week, over a period of 10 weeks.

Dyad 5 data for HRVC analysis came through and was analyzed data for HRVC and PS. The following tables (Tables 42-43) summarize Mean HRVC for control and intervention phases

of entire therapy sessions as well as mean HRVC values during intervention and non-intervention intervals from therapy sessions during the intervention phase. Additionally, average TPI scores from control and intervention phases are listed.

Table 42

Dyad 5, Lucy and Norah, HRVC and TPI

	Lucy	Norah
Mean HRVC Pre Intervention	2.423	1.609
Mean HRVC Post Intervention	2.558	1.789
TPI pre	6.46	6.92
TPI post	6.57	6.87

Table 43

Dyad 5, Lucy and Norah, HRVC during HLI and Shift and Lift

	Lucy	Norah
Mean HRVC HLI Begin	3.230	2.230
Mean HRVC HLI End	3.288	2.346
Mean HRVC Shift and Lift 1	4.495	2.489
Mean HRVC Shift and Lift 2	2.778	0.827
Mean HRVC Shift and Lift 3	2.099	-
Mean HRVC Pre HLI Begin	1.726	1.638
Mean HRVC Between HLIs	2.248	1.727
Mean HRVC Between HLI E and SL1	2.613	1.153
Mean HRVC Between SL1 and SL2	2.090	1.360
Mean HRVC Between SL and HLI E	2.075	-
Mean HRVC Post HLI End	2.384	1.845

Note. Dash (-) indicates missing/incomplete data.

Lucy Demographics

Lucy identified as a licensed clinical counselor, art therapist, sensorimotor psychotherapist, and infant mental- health specialist who has been practicing as a therapist for 18 years and engaged in this research study with two clients. Lucy described her therapeutic approach as transpersonal, creative arts based, heart-centered, integrative and holistic care, relational and collaborative with specialties in trauma, grief, loss, public health, groups and systems, infant mental health, attachment, and integrated body-centered holistic health care.

Table 44

Lucy Pre / Post HRVC Skills Acquisition Assessment Data and Analysis

		Pre study	Post study	Difference
Baseline	T1	2.881	2.028	-0.853
Stress Prep	T2	1.811	4.233	2.422
Coherence	T3	4.214	5.565	1.351
Post Reflect			2.668	2.668

This assessment that was conducted pre and post study reflects skills acquisition of coherence-building techniques. Skills acquisition was assessed through the baseline assessment included resting, stress preparation, and coherence phases. Data from this assessment were gathered from Lucy during pre and post study meetings. Lucy's mean HRVC values increased from pre to post study during stress preparation and coherence phases of the assessment and decreased from pre to post study during the resting phase of the assessment.

Lucy Quantitative HRVC Results

Based on data from 3 pre-intervention sessions and 13 post-intervention sessions, Lucy's HRVC mean values for pre-intervention was 2.423 and 2.558 for post-intervention. This indicated an increase in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. Data were missing from one session during the pre-intervention phase.

Lucy Survey Results: MAIA-2

Lucy completed MAIA-2 questionnaires before and after the study period. Lucy's scores on all eight subscales increased. See Table 45 for summary of Lucy's pre/post MAIA-2 scores.

Table 45

Lucy MAIA-2 per Subscale, Pre / Post

	Lucy pre	Lucy post
Noticing	3.50	4.00
Not-distracting	2.67	3.83
Not-worrying	2.80	3.80
Attention regulation	3.29	4.43
Emotional awareness	4.00	4.40
Self-regulation	3.75	4.50
Body listening	3.67	4.67
Trusting	4.00	4.33

Lucy Survey Results: TPI-T

TPI results were assessed and compared between the control phase and the intervention phase. Lucy's TPI-T average pre-intervention was 6.46 and mean score during intervention sessions was 6.57, with a slight increase in perceived therapeutic presence between the control and the intervention phase.

Lucy Post-Study Interview Themes and Summary

Given that Lucy is the researcher for this study, the interview process was a reflective time for Lucy to engage in assessment data, HLI, and reflections through creative expression art response (Figure 4). In reflecting upon the research as therapist, clients came into the heartspace as this therapist reflected upon how this research has influenced therapeutic presence and the therapeutic process. From this reflective heartspace came the image below along with narrative

words that describe the lived experience of having engaged in this research as a clinician. The heart qualities and words that arose in response included Transformation, Integration, Grounded Light, Embodied [heart], Roots, Heartspace, Blanket of Compassion, Fields of Awareness, Epigenetics, and Nature Heals.

Figure 4

Researcher and Therapist Art Response Reflection From Post-Study Interview With Lucy

Norah Demographics and Post-Study Questionnaire Summary:

Norah is a 39-year-old married female who has been engaged in therapy for 3 years. Norah did not complete the post-study questionnaire.

Norah Quantitative HRVC Results

Based on data from two pre-intervention sessions and seven post-intervention sessions, Norah's HRVC mean values for pre-intervention was 1.609 and 1.789 for post-intervention. This indicated an increase in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. Data from two pre-intervention

and six post-intervention sessions were missing. To draw firmer calculations, more data would have been needed. The direction of this post-test is as expected to confirm the hypothesis of increased HRVC with intervention, despite a discrepancy in the number of sessions.

Norah Survey Results: MAIA-2

Norah completed MAIA-2 questionnaires before and after the study period. Norah's scores revealed increases on five of the eight subscales while scores for three of the subscales (Not-Distracting, Body Listening, and Trusting) stayed the same. See Table 46 for summary of Norah's pre/post MAIA-2 scores.

Table 46

Norah MAIA-2 per Subscale, Pre / Post

	Norah pre	Norah post
Noticing	3.75	4.50
Not-distracting	3.83	3.83
Not-worrying	3.60	3.80
Attention regulation	3.71	4.00
Emotional awareness	4.80	5.00
Self-regulation	3.75	4.75
Body listening	3.67	3.67
Trusting	4.00	4.00

Norah Survey Results: TPI-C

TPI results were assessed and compared between the control phase and the intervention phase. Norah's average TPI-C score was the 6.92 during the control phase of the study and slightly dropped to 6.87 during the intervention phase of the study.

Dyad 5 (Lucy and Norah): Quantitative HRVC and IBI, PS Results / Intervention Period Plots, HRVC during HLI and S&L

HRVC line charts indicate mostly consistent PS between therapist and client during intervention periods of HLI at the beginnings and ends of intervention sessions and somewhat consistent PS during Shift and Lift time intervals. See Appendix Q for line charts graphing coherence over time during intervention phases of therapy sessions.

Intervention Period Plots, IBI during HLI and S&L

IBI line charts indicate mostly consistent PS between therapist and client during intervention periods of HLI at the beginnings and ends of intervention sessions as well as during the Shift and Lift intervention time intervals. Additionally, these line plots indicate therapist's wider range of IBI than client's IBI range. See Appendix Q for line charts graphing coherence over time during intervention phases of therapy sessions.

Dyad 6: Therapist (and Researcher) Lucy and Client HZ

Dyad 6 consisted of a 53-year-old female therapist and a 22-year-old female client. HZ reported the most important factor in therapy as "recovery and processing with kindness." Dyad 6 met in person once for an introductory session and in regular therapy sessions virtually for a total of five sessions, three for control phase and two sessions for intervention phase. This dyad met regularly over a time span of 7 weeks.

Recorded data for HRVC was not successful for Dyad 6, so full HRVC and PS analysis were not completed given the limited data for this dyad. Therapist data were gathered, however much of the client HRVC data was not successfully uploaded. HRVC was assessed for therapist yet dyadic data analysis and PS could not be assessed due to insufficient data acquisition. Control and intervention data were collected and analyzed based on partial data collected. The following tables (Table 47) summarize mean HRVC for control and intervention phases of entire therapy sessions. Additionally, average TPI scores from control and intervention phases are listed.

Table 47

Dyad 6, Lucy and HZ, HRVC, and TPI

	Lucy	HZ
Mean HRVC Pre Intervention	2.021	1.177
Mean HRVC Post Intervention	1.967	-
TPI pre	6.02	7.00
TPI post	6.70	7.00

Note. Dash (-) indicates missing/incomplete data.

Lucy Demographic Information

See above for Lucy's demographic information.

Lucy Pre / Post Assessment Data and Analysis

See above, Dyad 5, for information.

Lucy Quantitative HRVC Results

Based on data from three pre-intervention sessions and two post-intervention sessions, Lucy's HRVC mean values for pre-intervention was 2.021 and 1.967 for post-intervention. This

indicated a decrease in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. All data were gathered from five therapy sessions, three during control phase and two during intervention phase.

Lucy Survey Results: MAIA-2 and TP

See above, Dyad 5, for Lucy's MAIA-2 assessment data.

Lucy Survey Results: TPI-T

Lucy's TPI-T average pre-intervention was 6.02 and mean score during intervention sessions was 6.70, with an increase in perceived therapeutic presence between the control and the intervention phase.

Lucy Post-Study Interview Themes and Reflections Summary

See Dyad 5 information for Therapist 6T information from post-study interview and reflections.

HZ Demographics and Post-Study Questionnaire Summary:

HZ is a 22-year-old female engaged in therapy for 1 year. HZ did not complete the post-study questionnaire.

HZ Quantitative HRVC Results

Based on data from one pre-intervention sessions, HZ's HRVC mean values for pre-intervention was 1.177. Given that no data were successfully gathered during post-intervention sessions, there is no post-study coherence mean for comparison. Data were missing for two pre-intervention sessions and two post-intervention sessions.

HZ Survey Results: MAIA-2

HZ completed MAIA-2 questionnaires before and after the study period. There was missing data on one subscale (Not-Distracting). HZ's scores increased on six subscales and a

decrease on one subscale (Trusting). As noted below, HZ did not complete the pre-study questionnaire for the not-distracting scale; hence, this was not included in analysis. See Table 48 for summary of HZ's pre/post MAIA-2 scores.

Table 48

HZ MAIA-2 per Subscale, Pre / Post

	HZ pre	HZ post
Noticing	3.50	3.75
Not-distracting	-	3.00
Not-worrying	1.4	1.80
Attention regulation	1.71	2.14
Emotional awareness	4.6	5.00
Self-regulation	1.75	2.75
Body listening	3.67	4.33
Trusting	3.67	4.33

Note. Dash (-) indicates missing/incomplete data

HZ Survey Results: TPI-C

TPI results were assessed and compared between the control phase and the intervention phase. HZ's average TPI-C score was the same during the control phase of the study and during the intervention phase of the study. This score was 7.00.

Dyad 6 (Lucy and HZ): Quantitative HRVC and PS Results

Given missing data for this dyad, HRVC correlations and PS analysis was not completed.

Dyad 7: Therapist Jill and Client Leigh

Dyad 7 consisted of a 42-year-old female therapist and a 34-year-old female client. Leigh reported the most important factor in therapy as a "positive relationship with my therapist that creates trust and openness" while her greatest need in therapy was "to establish a self-care routine, increase mindfulness practice, and to change her 'people pleasing' mentality."

Dyad 7 met in person for a total of eight sessions, four for control phase and four sessions for intervention phase over a period of a little more than 5 months. Jill reported ongoing technological issues with the Inner Balance sensor and was unable to gather consistent HRV data. Additionally, Jill also recounted the challenge to note time when engaging in S&L during sessions with client, conveying that this therapist felt that this took them out of therapeutic presence and distracted them from clinical alignment.

Recorded data for HRVC was not successful for Dyad 2, so full HRVC and PS analyses were not completed given the limited data for this dyad. Pre and Post intervention data were collected and analyzed based on the partial data that were collected. The following tables (Table 49) summarize mean HRVC for control and intervention phases of entire therapy sessions. Additionally, average TPI scores from control and intervention phases are listed.

Table 49

Dyad 7, Jill and Leigh, HRVC, and TPI

	Jill	Leigh
Mean HRVC Pre Intervention	1.455	1.399
Mean HRVC Post Intervention	1.613	1.463
TPI pre	5.01	7.00
TPI post	5.11	7.00

Jill Demographics

Jill, a licensed social worker, has been practicing as a clinical therapist for 19 years. Jill defined her therapeutic approach as psychodynamic, mindfulness-based, relational, and trauma informed with a clinical specialty of chronic illness.

Table 50

Jill Pre / Post HRVC Skills Acquisition Assessment Data and Analysis

		Pre study	Post study	Difference
Baseline	T1	1.578	4.288	2.710
Stress Prep	T2	1.055	5.547	4.492
Coherence	T3	1.768	4.088	2.320
Post Reflect			4.830	4.830

This assessment that was conducted pre and post study reflects skills acquisition of coherence-building techniques. Skills acquisition was assessed through the baseline assessment included resting, stress preparation, and coherence phases. Data from this assessment were gathered from Jill during pre and post study meetings. Jill's mean HRVC values increased from pre to post study during all phases of this assessment. These increases in HRVC seemed significant based on *z* score analysis, with a 2.71 increase in resting phase, 4.492 increase during the stress preparation phase, and a 2.32 increase during the coherence phase. The greatest increase of 4.492 during the stress preparation phase implies that Jill successfully acquired the skill of coherence-building with the increase from past tools to prepare for a stressful situation to the use of coherence-building techniques acquired during this study.

Jill Quantitative HRVC Results

Based on data from four pre-intervention sessions and one post-intervention sessions (with only partial data gathered), Jill's HRVC mean values were 1.455 for pre-intervention and 1.613 for post-intervention. This indicated an increase in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. All data were gathered from four sessions during the control session, yet only 15 minutes of data were gathered during one post-intervention session. Data from three therapy sessions during intervention phase were missing.

Jill Survey Results: MAIA-2

Jill completed MAIA-2 questionnaires before and after the study period. Jill's scores increased on six subscales, stayed the same on one (Not-Distracting), and decreased on one (Attention Regulation). See Table 50 for summary of Jill's pre/post MAIA-2 scores.

Table 51

Jill MAIA-2 per Subscale, Pre / Post

	Jill pre	Jill post
Noticing	2.75	4.25
Not-distracting	3.83	3.83
Not-worrying	2.20	3.20
Attention regulation	4.00	3.57
Emotional awareness	4.00	4.60
Self-regulation	4.00	4.25
Body listening	4.00	5.00
Trusting	3.33	4.67

Jill Survey Results: TPI-T

TPI results were assessed and compared between the control phase and the intervention phase. Jill's TPI-T average pre-intervention was 5.01 and mean score during intervention sessions was 5.11, indicating a slight increase in perceived therapeutic presence between the control and the intervention phase.

Jill Post-Study Interview Themes and Reflections Summary

Jill and this researcher met for a final interview discussion approximately 2 weeks after dyadic data collection was complete. During this meeting, the post-study assessment was conducted and followed by the HLI then reflective time and discussion. Jill was invited to engage in reflective journaling or a form of creative expression from the heartspace created during the HLI. This therapist reported gratitude for being guided in the HLI and chose to journal

as a reflection upon the use of interventions introduced in this study, therapeutic relationship and presence, self-care practices, and the use of heart-based practices in therapy, relational integrity, and the ease of heart-based technologies. Jill reported that they were not engaged in coherence-building practices outside of session and that they wished they would have engaged and practiced more coherence-building techniques outside of session.

In the end, Jill reported the intention to engage in HLI regularly as this technique reportedly assists with feeling more grounded and supporting the flow of therapeutic process. Furthermore, Jill reported that it was challenging to guide the process and stay present with client. Jill journaled after assessment data collection and HLI, and this researcher engaged in art-making and reflections upon this dyad's participation in research study. As Jill engaged in reflective journaling after HLI, this researcher engaged in reflective creative expression as an art response to this therapist and this therapeutic dyad's engagement in the study. Key words that arose from this reflective art response included the following: Earthy grounded connected vibrance, gratitude, and growth potential contained light. This image and reflective words, which mirrored heart qualities that arose intuitively for this researcher, were shared with Jill to close the post-study interview session. The image is reflected in Figure 5.

Figure 5

Researcher Art Response Reflection From Post-Study Interview With Jill

Leigh Demographics and Post-Study Questionnaire Summary:

Leigh is a 34-year-old married female who has been engaged in therapy with Jill for one year. In the post-study interview responses, Leigh reported that the coherence-building techniques created ease and allowed "connection, gratitude, and awareness" when overwhelmed along with increased capacity to "stop and listen to [my] body." Leigh also noted a shift in therapy goals with renewed priority to "increase internal awareness and to do things more mindfully and intentionally." Additionally, this client reported shifting self-care practices from "external things" to "defining self-care as taking a moment to ask my heart and body what it needs . . . and then doing that." Relationally, Leigh noticed more patience with her children and partner along with expressions of gratitude. Lastly, this client reported turning focus inward with a realization that spirituality is "all about internal awareness and connectiveness to others, the earth, and our universe."

Leigh Quantitative HRVC Results

Based on data from four pre-intervention sessions and three post-intervention sessions, Leigh's HRVC mean values were 1.399 for pre-intervention and 1.463 for post-intervention. This indicated an increase in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. All data were gathered from four sessions during the control session from three sessions during intervention phase of the study. Data from one therapy sessions during intervention phase were missing.

Leigh Survey Results: MAIA-2

Leigh completed MAIA-2 questionnaires before and after the study period. Leigh's scores increased on all subscales. See Table 52 for summary of Leigh's pre/post MAIA-2 scores.

Table 52

Leigh MAIA-2 per Subscale, Pre / Post

	Leigh Pre	Leigh Post
Noticing	3.25	4.25
Not-distracting	1.83	4.83
Not-worrying	2.80	3.60
Attention regulation	3.14	4.00
Emotional awareness	4.00	4.60
Self-regulation	4.75	5.00
Body listening	2.33	4.00
Trusting	4.00	5.00

Leigh Survey Results: TPI-C

TPI results were assessed and compared between the control phase and the intervention phase. Leigh's average TPI-C score was the same during the control phase of the study and during the intervention phase of the study. This score was 7.00.

Dyad 7 (Jill and Leigh): Quantitative HRVC and PS Results

Given missing data for this dyad, HRVC correlations and PS analysis was not completed.

Dyad 8: Therapist CareBear and Client KC

Dyad 8 consisted of a 61-year-old female therapist and a 30-year-old female client. KC reported her greatest need in therapy as "being seen" and the most important factor in therapy as connecting with her therapist.

Dyad 8 met in person for a total of four sessions, two for control phase and two sessions for intervention phase over the time period of almost 4 months. Given that two of these sessions, one during the control phase and one during the intervention phase were couples' sessions, the total number of individual dyadic sessions was two, with one during control and one during intervention.

Recorded data for HRVC was not successful for Dyad 2, so full HRVC and PS analyses were not completed given the limited data for this dyad. Pre and post intervention data were collected and analyzed based on the partial data that were collected. The following table (Table 53) summarize Mean HRVC for control and intervention phases of entire therapy sessions. Additionally, average TPI scores from control and intervention phases are listed.

Table 53

Dyad 8, CareBear and KC, HRVC and TPI

	CareBear	KC
Mean HRVC pre intervention	1.81	1.35
Mean HRVC post intervention	1.57	1.74
TPI pre	6.82	7.00
TPI post	6.75	7.00

CareBear Demographics

See CareBear's demographic description in Dyad 1 summary.

CareBear Pre / Post Assessment Data and Analysis

See Dyad 1 for CareBear's pre / post assessment data and analysis.

CareBear Quantitative HRVC Results

Based on data from two pre-intervention sessions and one post-intervention session, CareBear's HRVC mean values for pre-intervention was 1.807 and 1.569 for post-intervention. This demonstrates a decrease in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. Data were missing for one pre-intervention session.

CareBear Survey Results: MAIA-2

See CareBear's MAIA-2 assessments noted in Dyad 1 summary.

CareBear Survey Results: TPI-T

Within this dyad, CareBear's TPI-T average pre-intervention was 6.82 and mean score during intervention sessions was 6.75, with a slight decrease in perceived therapeutic presence between the control and the intervention phase. It seems important to note that this included only one session with intervention.

CareBear Post-Study Interview Themes and Reflections Summary

During the post-study interview, CareBear engaged in gathering of assessment data, HLI, and reflective journaling. CareBear and this researcher met for final post-study interview and to gather post-study assessment data almost 3 months after completion of data collection with clients. CareBear reported that KC had been inconsistent with therapy as she was busy with other life events. Reportedly, KC was open to engaging in coherence-building techniques during individual and couples therapy sessions. In theory, KC met with CareBear individually one week and as a couple the following, alternating weeks. For multiple reasons, this became inconsistent and led to minimal engagement for KC and CareBear with the interventions. CareBear reported that KC was doing well and likely benefited from the coherence-building techniques despite the minimal contact in therapy.

Additionally, CareBear has reportedly received training in HeartMath techniques in the past and conveyed appreciation for this study as a reminder of the importance of rituals and regular use of coherence-building techniques for herself and also in sessions with clients, especially couples sessions with clients who often want connection yet fall into patterns of getting stuck in figuring out or fixing problems. CareBear acknowledged that this study assisted her in deepening into and remembering to use coherence-building techniques during and outside of therapy, as a deepening into access with her heartspace where wisdom can guide and support

connection. This study has reportedly offered opportunity for CareBear to expand the work to use with clients who have not engaged in the study and as a complement to other modalities. See Dyad 1 for image of reflective art response (Figure 1) during post-study interview with CareBear.

KC Demographics and Post-Study Questionnaire Summary

KC is a 30-year-old married female who reported her most important core values as family and connection. Through the post-intervention survey, KC reported that the intervention tools helped her to feel calm and centered. Additionally, KC noted that these experiences brought her closer to her therapist and reconnected her with her spirituality.

KC Quantitative HRVC Results

Based on data from two pre-intervention sessions, one of which only included partial data for the session, and one post-intervention sessions. KC's HRVC mean values for pre-intervention was 1.354 and 1.739 for post-intervention, indicating an increase in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. Data were completely missing for one pre-intervention session and partially missing for one pre-intervention sessions. All available data gathered were used to assess mean coherence values. Post-intervention included data from only one therapy session.

KC Survey Results: MAIA-2

KC complete the MAIA-2 questionnaires before the study period and did not complete this MAIA-2 questionnaire post-study. Given that KC did not complete the post-study MAIA-2 questionnaire, the pre-session scores could not be compared with post-session scores.

KC Survey Results: TPI-C

TPI results were assessed and compared between the control phase and the intervention phase. KC's average TPI-C score was the same during the control phase of the study and during the intervention phase of the study. This score was 7.00. Similarly, for the couples sessions, TPI-C scores remained steady for the control phase session and the intervention phase session.

Dyad 8 (CareBear and KC): Quantitative HRVC and PS Results

Given missing data for this dyad, HRVC correlations and PS analysis was not completed.

Triad Couple With Therapist: Therapist CareBear and Clients Jimmy and KC

Triad Couple with Therapist consisted of a 61-year-old female therapist, a 31-year-old male, and a 30-year-old female client. This couple's triad met in person for a total of three sessions, two during the control phase without intervention and one session during the intervention phase over approximately 3 months. Of these three sessions, two sessions led to successful data collection for HRVC and IBI. In reviewing couples' session data from one control and one intervention session, analysis of HRVC, IBI, MAIA-2, TPI, and PS data follows. Data were gathered for two couples' therapy sessions during the control phase and one therapy session during the intervention phase. These couples therapy sessions were conducted with Jimmy and KC as clients and CareBear as therapist.

Limited data were available from couples sessions, yet the data collection from control and intervention phases did come through for at least one session in each phase. Hence, available data were analyzed and reviewed during the couples session, adding an additional lens to the use of coherence-building techniques during individual and couples sessions. Pre and Post intervention data were collected and analyzed based on the data that were collected. The

following table summarizes mean HRVC for control and intervention phases of entire therapy sessions. Additionally, average TPI scores from control and intervention phases are listed.

Table 54

Couples Triad, CareBear, Jimmy, and KC, HRVC, and TPI

	CareBear	Jimmy	KC
Mean HRVC Pre Intervention	1.946	1.678	1.564
Mean HRVC Post Intervention	1.454	1.388	1.454
TPI Pre	5.74	7.00	7.00
TPI Post	6.83	7.00	7.00

Participants (CareBear & Therapist, Jimmy & Client, KC & Client) Demographics

See Dyad 1 and Dyad 8 for participants' demographic descriptions.

CareBear's Pre / Post Assessment Data and Analysis

See Dyad 1 for CareBear's Pre / Post Assessment Data and Analysis.

CareBear Quantitative HRVC Results

Based on data gathered from two pre-intervention sessions and one post-intervention session, CareBear's HRVC mean values for pre-intervention during couples sessions was 1.946 and 1.454 for post-intervention. This demonstrates a decrease in mean coherence values during the intervention phase of the study from the mean coherence value during the control phase of the study. Data were missing for one pre-intervention session. CareBear's mean coherence during couples' sessions indicated higher mean coherence pre-intervention and lower mean coherence post-intervention, as with the clients as well.

CareBear Survey Results: TPI-T

Within this triad and the couples sessions, CareBear's TPI-T average pre-intervention was 5.74 and mean score during intervention sessions was 6.83, which indicates and increase in therapist's perceived therapeutic presence between the control and the intervention phase.

Therapist CareBear and Clients Jimmy and KC Quantitative HRVC Results

CareBear's mean coherence values during couples sessions pre-intervention and post-intervention were 1.946 and 1.454 respectively. Data were gathered for two couples therapy sessions during the control phase, one of which included only partial data for KC, and one therapy session during the intervention phase. KC's mean coherence values during couples' sessions pre-intervention and post-intervention were 1.564 and 1.454 respectively, indicating a decrease with intervention phase.

With limited sessions compared to individual sessions, KC's mean coherence value during couples' sessions was higher during control phase and lower during intervention phase compared to individual sessions. Jimmy's mean coherence values during couples' sessions pre-intervention and post-intervention were 1.678 and 1.388 respectively. Compared to individual sessions, Jimmy's mean coherence value during couples' sessions was higher during control phase and lower during intervention phase compared to individual sessions. All triad members, therapist and clients alike, demonstrated higher coherence pre-intervention than with intervention. Given minimal data available and analyzed, this finding might indicate further study to investigate difference in coherence values during individual versus couples' therapy sessions.

Jimmy and KC Survey Results: MAIA-2

See Dyad 1 for Jimmy's MAIA-2 survey results and Dyad 8 for KC's MAIA-2 survey results.

Clients Jimmy and KC Survey Results: TPI-C

TPI results were assessed and compared between control and intervention phases. Jimmy and KC completed TPI-C questionnaires independently after couples' sessions. TPI-C results indicated scores of 7.00 pre and post for both Jimmy and KC. These scores indicate a high level of therapeutic presence according to both clients' perceptions of their therapist.

Triad Couple Quantitative HRVC, PS Results / Intervention Period Plots, HRVC during HLI and S&L

HRVC line charts indicate inconsistent PS between triad members during the intervention period of HLI at the end of the intervention sessions. There is not enough data to draw conclusions about PS based on one intervention time interval during one session. See Appendix R for line charts graphing coherence over time during this intervention phases of the couples' therapy session.

Summary / Conclusions

This chapter reviewed case study dyad summaries of individual HRVC, IBI, and IA as well as PS during dyadic interactions during intervention periods. Details of each individual dyads' multiple data streams were summarized and analyzed. Additionally, overall assessment based on analysis of HRVC and IA led to analysis of the entire group of all therapists as well as the group of all clients combined. PS analysis included line plots of client/therapist HRVC and IBI to assess for synchrony within the therapeutic dyad. Chapter 5 will provide a discussion of results, correlational analysis among data streams, limitations and assumptions of this study,

implications of this research, and suggestions for future research directions based on findings from this study and potential pathways for global, social, and individual shifts in coherence.

Chapter 5: Discussion

In this chapter, findings from this study will be discussed along with limitations and suggestions for future research. The findings that were presented in Chapter 4 will be discussed along with how they relate to the research questions and hypotheses posed in Chapters 2 and 3. Given this multiple case study format, each dyad will be discussed with review of the multiple data streams. Further, discussion will include analysis of interoception and HRVC values of the group of therapists as a whole and of the entire group of clients. Exploration will also include assessment of HLI and Shift and Lift as therapeutic interventions along with PS analysis during these intervention time intervals.

Research questions for this study include: What are the impacts of coherence-building techniques on HRV, coherence, interoceptive awareness, regulatory capacity, therapeutic presence, and physiological synchronization during psychotherapy sessions? Correlations within multiple dyads were designed to address the following hypotheses. The relationship of data to hypotheses will be further evaluated and discussed in the conclusions of this dissertation study.

Hypotheses for this study, with its multiple data streams, included:

- Physiological Synchronization (PS) and Heart Rate Variability Coherence (HRVC) increases over time with practices of HLI and Shift and Lift.
- PS and HRVC increases during HLI and Shift and lift practices.
- Heart Lock-In practice increases HRV, *heart rhythm coherence*, and states of *psychophysiological coherence*.
- Heart Lock-In practice increases RSA and vagal tone, affecting the parasympathetic nervous system, relaxation response, and synchronization.

- Heart Lock-In practice informs and enhances IA and subjective observation and assessment of one's internal state.
- Heart Lock-In practice enhances therapeutic presence.
- Shift and Lift serves as a practice during therapy sessions for repair or recentering.
- Shift and Lift practice indicates shifts in coherence and physiological synchronization.
- Shift and Lift enhances coherence levels: HRVC and PS.
- Shift and Lift during session increases relational resonance and perceptions of therapeutic presence, as indicated by the TPI.
- Shift and Lift along with HLI increases self-awareness and self-regulation as indicated by IA, HRVC, TPI, and PS.

Dyad 1: Therapist CareBear and Client Jimmy

CareBear and Jimmy both reported positive rapport in their work together therapeutically. CareBear, who had trained with HeartMath years ago, indicated the use of heart-based techniques in her clinical practice and welcomed the structure of incorporating the HLI at the beginnings and ends of sessions as well as the Shift and Lift intervention. In the end, though, CareBear did not engage any Shift and Lift interventions during the sessions with Jimmy. While Jimmy reported a positive therapeutic rapport before and after the study, he also stated (in the post-study interview) that the therapeutic interventions were a "waste of time and not useful." Given that Jimmy had been in therapy for a long time and regularly tracked HRV measures outside of therapy, these interventions may not have been as novel for Jimmy as for clients new to the interventions. CareBear, on the other hand, noted that Jimmy has decided to engage in some life transitions and wondered if these changes may have been related to the study.

Skills acquisition assessments with CareBear indicated decreased mean coherence from pre to post study in all assessment time intervals, which included baseline/resting, stress preparation, and coherence-building techniques. This decrease in HRVC could have been attributed to many factors, including a time-challenge and apparent stressor during the post-study assessment where CareBear did not have the sensor for our meeting and traveled to her office where she settled into the assessment after relocating and between clients.

Both CareBear's and Jimmy's mean HRVC values increased during the intervention phase of this study, and CareBear's perception of therapeutic presence also increased. Likewise, most subscales of the MAIA-2 indicated increase or no change from pre to post study for both CareBear and Jimmy, with the exception of Jimmy's decreased score in the Not-Distracting subscale. Overall, these results might be suggestive that use of the HLI intervention during therapy sessions could potentially increase HRVC, capacity for self-regulation, and IA. There was not enough variance in TPI scores to assess for suggestive nor significant findings related to TP. Linking this quantitative data with qualitative assessment, CareBear's subjective report of benefits, such as expansion into heartspace and self-regulation, through use of HLI during therapy sessions appeared congruent and confirmed quantitative changes that indicated increase in coherence, IA, and PS and demonstrated synchrony between client and therapist during HLI interventions. Jimmy also reported that he already tracks HRV and other measures using a different instrument, so his subjective report about the intervention being useless could be related to his personal use of tracking quantitative measures and his perception of a strong relationship with his therapist before this study.

Correlations of HRVC from control to intervention sessions indicated an increase in coherence for both client and therapy, which aligns with the hypothesis that the HRVC would

increase with use of HLI interventions at the beginning and end of therapy. Additionally, with comparisons between intervention and non-intervention time intervals of sessions with implementation of intervention, there did not seem to be a pattern of increase during the intervention interval. This could be due to limited sessions and lack of concise time measures. No consistency was noted between client and therapist on MAIA-2 subscales change before and after the study. Further, there was no change in Jimmy's TPI score pre and post intervention so these numbers were not correlated between therapist and client.

Line charts assessing PS within this dyad indicated synchrony at times during intervention phases, although there was not a consistency in this finding and not enough data for conclusive analysis to assert significant correlation. Further study would be necessary. Mean coherence scores during the HLI interventions at the beginning of the session, for both CareBear and Jimmy during control and intervention phases, were higher than the averages during HLIs at the end of sessions. Implementation of the Shift and Lift intervention was not reported by CareBear during this study, which could also indicate a rhythm within therapy sessions that did not require this intervention.

Overall impressions of use of intervention as it relates to IA, TP, and HRVC correlations were inconclusive for this dyad. Intervention phase HRVC values were found to be greater than during the control phase for both client and therapist seems to be the most significant findings for this dyad, although with the potential PS during interventions. Even the qualitative interview data revealed inconsistencies within this dyad's report of impact on therapy and therapeutic process. Regarding skills acquisition based on pre and post assessment data from CareBear, mean HRVC values before and after study indicated a decrease in all areas of resting, stress preparation, and coherence-building phases. These results could also reflect the fact that

CareBear had studied with HeartMath and practice heart-based coherence-building skills prior to this study and as a practice during and outside of therapy sessions.

Dyad 2: Therapist Illona and Client Luz

Illona and Luz both reported enthusiasm about engaging in this study and reported positive outcomes both individually and relationally based on engagement with the interventions. Therapy sessions with Illona and Luz were held virtually, within a secured and online format. Both Illona and Luz reported benefits from the intervention practices, including discovering effective skills to use when under stress. Illona described a somatic experience of stress being lifted during the Shift and Lift interventions as well as increased calm and ease when practicing and following the practice of coherence-building interventions, during and outside of therapy. Moreover, Luz reported increased capacity to find center and calm especially in these highly challenging and stressful times.

Based on the quantitative data gathered and assessed, mean HRVC increased for both Illona and Luz during the intervention phase compared to the control phase. This finding is consistent with the hypothesis that HRVC increases with coherence-building interventions. Additionally, TPI results indicate client's perception that therapeutic presence increased during intervention phase. However, therapist's perception of therapeutic presence decreased during intervention phase from control phase. In reviewing pre and post results of IA with its 8 subscales, there were no noted consistencies that paralleled client and therapist report and not enough data to compare IA with HRVC, TP, and PS.

Unfortunately, there was not enough HRVC data to fully analyze PS between client and therapist. Skills acquisition results for Illona indicated a decrease in HRVC during resting and stress preparation phases of the assessment process, with a slight increase from pre to post study

during the coherence-building phase and a greater increase during reflection phase after assessment during post-study interview. During the interview and Illona's qualitative report, Illona indicated benefits from learning these coherence-building practices along with an intention to continue the practice as well as admission that she did not consistently practice independently during the study. Minimal training and practice might have influenced results.

Dyad 3: Therapist Vera and Client Betty

Vera and Betty both reported benefits from learning coherence-building techniques and engaging in this research study, specifically related to increased body awareness. Interestingly, Vera showed no increase on the MAIA-2 subscale of Body Listening while Betty showed an increase on this scale post-study. Vera's biggest take-away was an increase in somatic awareness and feeling more deeply in her body during therapy sessions, according to her post-study report, while also increasing curiosity about how to bring somatic awareness into sessions more directly with clients. Similarly, Betty reported transformational experiences, connections between emotions and somatic awareness, and a deepening of spiritual grounding along with deeper trust and connections with nature and in therapeutic relationship. Vera described an experience of embodiment based on practicing these coherence-building tools as well as an interest in discernment about non-verbal interconnectivity within herself and with clients. Vera also reported that Betty was attuned and engaged with interventions and therapeutic healing.

During the post-study interview, after engaging in art-making and reflective processing, the images created by Vera and by this researcher during that time seemed strikingly similar visually. We both got a laugh out of the similarity and interconnectivity of a process with which we engaged online. Skills acquisition assessments with Vera indicated increased mean coherence from pre to post study in the resting and stress preparation phases and a decrease in mean

coherence in the coherence-building phase of the assessment. These increases indicate attainment of skills related to stress preparation along with an increased coherence during resting phase. However, the decrease in coherence during the coherence-building phase, although minimal, brings up uncertainty as to what occurred and could be attributed to multiple factors that were not assessed directly. Vera reported personal interest in the coherence-building tools for self-care and therapy.

Both Vera's and Betty's mean HRVC values increased during the intervention phase of this study, and Vera's perception of her therapeutic presence also increased. There was not enough variance in TPI scores to assess for suggestive nor significant findings related to TP. All subscales of the MAIA-2 indicated increased IA for Betty, and scores for all but two subscales indicated increase from pre to post study for both Vera. No consistency was noted between client and therapist on MAIA-2 subscales change before and after the study. Further, there was no change in Betty's TPI score pre and post intervention, so these numbers were not correlated between therapist and client.

Overall, these results might be suggestive that use of the HLI intervention during therapy sessions could potentially increase HRVC, capacity for self-regulation, and IA. Linking this quantitative data with qualitative assessment, Vera's subjective report of benefits, such as increase somatic awareness and embodiment, through use of HLI during therapy sessions is not reflected in self-report of IA. However, qualitative reports from Vera and Betty both appears congruent and confirmed with quantitative changes that indicate increase in coherence, IA, and PS that demonstrated synchrony between client and therapist during HLI interventions. Further, Betty emphasized increased attunement and resonance within therapeutic relationship and noted that these felt heart connections were experienced deeply even via telehealth.

Correlations of HRVC from control to intervention sessions indicate an increase in coherence for both client and therapist, which aligns with the hypothesis that the HRVC would increase with use of HLI interventions at the beginning and end of therapy. Additionally, comparisons between the intervention and non-intervention time intervals of sessions with implementation of intervention, both Vera's and Betty's mean HRVC during intervention time intervals were higher than during non-intervention time intervals. Further, Betty's mean HRVC increased even during the Shift and Lift intervention while Vera's mean coherence did not.

While assessing PS through images of HRVC and IBI line graphs, Vera and Betty appeared synchronized during most of the intervention times with some exceptions demonstrating asynchrony at times. See Figures in Appendix O. Line charts assessing PS using HRVC over time and IBI data within this dyad during intervention time intervals indicated synchrony during intervention phases. Mean coherence scores during the HLI interventions at the beginning of the session, for both Vera and Betty intervention phase, were higher than the averages during HLIs at the end of sessions and also higher than mean HRVC during Shift and Lift intervention.

Overall impressions of use of intervention as it relates to IA, TP, and HRVC correlations indicate increased therapeutic presence and coherence for Vera as well as increased coherence during intervention phase as well as intervention time intervals for both Betty and Vera. Most significant findings for this dyad seemed to be the qualitative report of increased somatic awareness, increased coherence with interventions, and Betty's report of deeper therapeutic alliance and attunement within therapeutic relationship as well as increased stress-reduction in her personal experience. Qualitative interview data revealed consistencies within this dyad's

report about the impact of coherence-building interventions on therapy, therapeutic relationship or presence, and the therapeutic process.

Dyad 4: Therapist Vera and Client Aelin

Vera reported increased somatic awareness and embodiment in response to this research study and learning coherence-building skills. See above, in Dyad 3 review, for Vera's skills acquisition summary results. Aelin did not complete the post-study questionnaire survey, so no data report exists from Aelin in regard to what she learned from the study. Vera reported that Aelin's anxiety symptoms seemed to lessen with interventions and that the coherence-building tools appeared to be beneficial for Aelin in terms of self-regulation.

Both Vera's and Aelin's mean HRVC values decreased during the intervention phase of this study. Further, mean HRVC scores for HLI at the end of sessions were higher than the mean HLI at the beginnings of sessions. No Shift and Lift was reported from Vera during sessions with Aelin. Mean HRVC scores during intervention intervals were higher than non-intervention time between HLIs. Vera's perception of therapeutic presence increased during the intervention phase while Aelin's report of therapeutic presence stayed the same. Aelin did not complete the post-study MAIA-2 survey, so these data were not available.

Overall, these results suggest that use of the HLI intervention during therapy sessions could potentially increase HRVC and capacity for self-regulation. There was not enough variance in TPI scores to assess for suggestive nor significant findings related to TP. Linking quantitative data with qualitative assessment, Vera's subjective report of benefits, such as embodiment and increased somatic awareness, through use of HLI during therapy sessions appeared congruent with quantitative changes that indicate increased coherence with intervention phase as well as PS that demonstrated synchrony between client and therapist during HLI

interventions. Line charts assessing PS within this dyad indicated synchrony at times during intervention phases, although some inconsistencies were noted.

Correlations of HRVC from control to intervention sessions indicate a decrease in coherence for both client and therapist, which rejects the hypothesis that HRVC would increase with use of HLI interventions at the beginning and end of therapy. Additionally, comparisons between the intervention and non-intervention time intervals of sessions with implementation of intervention reveal inconsistencies in the data. Both Vera's and Aelin's mean HRVC during intervention time intervals were higher than during non-intervention time intervals between HLIs.

While assessing PS through images of line graphs showing HRVC over time and IBI data, line charts revealed some synchrony during intervention phases. Vera and Aelin appeared synchronized during some of the intervention times with some time intervals demonstrating asynchrony at times. See figures in Appendix P. Mean coherence scores during the HLI interventions at the end of the session, for both Vera and Aelin, were higher than the averages during HLIs at the beginning of sessions, which suggested increased coherence and self-regulation at the end of the session compared with the beginning.

Overall impressions of use of intervention as it relates to IA, TP, and HRVC correlations indicate increased perception of therapeutic presence for Vera along with increased HRVC during interventions at the end of sessions. Inconsistent though was the decrease in mean HRVC during the intervention phase. Most significant findings for this dyad seemed to be the qualitative report of increased somatic awareness and embodiment for Vera along with Vera's report of Aelin's increased capacity for self-regulation and presentation of decreased anxiety.

Dyad 5: Therapist (and Researcher) Lucy and Client Norah

Lucy and Norah engaged in this research process together and both have reported benefits to the practices. Both Lucy and Norah continue to use the interventions personally and professionally as self-care and self-regulatory support. Lucy has engaged in heart-focused practices for some time now, and Norah has reported appreciation for the structure and specific tools while navigating grief, loss, relational challenges, and trauma recovery. Norah did not complete the post-study survey questionnaire, so these data are missing.

Skills acquisition assessments with Lucy indicated decreased mean coherence from pre to post study in the resting phase and increased mean HRVC during the stress preparation and coherence-building phases of the post-study assessment. The decrease in HRVC during resting phase could indicate stressors present while resting. Moreover, the increase in mean HRVC during stress preparation and coherence-building phases implies increased skills acquisition apparent for stress preparation and coherence-building. Lucy reportedly noted increased appreciation and reverence for coherence-building techniques as a therapeutic tool.

Both Lucy's and Norah's mean HRVC values increased during the intervention phase of this study. Lucy's perception of TP increased slightly while Norah's perception of TP decreased during the intervention phase. Likewise, Lucy's MAIA-2 results indicated increases on all subscales while Norah's scores indicated increase or no change on all subscales.

Overall, these results suggest that use of the HLI intervention during therapy sessions could potentially increase HRVC, capacity for self-regulation, and IA. There was not enough variance in TPI scores to assess for suggestive nor significant findings related to TP. Linking quantitative data with qualitative assessment, Lucy's subjective report of benefits such as increased attuned presence and relational resonance through use of HLI during therapy sessions

appeared congruent and confirmed quantitative changes that indicate increase in coherence, IA, and PS that demonstrated synchrony between client and therapist during HLI interventions. See the figures (graphs) in Appendix Q.

Correlations of HRVC from control to intervention sessions indicated an increase in coherence for both client and therapy, which aligned with the hypotheses that the HRVC would increase with use of HLI and Shift and Lift interventions. Additionally, comparisons were evaluated between the intervention and non-intervention time intervals of sessions with implementation of intervention. HLI at the beginning and end of sessions indicated higher mean HRVC values for both therapist and client during these interventions. Additionally, when Lucy engaged with the Shift and Lift intervention, data revealed increased HRVC for both therapist and client. No consistency was noted between client and therapist on MAIA-2 subscales changes before and after the study.

Line charts assessing PS within this dyad indicated fairly consistent synchrony between client and therapist during interventions. Mean coherence scores during the HLI interventions at the ends of sessions, for both Lucy and Norah during intervention phase, were higher than the averages during HLIs at the beginnings of sessions. This indicates a slight increase in coherence at the end of session compared to the beginning. Implementation of the Shift and Lift intervention was remarkable in that Lucy's mean HRVC increased during the multiple implementations of Shift and Lift as did Norah's mean HRVC during these time intervals.

Overall impressions of use of intervention as it relates to IA, TP, and HRVC correlations indicated increase in IA and HRVC as well as PS present during interventions. Data related to TP is inconsistent with these HRVC, PS, and IA results, perhaps due to inconsistencies and/or little variance in scores. Significant findings include PS during interventions as well as increased

HRVC during intervention phase of the study as well as during intervention time intervals of therapy sessions. Intervention phase HRVC values were found to be greater than during the control phase for both client and therapist, and PS seemed apparent upon review of the line graphs correlating HRVC and IBI data for both therapist and client.

Dyad 6: Therapist (and Researcher) Lucy and Client HZ

See above, Dyad 5, for summary related to Lucy's skills acquisition and MAIA-2 results. Lucy reportedly enjoyed engaging in coherence-building techniques with HZ that seemed to be useful for HZ as stress-reduction and regulatory techniques during and between therapy sessions. HZ did not complete the post-survey questionnaire, so this limits data for analysis.

Lucy and HZ demonstrated increased IA scores post-study on all eight subscales of the MAIA-2, with the exception of Trusting which decreased for HZ. Lucy reported that HZ was struggling with various stressors in life, and HZ reported during therapy that the coherence-building techniques were helpful in decreasing stress and engaging with somatic connections that helped ease anxiety-provoking thoughts. This subjective report demonstrated consistency with HZ's increased scores of IA post-study compared to pre-study.

Based on the quantitative data gathered and assessed, mean HRVC decreased for Lucy. Data could not be assessed for HZ due to missing data during intervention phase. Hence, a comparison of mean HRVC values cannot be evaluated for this dyad. Additionally, TPI results indicated therapist's perception that TP increased during intervention phase while client's perception of TP did not change, based on TPI-C results. In reviewing pre and post results of IA with its 8 subscales, there were no noted consistencies that paralleled client and therapist report and not enough data to compare IA with HRVC, TP, and PS. Unfortunately, there was not enough HRVC data to fully analyze PS between client and therapist.

Dyad 7: Therapist Jill and Client Leigh

Jill reported enthusiasm, gratitude, and positive movement toward greater self-awareness and regulation based on implementation of coherence-building techniques related to personal and professional life. Jill and Leigh met online for the length of the study, and Leigh terminated therapy after the study. Jill reported that Leigh showed improvement in therapy and reported access to skills through the implementation of coherence-building skills.

While Jill reported regret about not practicing coherence-building activities outside of therapy sessions, she acknowledged that the interventions were helpful during therapy sessions and that she intends to continue with the coherence-building practices to support self-care and therapeutic presence. Jill also reported that it felt easier for her to drop into coherence when guided during post-assessment practice than when she was leading a process during therapy sessions. Consistent with Jill's report, Leigh also reported benefits from these coherence-building practices that included inner calm, increased somatic awareness, relational patience/presence, and connection with self, other, and the world.

This subjective report demonstrated consistency with Leigh's increased scores of IA post-study compared to pre-study. Leigh's IA scores increased on each scale post-study. Jill's IA scores also indicated increase on some scales yet not as much of an increase along with a decrease on the attention-regulation scale. This finding may indicate unrelated attention regulation challenges that are consistent with Jill's subjective report.

Based on quantitative data gathered and assessed, mean HRVC increased for both Jill and Leigh during intervention compared to control phase. This finding supports the hypothesis that HRVC increases with coherence-building interventions. Additionally, TPI results indicated therapist's perception that TP increased during intervention phase. However, client's perception

of therapeutic presence remained the same, based on TPI-C results. In reviewing pre and post results of IA with its eight subscales, there were no noted consistencies that paralleled client and therapist report and not enough data to compare IA with HRVC, TP, and PS.

Unfortunately, there was not enough HRVC data to fully analyze PS between client and therapist. Skills acquisition results for Jill were quite remarkable, with post-study results indicating considerable increases in mean HRVC during all phases of the assessment as well as during the reflective period of the interview/assessment process. Based on her qualitative report during the post-study interview, Jill specified that she felt more at ease being led by the process as opposed to leading the interventions during therapy with some anxiety. The sizeable increase in Jill's mean HRVC values post-study could indicate skills acquisition of coherence-building techniques that can support Jill's self-care, self-regulatory capacity, IA and TP. Further, minimal training could have been a limitation. Lastly, analysis of all measures was inconclusive and beyond the scope of this study.

Dyad 8: Therapist CareBear and Client KC

CareBear and KC reported positive results from the use of coherence-building interventions during therapy sessions. CareBear, who had trained with HeartMath years ago, indicated reminders of the benefits of using coherence-building and heart-centered tools personally and professionally. While CareBear reported that engagement in the study served as a reminder to use coherence-building tools regularly, KC reported that the use of coherence-building skills in therapy resulted in increased inner calm and more closeness to her therapist and with her spirituality. CareBear reported that KC's engagement in the interventions was minimal due to practicalities of KC's schedule and limited therapy sessions during the study.

Skills acquisition assessments with CareBear indicated decreased mean coherence from pre to post study in all assessment time intervals, which included baseline/resting, stress preparation, and coherence-building techniques. This decrease in HRVC could have been attributed to many factors, including a time-challenge and apparent stressor during the post-study assessment where CareBear did not have the sensor for our meeting and traveled to her office where she settled into the assessment after relocating and between clients.

CareBear's mean HRVC values increased during the intervention phase as compared to the control phase of this study, whereas KC's mean coherence scores increased. Minimal data was used with this dyad, so further study would need to occur to reach significant conclusions. Based on qualitative report linked with these quantitative HRVC results, KC appeared to benefit from the interventions. KC's mean HRVC results corroborate with the hypothesis that coherence-building interventions increase HRVC. KC also reported feeling closer to her therapist which is not necessarily indicated with the TPI values that remained the same pre and post study. CareBear's perception of therapeutic presence decreased, indicating a decrease in CareBear's perception of her therapeutic presence with KC. Given that KC did not complete the post-study MAIA-2 questionnaire, these data were not analyzed nor correlated within this dyad. There was not enough variance in TPI scores to assess for suggestive nor significant findings related to TP.

Overall, these results suggest that the HLI intervention during therapy sessions potentially increased HRVC, and resulting capacity for self-regulation, for KC and not necessarily for CareBear. Linking this quantitative data with qualitative assessment, CareBear's subjective report of benefits, such as expansion into heartspace and self-regulation, through use of HLI during therapy sessions appeared congruent with KC's experience of increased closeness and connection with CareBear.

Overall impressions of use of intervention as it relates to IA, TP, and HRVC correlations are inconclusive for this dyad given limited data acquisition. Unfortunately, there was not enough HRVC data to fully analyze PS between client and therapist. Skills acquisition results for CareBear were not obvious since mean HRVC values indicated a decrease in HRVC during all phases (resting, stress preparation, and coherence-building) of the assessment post-study. These results could reflect a threshold level of CareBear's previous HeartMath trainings and current style of therapy that incorporates heart-based coherence-building skills even prior to this study and as a practice during and outside of therapy sessions.

Triad Couple With Therapist: Therapist CareBear and Clients Jimmy and KC

Overall findings of qualitative reports can be found in summaries for Dyads 1 and 8 with Jimmy and KC, respectively. The uniqueness of assessing coherence during couples sessions came about unintentionally, as CareBear was working with both Jimmy and KC individually and as a couple. Therefore, CareBear and clients also gathered data throughout couples sessions. Based on data collected and analyzed, mean HRVC values for all members of this triad decreased from the control phase to the intervention phase. Additionally, during the intervention time interval of the one couples sessions that were recorded, PS was not indicated nor apparent during the HLI of this couples session. Again, data collected were minimal and not enough to reach conclusions. However, this information regarding decrease in mean HRVC during intervention phase along with lack of PS during intervention could lead to further study and curiosity, especially given that mean HRVC increased for clients and therapist (with the exception of CareBear's mean HRVC decrease in Dyad 8 with KC) during individual sessions. Further study could warrant more information and access to correlating couples sessions with

individual sessions, for example. Confounding factors must be considered as well, for more in-depth analysis and assess for statistical significance.

Review of MAIA-2 correlations within this triad was not conducted since KC did not complete the post-study questionnaire. Regarding TPI, CareBear's TPI score increased by 1.09 post-study, indicating CareBear's perception of increased TP while both client's TPI scores indicated no change in perceptions of therapeutic presence with intervention.

Overall, results for this triad are inconsistent. KC reported transformation based on use of coherence-building skills, as she reported increased calm and connection to spirituality and her therapist. Similarly, CareBear reported benefits from the practice within therapy sessions. On the other hand, Jimmy reported no benefit of using the interventions. A question arises about how coherence is impacted during a couples session compared to individual therapy sessions. Further study may reveal these differences.

Skills Acquisition—Therapists

This study included assessment of skills acquisition of coherence-building techniques for therapists as a form of self-care as well as a therapeutic skill during therapy sessions with clients. Hence, these skills were assessed before and after the study, in an online private interview with each therapist participant. Results from the skills acquisition assessment indicated differences for each therapist participant. When assessing all therapists as a group, post-study results showed a significant difference from pre-study (according to *z* score calculations). Analysis included use of *z* scores with a guideline that a *z* score greater than 10 would be significant. The difference of mean HRVC scores from 1.478 pre-study to 2.893 post-study has been interpreted as significant based on the z score of 17.84 for T2 (stress preparation phase) HRVC change in value from pre to post study (with T2 pre as control and T2 post as target). This significant *z* score with increase

of coherence post-study confirms the hypothesis that therapist coherence levels (and possibly therapists' capacity for self-regulation) increased significantly post-study during the Stress Prep, T2 phase. More specifically, this analysis is based on mean average scores for all therapists during the T2 phase of the assessment.

Further, mean coherence values for all therapists decreased from 2.147 during resting phase, T1 Pre, to 1.478 during stress prep phase, T2 Pre, and increased from T1 Post to T2 Post with *z* scores of -6.78 pre-study and +6.97 post study. These results seem to indicate a significant increase from resting to stress prep post-study with an equally significant decrease from resting to stress prep pre-study (when we are looking at T1 Pre as control and T2 Pre as target, then T1 post as control and T2 post as target).

Overall, I argue that these stress prep phase results indicated that the use of therapist's own skills (pre-study T2) compared to skills developed during the study (used during T2 post-study), that coherence-building techniques used during the study have a positive impact on therapist coherence levels than using their own skills for stress prep during the baseline pre-study. Moreover, it is important to acknowledge confounding factors as well as the chosen method of statistical analysis which used *z* scores and related assumptions.

When looking further at T3 compared to T1 pre and post as well as T3 compared with T2 pre and post, it seems that the significant *z* scores indicated significant difference between T3 post (HLI) and T1 post (resting) as well as an even greater significant increase between T3 Pre (HLI) and T2 Pre (stress prep). The coherence values from pre-study include T2 Pre (Stress Prep) of 1.478 and T3 Pre (HLI) of 2.654 with *z*-score of 14.83 indicating a significant increase in HRVC from stress prep to HLI. This tells me that the HLI was effective pre-study at increasing coherence during the baseline assessment. Further, during post-study comparison of

T3 with T1, I found a *z*-score of 9.86, which indicates that the 1.101 difference between coherence values during T3 (HLI) and T1 (resting) is significant. Post-study, the mean coherence value of T1 was 2.115 with mean coherence of T3 being 3.216.

In reviewing data at the individual therapist level, with mean coherence scores and differences between pre and post study values, there was an increase in mean coherence for three of the therapists and decrease for two therapists from T2 pre-study to T2 post-study. Further, maximum coherence values were reportedly much higher during post-study assessment compared to pre-study assessment.

In summary, noteworthy is the main result of the *Z* score = 17.84, which clearly demonstrated skills acquisition based on analyzing the group of therapists who engaged in this assessment protocol. Skills acquisition specifically refers to therapists' acquirement of the new coherence-based practice compared to the old stress preparation approach. Additionally, there was a suggestive decrease pre-study from resting to stress preparation phase versus a suggestive increase post-study from resting to stress preparation phase, both with *Z* scores around 6. This result suggests a drop in the use of old stress preparation skills with a seemingly equivalent increase in coherence when using the new coherence-building technique for stress preparation. A suggestive increase in coherence during T3, coherence-building phase, indicated increased skillfulness of the coherence-building technique, HLI. Finally, baseline resting phase pre and post indicates little to no significant change, potentially indicating justification of T2 and T3 results. That said, individual therapists mean HRVC values during T1 pre and post indicate wide variation among therapists.

Comparative Analysis of Cases

Given the wide variation of data streams and indicators among all eight dyads, comparison across dyads for all data streams is beyond the scope of this study. Analysis of HRVC and IA for therapists as a group and clients as a group indicated suggestive results that confirm multiple hypotheses. With a *Z* score of 5.055 for all therapists and a *Z* score of 4.82 for all clients in the total calculation of the MAIA-2 scale, I conclude that there were positive impacts on IA with overall increases in scores post-study. These results raised curiosity about the generalizability of results and the impact of coherence-building techniques on IA. Unfortunately, analysis of the TPI between therapist and client and within therapist and client dyads during the control phase versus the intervention phase was not conducted because there was little to no variance in TPI-C (and sometimes TPI-T) scores. While analysis of HRVC values pre and post intervention for each therapist and client indicated increases in coherence values with the intervention, this result has been validated based on use of *Z* scores to assess therapists as a group and clients as a group. Further, analysis of HRVC during intervention phases mostly indicated increased in mean HRVC for clients and therapists.

Most notable in the interventions assessments, when a therapist used the Shift and Lift technique (which was done without the client knowing), both therapist and client coherence levels appeared to increase. Further study related to these interventions could offer great implications within the field of therapy, as these results suggest the potential of increases in coherence shifts within a client when the therapist intentionally engages a coherence-building technique—even without the clients' conscious knowing. This researcher has found this to be the most significant and promising finding in terms of potential synchrony between two individuals in a healing and transformative relational field. Lastly, these sessions were conducted in person

and online, with no apparent differentiation between in person sessions or virtual sessions based on the quantitative data gathered. This finding suggests that synchrony involves features and connections that transcend physical proximity.

The study of PS, a growing inquiry with various techniques, offered perspective about how hearts synchronize to each other. Again, the online and in-person formats did not seem to differ, with PS showing up for dyads in person and for dyads online. That said, three of the four dyads (for whom complete data were collected) met online whereas one (Dyad 1) met in person. Based on assessment of line graphs plotted for visual inquiry, most dyads within the intervention phases seemed to be in sync with each other at some points during the interventions of HLI and Shift and Lift. PS was most notably tracked with the intervention time intervals during sessions between Lucy and Norah, which also had the most data points. Least noteworthy were the interventions within Dyad 1 sessions with CareBear and Jimmy, for which the least data points were recorded. PS was assessed using mean HRVC and IBI data, comparatively (see figures in Appendix N). Given this anomalous data with the single male client, future studies might also include exploration of gender dynamics in regard to therapist/client coherence values and synchronization study.

Evaluation of hypotheses include confirmation of multiple investigation points including correlations between and among quantitative appraisal of HRVC, IBI, PS, IA, TP, and qualitative subjective surveys. Overall, this study confirmed that hypotheses that PS and HRVC increased over time with intervention practices both in the assessment of control versus intervention phases and during the intervention intervals of HLI and Shift and Lift practices during therapy sessions. Further, HLI practices increased HRVC and states of psychophysiological coherence as indicated by quantitative and qualitative reports. Assessment of RSA specifically as well as vagal tone

were not directly studied at this time, although frequency-based and spectral analysis data were gathered and may be further evaluated at a future date. HLI practices informed and enhanced IA and subjective observation for many participants, which suggested a potential correlation between HRVC and IA although this relationship is not known to be causal. HLI may enhance TP; however, the lack of variance in TPI-C data resulted in data that were not robust enough to investigate.

The implications and assumptions that Shift and Lift serves as a practice during therapy sessions for repair or recentering has been supported by the HRVC and PS analysis during Shift and Lift. Given the few data points, however, further inquiry could be validating and offer more information regarding potential generalizability for the use of this intervention during therapy sessions. The hypothesis that Shift and Lift practice indicated enhancement of HRVC and PS has been confirmed by suggestive evidence that HRVC increased with Shift and Lift while PS seems apparent based on HRVC and IBI comparative data with client and therapist. Based on subjective report, interventions of HLI and Shift and Lift during session potentially increased relational resonance and perceptions of therapeutic presence, as indicated by the TPI.

Given that TPI data offered some suggestive information to be used in cooperation with quantitative data, this study did not result in conclusive information based on therapeutic presence and the TPI measure. In summary, interventions of Shift and Lift along with HLI seemed to play a part in increased self-awareness and self-regulation as indicated by IA, HRVC, TPI, PS, and qualitative reports of participants. Finally, HLI and S&Ls impacted therapists' and clients' self-care practices, self-awareness, self-regulatory capacity during therapy sessions as well as in day-to-day life. Hence, the impact of these coherence-building techniques could have great implications on therapist self-care practices, therapeutic relational resonance, client and

therapist self-regulatory capacity, and felt connections within and between therapist and clients. It is noteworthy that these interventions seemed to effectively impact therapists and clients HRVC and PS in a virtual format, a topic of future study that could serve the profession of therapy especially as therapy is becoming more acceptable in the online format.

Dyadic work can offer implications that could further be generalized to training programs and groups. This study further demonstrated and encouraged implications of how critical a therapist self-care and practice outside of therapy can be, for the health of therapists and clients alike—an ethical implication for aligned congruent healing capacity. Further inquiry is warranted as it relates to how these interventions impact therapists and clients in session as well as if it makes a difference for therapists to engage in practice outside of therapy. These findings generalize to therapists who are engaged in self-care practices, however some therapists reported lack of practice outside of session. One might investigate how these interventions impact therapists and clients alike based on whether a therapist actually engages in practicing these coherence-building techniques outside of therapy or not.

Limitations, Assumptions, and Biases of This Study

Limitations of this study included a small sample size that served as a pilot study for future research that can assess for generalizable results. The multiple case study format, with its multiple data streams, also led to few participants (eight dyads and five therapists) and irregular therapy sessions. With a priority for clinical integrity, therapists engaged in research as complementary (and hopefully supportive) of regular therapy process. This study included only female therapists with client majority being female and one male client. Demographics of participants were also limited in gender and ethnicity, which was a result of challenges in finding

participants to fit inclusion criteria. Most of the practitioners were experienced practitioners and therapists who have been practicing over 14 years.

Some of the HRVC data were not successfully uploaded to the cloud so not all data were available. Lack of data acquisition occurred for various reasons including technological difficulties and forgotten sensors for participants as well as possible limitations and missed information during technical trainings. Technical trainings included researcher training therapists and therapists training clients, which could lead to error and misunderstandings given the limited time periods of practice and implementation. Further, it is important to note subjectivity with self-report psychometrics that could include response biases along with other confounding factors that were not included in this study. Given subjective measures of this study, there might be biases related to self-report due to complexities and subtleties of inner experiences. These biases could potentially skew data either way, with potential discrepancies from participants' experiences and their report on experience. Further, the TPI-C questionnaire had a small number of items, which limited the capacity for variance and assessment. Lastly, McCraty reported lack of correlation, in general, in comparing physiological and psychometric data (R. McCraty, personal communication, July 18, 2020).

Assumptions and Biases Related to Data Collection and Analysis

Assumptions of *Z* score analysis include independence of time points; whereas, in actuality, these time points are related due to gradual changes in coherence states as well as HRVC measures being calculated in 64-second overlapping windows. Further, *Z* score analyses for this study used $Z = 2$ as a baseline measure of significance and $Z = 10$ as the chosen cut-off to define $Z < 10$ as suggestive and $Z > 10$ as significant in findings.

Additionally, it seems important to note that the researcher also engaged in the study as a clinician with clients who participated in the study. While assumptions and biases related to my past experiences with the use of coherence-building activities could have skewed the data, training in interventions and technology could potentially have been useful compared to other dyads in the study. That said, the therapist in Dyad 1 was also trained in HeartMath technologies years ago, which could have impacted the results of Dyad 1.

This Research Contributions to the Field of Therapy

This innovative study has contributed and will have implications on the field of psychotherapy as well as ongoing research related to self-regulatory capacity, peace building, and increasing the coherent fields of individuals, therapeutic dyads, and global communities at an increasingly stressful time on the planet. Research such as this multiple case study along with further studies born of the conceptualizations in comparing quantitative reports of HRVC, PS, IA, TP, and qualitative reports of subjective lived experience can provide gateways to unchartered territories for pioneers in the shifting field awareness of heart-based living and heart-centered healing foundations. Discoveries from this study will encourage further inquiry to expand and deepen conscious intentional healing capacities within ever-evolving and emergent growth of the human condition. This growth will inevitably integrate subjective and objective data measurements along with the holding container of transpersonal awareness that focuses on the whole person and the whole of humanity with unity and peace as intentions for connections.

Future Research: Where to Go From here?

Future research might include correlations between therapists and clients, or any groups or dyads such as a couple or caregiver/child dyad, with larger numbers of cases and a broader scope of study. Additionally, including additional dyads and more case studies could increase

validity with more participants who can further validate and offer reliable data. A larger sample size could incorporate additional "between group/dyad analysis" as well as "within group/dyad analysis" to increase strength and assessment of statistical significance with more data and additional statistical analyses tools.

As for statistical analysis, additional frequency analysis with HRV power spectrum and exploration of various ways of PS analysis could add to the depth and breadth of this topic of study. Future research may also involve creative measures to incorporate heart-based attunement with art-making as mirror reflections in the heart verses not being engaged in the heart. Art-making with and without heart-based interventions could reveal interesting results. Inspired by the post-study art-making with therapists, and the similarity of shape through imagery (without seeing that which was being created) with Vera and Lucy, an interesting study could bring art into the assessment as a non-verbal assessment tool. Art from the heart could be part of the assessment versus art without any heart-based interventions. How is the heart included in the creative process?

Comparison of the use of interventions with individuals and with couples could also offer thought-provoking study, given the preliminary look at couples' interventions compared to individual sessions interventions offered a window into the potential differences. Furthermore, engaging with groups to assess social and global coherence will continue to offer more information related to the phenomena of PS and HRVC as a study of how humans connect in and through heart-based interventions.

Summary / Conclusions

In summary, findings from this study offer hope for coherence-building interventions as effective and efficient tools for enhancing self-regulatory capacity within therapists and clients as

individuals as well as strengthening interconnectivity within therapeutic dyads. Further, skills acquisition of coherence-building techniques for therapists were apparent as support methods for self-care to bolster health and well-being of therapists and healers in support of others. Overall, I would advocate that increases in therapist and client coherence levels and interoceptive awareness promote increased relational and global coherence. Hence, further studies and advocacy could prove revolutionary for growth and evolution of psychotherapy as a field as well as sustainable transformation within and between individuals, groups, and global communities.

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Appendix A

Informed Consent to Participate in Research—Therapist

Project Title: Exploration of the impact of coherence-building technique on neurobiological regulation, interoception, therapeutic presence, and physiological synchronization

Primary Researcher: Michelle Daly
Phone: 888-888-8888
Email: michelle.daly@email.address

Dear Participant,

You are invited to participate in a dissertation research study seeking to gain understanding of how heart-based interventions impact self-regulation, heart coherence, interoceptive awareness, therapeutic presence, and physiological synchronization within therapist/client dyads. This research is being conducted as part of the requirements of the Ph.D. program at Sofia University located at 1069 East Meadow Circle in Palo Alto, California, 94303. Your participation in the study is greatly appreciated and equally valuable in contributing to a greater understanding of synchrony, therapeutic presence, relational resonance, self-awareness, and self-regulation within therapy dyads.

To participate in this study, you must be over the age of 18 years and comprehend English, be a licensed mental health professional who has been providing psychotherapy services for at least three years, have access to a smart phone and internet, and be open to engaging in heart coherence techniques, self-reflection as well as sharing about your subjective experience of the intervention and delivering this intervention in therapy sessions. If you have a heart arrhythmia and/or if you are on medications (such as beta blockers) that affect your autonomic nervous system, or any psychoactive medications, you will not qualify for the study. As part of the study, you will be asked to participate in an online preliminary survey that should take no more than 10 minutes as well as an informal screening interview that could take 30 minutes. The preliminary survey and interview will allow for assessment of your interest level and experience with will be used to assess your interest in and level of experience with the subject matter. If you are interested in participating further, you will be asked to complete a 60-to-90-minute meeting that will include gathering baseline heart rate variability data and training on the intervention and

data collection methods to be used in the study. This meeting will be held at a mutually agreed upon time and location.

Further, you will agree to engage in the study for thirteen therapy sessions as therapist in the therapeutic dyad. During the first 6 therapy sessions, data will be gathered without intervention. For the seventh therapy session after the initial meeting, you will train your client in the therapeutic intervention and the use of technology that will be implemented throughout the intervention period that includes the next six therapy sessions. During all therapy sessions, heart rate variability coherence data will be continuously gathered for both therapists and clients. Prior to and after the intervention period, therapists and clients will complete questionnaires to assess interoceptive awareness. After each therapy session, therapists and clients will complete a questionnaire indicating perceived therapeutic presence.

All interviews and therapy sessions will be recorded as video recordings for accuracy while gathering data. If it is not feasible to meet with you in person, the interview will be conducted on the phone or by online video-chatting using Zoom.us. (Please see: https://zoom.us/legal for details about Zoom.us' privacy policy.) If more time is needed to complete the interview, a supplemental interview can be arranged that will be no longer than 45 minutes. In-person interviews will be held in a neutral location of your choosing.

To protect your privacy, you will choose a pseudonym, and your identifying information will be protected. The names of any individual you discuss during the interviews will also be changed to a pseudonym and the information will respectfully be held in confidence. All material associated with this study, both digital and on paper, will be password-protected and/or stored in a locked closet. If a professional transcriber is hired to transcribe the interviews, a Transcriber Confidentiality Agreement will be signed by that individual prior to services rendered. A Research Partnership Confidentiality Agreement will also be created to ensure privacy with third party contributors such as HeartMath Institute who will be assisting with data collection and analysis for this research study.

Personal benefits for participating in this study could include a deeper understanding of yourself, heart-brain connections, self-awareness, self-regulation, and enhanced therapeutic presence as well as personal coherence and connection with yourself and others. An additional tool for self-regulatory capacity will have been gained in practicing the Heart Lock-In and Shift and Lift interventions that can be used personally and professionally throughout life. Benefits

may include personal self-regulation along with shifts to deeper connection in relationships. I do not anticipate that you will be exposed to any risks or dangers as a result of your participation. However, as we deepen into ourselves, there might be a risk of dysregulatory states along with learning new levels of regulatory states. In the event that you wish to further process what has arisen during the study, I will provide you with a list of therapists or mental-health professionals if you choose to seek these services as a result of this study.

If you have any questions following the interview, you are welcome to contact me, Michelle Daly, by email at Michelle.Daly@email.address or at (888) 888-8888. I will be happy to discuss any matter you would like to raise and to offer suggestions. If at any point during your participation in this research study you have questions or concerns about your individual rights and/or the manner in which you have been treated, you may contact the chairperson for my dissertation committee, John Elfers, at John.Elfers@sofia.edu or by phone at (650) 493-4430. Additionally, you may contact the Research Ethics Committee Chair, Dr. Fred Luskin, through email at fred.luskin@sofia.edu or by phone at (650) 493-4430.

By signing this document, you confirm your understanding that your participation in this research study is entirely voluntarily and that you may withdraw at any time without penalty or prejudice. Your signature represents the understanding that your information will be held in confidentiality and that the researcher has fully explained the research process clearly, highlighting any risks or benefits, and has answered your questions.

You may elect to request a summary of themes and findings (no individual material will be released) after the final analysis of the research is completed by providing your mailing address at the end of this document. My deep gratitude goes to you for participating in this dissertation research study. When you are ready, please place your signature on the designated line on the next page.

I attest that I have read and fully understand this consent form. Any questions I have about my participation in this research study have been answered to my satisfaction. I understand that my participation is entirely voluntary and that no pressure has been applied to encourage participation. My signature indicates that I meet all participant qualifications, indicating that I am willing to participate in this research study, under the terms described in this document, and to have the findings of overall results published.

Chosen Pseudonym: _____

***Project Title*: Exploration of the impact of coherence-building technique on neurobiological regulation, interoception, therapeutic presence, and physiological synchronization**

Signature Page:

_____	_____	_____
Printed Participant's name	Participant's signature	Date
_____	_____	_____
Researcher's name	Researcher's signature	Date

If you wish to receive a written summary of the overall group findings of this study, please provide your contact information below.

____ Yes. Please send me a summary of the study's findings.

Contact Information (Please Print):

Name: _____

Mailing Address: _____

_____

Phone: _____

Email: _____

Appendix B

Informed Consent to Participate in Research—Client

Project Title: Exploration of the impact of coherence-building technique on neurobiological regulation, interoception, therapeutic presence, and physiological synchronization

Primary Researcher: Michelle Daly
Phone: 888-888-8888
Email: michelle.daly@email.address

Dear Participant,

You are invited to participate in a dissertation research study seeking to gain understanding of how heart-based interventions impact self-regulation, heart coherence, interoceptive awareness, therapeutic presence, and physiological synchronization within therapist/client dyads. This research is being conducted as part of requirements of the Ph.D. program at Sofia University located at 1069 East Meadow Circle in Palo Alto, California, 94303. Your participation in the study is greatly appreciated and equally valuable in contributing to a greater understanding of synchrony, therapeutic presence, relational resonance, self-awareness, and self-regulation within therapy dyads.

To participate in this study, you must be over the age of 18 years and comprehend English, be in therapy with a practicing clinician who has agreed to this study, have access to a smart phone and internet, and be open to engaging in heart coherence techniques, self-reflection as well as sharing about your subjective experience of the intervention and delivering this intervention in therapy sessions. If you have a heart arrhythmia and/or if you are on medications (such as beta blockers) that affect your autonomic nervous system, or any psychoactive medications, you will not qualify for the study. As part of the study, you will be asked to participate in an online preliminary survey that should take no more than 10 minutes as well as an informal screening interview that could take 30 minutes. The preliminary survey and interview will be used to assess your interest in and level of experience with the subject matter. If you are interested to participate further, you will engage with your therapist's guidance regarding training of a therapeutic intervention, Heart Lock-In, along with training on technology to gather data.

Further, you will agree to engage in the study for the thirteen-week intervention period as client within the therapeutic dyad. During the first 6 therapy sessions, data will be gathered without intervention. For the seventh therapy session after the initial meeting, you will be trained by your therapist in the therapeutic intervention and the use of technology that will be implemented throughout the intervention period that includes the next six therapy sessions. During all therapy sessions, heart rate variability coherence data will be continuously gathered for both therapists and clients. Prior to and after the intervention period, therapists and clients will complete questionnaires to assess interoceptive awareness. After each therapy session, therapists and clients will complete a questionnaire indicating perceived therapeutic presence.

All interviews and therapy sessions will be recorded as video recordings for accuracy while gathering data. If it is not feasible to meet with you in person, the interview can be conducted on the phone or by online video-chatting using Zoom.us (please see: https://zoom.us/legal for details about Zoom.us' privacy policy). If more time is needed to complete the interview, a supplemental interview can be arranged that will be no longer than 45 minutes. In-person interviews will be held in a neutral location of your choosing.

To protect your privacy, you will choose a pseudonym, and your identifying information will be protected. The names of any individual you discuss during the interviews will also be changed to a pseudonym and the information will respectfully be held in confidence. All material associated with this study, both digital and on paper, will be password-protected and/or stored in a locked closet. If a professional transcriber is hired to transcribe the interviews, a Transcriber Confidentiality Agreement will be signed by that individual prior to services rendered. A Research Partnership Confidentiality Agreement will also be created to ensure privacy with third party contributors such as HeartMath Institute who will be assisting with data collection and analysis for this research study.

Personal benefits for participating in this study could include a deeper understanding of yourself, heart-brain connections, self-awareness, self-regulation, and enhanced therapeutic presence as well as personal coherence and connection with yourself and others. An additional tool for self-regulatory capacity will have been gained in practicing the Heart Lock-In intervention that can be used throughout life. Benefits may include personal self-regulation along with shifts to deeper connection in relationships. I do not anticipate that you will be exposed to any risks or dangers as a result of your participation. However, as we deepen into ourselves,

there might be a risk of dysregulatory states along with learning new levels of regulatory states. In the event that you wish to further process what has arisen during the study, you can discuss this with your therapist and/or I will provide you with a list of therapists or mental health professionals if you choose to seek these services as a result of this study.

If you have any questions following the interview, you are welcome to contact me, Michelle Daly, by email at Michelle.Daly@email.address or at (888) 888-8888. I will be happy to discuss any matter you would like to raise and to offer suggestions. If at any point during your participation in this research study you have questions or concerns about your individual rights and/or the manner in which you have been treated, you may contact the chairperson for my dissertation committee, John Elfers, at John.Elfers@sofia.edu or by phone at (650) 493-4430. Additionally, you may contact the Research Ethics Committee Chair, Dr. Fred Luskin, through email at fred.luskin@sofia.edu or by phone at (650) 493-4430.

By signing this document, you confirm your understanding that your participation in this research study is entirely voluntarily and that you may withdraw at any time without penalty or prejudice. Your signature represents the understanding that your information will be held in confidentiality and that the researcher has fully explained the research process clearly, highlighting any risks or benefits, and has answered your questions.

You may elect to request a summary of themes and findings (no individual material will be released) after the final analysis of the research is completed by providing your mailing address at the end of this document. My deep gratitude goes to you for participating in this dissertation research study. When you are ready, please place your signature on the designated line on the next page.

I attest that I have read and fully understand this consent form. Any questions I have about my participation in this research study have been answered to my satisfaction. I understand that my participation is entirely voluntary and that no pressure has been applied to encourage participation. My signature indicates that I meet all participant qualifications, indicating that I am willing to participate in this research study, under the terms described in this document, and to have the findings of overall results published.

Chosen Pseudonym: _____

***Project Title*: Exploration of the impact of coherence-building technique on neurobiological regulation, interoception, therapeutic presence, and physiological synchronization**

Signature Page:

_____	_____	_____
Printed Participant's name	Participant's signature	Date
_____	_____	_____
Researcher's name	Researcher's signature	Date

If you wish to receive a written summary of the overall group findings of this study, please provide your contact information below.

____ Yes. Please send me a summary of the study's findings.

Contact Information (please print):

Name: _____

Mailing Address: _____

_____

Phone: _____

Email: _____

Appendix C

Demographic Information and Questionnaire—Therapist

Pseudonym:

Age:

City, state, or country:

Education Level:

o Less than high school degree

o High school degree or equivalent (e.g., GED)

o Some college but no degree

o Associate degree

o Bachelor degree

o Graduate degree

Religion and/or Spiritual Practice

c Nonreligious Secular

c Agnostic

c Atheist

c Christianity-Catholic/Protestant

c Judaism

c Hinduism Sikhism

c Buddhism

c Islam

c Unitarian-Universalism

c Muslim

c Wiccan Pagan Druid

c Spiritualism

c Native American

c Baha'i

c Other/Non-specified

If other religious and spiritual practice, please describe below:

_____

_____

Marital Status

o Single

o Domestic Partner

o Married

o Divorced

o Widowed

o Separated

Gender

o Male

o Female

o Transgender

o Other

Are you currently taking, or have you taken, any medication that affects your heart or nervous system (such as beta blockers, etc.)?

o Yes

o No

Have you been diagnosed with a personality disorder, psychosis, or schizophrenia?

o Yes

o No

Have you been diagnosed with any physical or mental health diagnosis?

o Yes

o No

If so, what is your previous/current diagnosis? _____

For how long have you practiced psychotherapy? _____

Appendix D

Demographic Information and Questionnaire—Client

Pseudonym:

Age:

City, state, or country:

Education Level:

o Less than high school degree

o High school degree or equivalent (e.g., GED)

o Some college but no degree

o Associate degree

o Bachelor degree

o Graduate degree

Religion and/or Spiritual Practice

c Nonreligious Secular

c Agnostic

c Atheist

c Christianity-Catholic/Protestant

c Judaism

c Hinduism Sikhism

c Buddhism

c Islam

c Unitarian-Universalism

c Muslim

c Wiccan Pagan Druid

c Spiritualism

c Native American

c Baha'i

If other religious and spiritual practice, please describe below:

_____

_____

Marital Status

o Single

o Domestic Partner

o Married

o Divorced

o Widowed

o Separated

Gender

o Male

o Female

o Transgender

o Other

Are you currently taking, or have you taken, any medication that affects your heart or nervous system (such as beta blockers, etc.)?

o Yes

o No

What medications are you currently taking? _____

Have you been diagnosed with a personality disorder, psychosis, or schizophrenia?

o Yes

o No

Do you have any previous or current physical or mental-health diagnosis?

o Yes

o No

If so, what was/is your diagnosis? _____

Appendix E

Screening Interview Questionnaire—Therapist

Pseudonym: _____

How do you currently describe your gender identity? _____

How would you identify your race and ethnicity? _____

What language are you most comfortable speaking? _____

Where do you practice psychotherapy? (city, state): _____

How would you describe your worldview, religion, or spiritual practice(s)? _____

_____

_____

_____

Are you a licensed psychotherapist? _____ If yes, type of license: _____

How many years of experience do you have providing psychotherapy? _____

What therapeutic approach/es do you use? _____

_____

Do you have a clinical specialty? _____ If yes, type of specialty: _____

Are you currently taking any medications that affect your heart or nervous system? If so, which medications are you taking? _____

How would you say your heart informs your therapy practice? _____

_____

_____

_____

How would you say your heart informs / influences your personal health?

_____

_____

_____

Do you engage in self-care / self-regulatory practices? _____

If so, how would you describe these practices?

_____

_____

_____

If so, how often do you engage in these practices? _____

Do you have a support network? _____

Would you be open to learning self-care/self-regulatory practices? _____

How would you describe your level of self-awareness, or interoceptive awareness?

_____

_____

How would you define / describe therapeutic presence?

_____

_____

How would you say your therapeutic presence influences your clients?

_____

_____

Appendix F

Screening Interview Questionnaire—Client

Pseudonym: _____

How do you currently describe your gender identity? _____

How would you identify your race and ethnicity? _____

What language are you most comfortable speaking? _____

How do you identify your romantic relationship status? _____

Do you have biological, foster, adopted, or step-children? _____

How long have you been engaged in psychotherapy? _____

How would you describe your worldview, religion, or spiritual practice(s)?

_____

_____

What therapeutic approach/es does your therapist use?

_____

_____

What is the most important factor for you in therapy?

_____

What is the most important quality for you in a therapist? _____

What do you consider your most important core value? _____

How would you define therapeutic presence? _____

_____

_____

Are you currently taking any medications that affect your heart or nervous system? If so, which medications are you taking? _____

How would you say your heart informs your life? _____

Do you engage in self-care/self-regulatory practices? _____

If so, how would you describe these practices? _____

_____

If so, how often do you engage in these practices? _____

How would you describe your support network? _____

What is your greatest need in therapy? _____

How important is the therapeutic relationship to you? _____

Appendix G

Post-Intervention Interview—Therapist

Pseudonym: _____

What was your experience of the HLI and Shift and Lift interventions for yourself?

_____

_____

What was your experience of the HLI and Shift and Lift interventions in relationship to your client?

_____

_____

How has the practice of these interventions and implementation into therapy transformed who you are as a human being, on a personal level, if they have?

_____

_____

How has the practice of these interventions and implementation into therapy transformed who you are professionally?

_____

_____

How has the practice of these interventions, and implementation into therapy, influenced therapeutic relationship(s)?

_____

_____

_____

How would you say your heart informs your therapy practice?

How would you say your heart informs/influences your personal health?

How has this experience influenced your self-care/self-regulatory practices?

What are your intentions, if any, moving forward with this knowledge and experience of regulatory practices?

How have these experiences influenced your relationship to yourself?

How have these experiences influenced your relationship to your clients?

How have these experiences influenced your relationship to your support network, if they have?

_____

_____

How has this experience influenced your level of self-awareness, or interoceptive awareness?

_____

_____

How would you define/describe therapeutic presence?

_____

_____

How have these experiences influenced your therapeutic presence influences your clients?

_____

_____

How has this experience transformed your worldview or spiritual orientation?

_____

_____

Appendix H

Post-Intervention Interview—Client

Pseudonym: _____

How would you describe your experience learning these therapeutic tools of HLI in therapy?

_____

_____

How have learning and practicing these tools (HLI) in therapy influenced your experiences outside of therapy?

_____

_____

How would you describe your experience of the HLI in relation to your therapist during therapy sessions?

_____

_____

_____

Have your priorities in therapy shifted based on using these therapeutic interventions?

_____

_____

_____

Did you notice any changes in your therapist or in the therapeutic relationship during therapy sessions? _____ If so, what were these changes?

_____

_____

How would you define therapeutic presence?

_____

_____

_____

How would you say your heart informs your life? _____

_____

_____

_____

Has this process changed how you engage in self-care/self-regulatory practices?

_____

If so, how would you describe these changes? _____

_____

Has this experience changed your relationships? _____ If so, how would you describe the changes that have occurred?

_____

_____

Has this experience changed your support network? _____ If so, how?

_____

_____

What is your greatest need in therapy? _____

How important is the therapeutic relationship to you? _____

Has this experienced transformed your relationship to your therapist? ___ If so, how?

_____

_____

How has this experience transformed your worldview or spiritual orientation?

_____

_____

Appendix I

Research Partnership Confidentiality Agreement

CONFIDENTIAL AGREEMENT

We, _____, HeartMath Institute (HMI), and _____, Michelle Daly, doctoral student researcher, agree to maintain full confidentiality in regard to any and all data collected, received, and analyzed from the Global Coherence Initiative (GCI) server relating to the research through Sofia University's Ph.D. program.

The scope of collaboration will include data acquisition through the Global Coherence Initiative (GCI) Application which is hosted on an Amazon cloud server (https://cloud.google.com/resources/forrester-iaas-security-2020) for the HeartMath Institute (HMI).

This agreement provides assurance of confidentiality and privacy for research participants. Data collected through the GCI server will be gathered with live time stamps and without identifying information of the research participant. The data will be housed in a private and confidential location, to be shared only with Sofia University researcher and statisticians who will be assisting with data analysis. Hence, all data will be anonymous and will solely be used for research purposes that maintain ethical standards and integrity of confidentiality.

Furthermore, we agree:

1. To hold in strictest confidence the identification of any individual that may be inadvertently revealed during the data collection and analysis.
2. To not make copies of data collected or analyzed, except for the intent purposes of research data collection and analysis, unless specifically requested to do so by the researcher.
3. To store all research-related data and materials in a safe, secure location as long as they are in HMI's possession.

4. To return all data collection and analysis, and any research-related materials to the above-named researcher in a complete and timely manner.
5. To anonymize any data collected and analyzed.
6. To delete all electronic files containing research-related documents from email accounts, computer hard drive, and any back-up devices.

I am aware that I can be held legally responsible for any breach of this confidentiality agreement, and for any harm incurred by individuals if I disclose identifiable information contained in the data and/or files to which I will have access.

HeartMath Director of Research, name (printed) __Rollin McCraty _____

HeartMath Director of Research, signature __ 

Date: April 13, 2021

Michelle Daly, Doctoral Student Researcher, signature _____

Date _____

Michelle Daly, Doctoral Student Researcher, signature _____

Date _____

Appendix J

Heart Lock-In Technique Script

Step 1: Focus your attention in the area of the heart. Imagine your breath is flowing in and out of your heart or chest area, breathing a little slower and deeper than usual.

Step 2: Activate and sustain a regenerative feeling such as appreciation, care or compassion.

Step 3: Radiate that renewing feeling to yourself and others.

Source: This Heart Lock-In script is from the Reslience Advantage™ Skills for Personal and Professional Effectiveness, Institute of HeartMath, HeartMath LLC training manual (2014).

Appendix K

Shift-and-Lift Technique Script

Step 1: Heart-Focused Breathing™

Focus your attention in the area of the heart. Imagine your breath is flowing in and out of your heart or chest area, breathing a little slower and deeper than usual. Find an easy rhythm that's comfortable.

Step 2: Activate feelings of kindness, appreciation, genuine connection or an attitude of deep listening.

Suggestion: If you cannot connect with a heart feeling, try to recall a time when you felt a kind, deeper connection with someone. If that is challenging, just breathe appreciation for something for a while to help raise your vibration and to help settle your energies.

Step 3: Radiate these heart qualities to raise your vibration and help lift the energy field environment that surrounds you.

Quick Steps

1. Heart-Focused Breathing
2. Activate
3. Radiate

"This Shift-and-Lift technique is intended to be used with eyes open, during a conversation, meeting" (R. McCraty, personal communication, January 25, 2021).

Source: This Shift-and-Lift script is from the HeartMath LLC "Activating the Heart of Teams" training program (2021) developed by Rollin McCraty

Appendix L

Skills Acquisition Stress Prep Protocol Baseline and Post-Study

Pre-Intervention Protocol With Therapists During Pre-Study Interview

Resting Baseline Phase (3-4 min): Baseline HRV data collected

Therapists sit still in silence. No moving, talking, engaging in practice or technique.

Stress Prep phase (3-4 min): Therapists invited to consider stressful/challenging situation such as a challenging client. Therapists asked to quietly to prepare for a challenging client.

"Prepare in whatever way you would normally prepare for an upcoming stressful situation, like a client known to be challenging for you."

Heart Lock-In (4-5 min): Engage in HLI

Post-Intervention Protocol With Therapists During Post-Study Interview

Resting Baseline Phase (3-4 min): Baseline HRV data collected

Therapists sit still in silence. No moving, talking, engaging in practice or technique.

Stress Prep phase (3-4 min): Therapists invited to consider stressful/challenging situation such as a challenging client. Therapists asked to quietly to prepare for a challenging client.
to stimulate condition of stressful/challenging client situation.

"Prepare for a stressful situation, like a client known to be challenging for you, using a coherence-building technique and practice bringing in a regenerative emotion as you consider the upcoming stressful situation or client."

Heart Lock-In (4-5 min): Engage in HLI

Appendix M

Instructions for Technical Training for Heart-Based Therapy Research

Download App, Create Account, Join Private Group

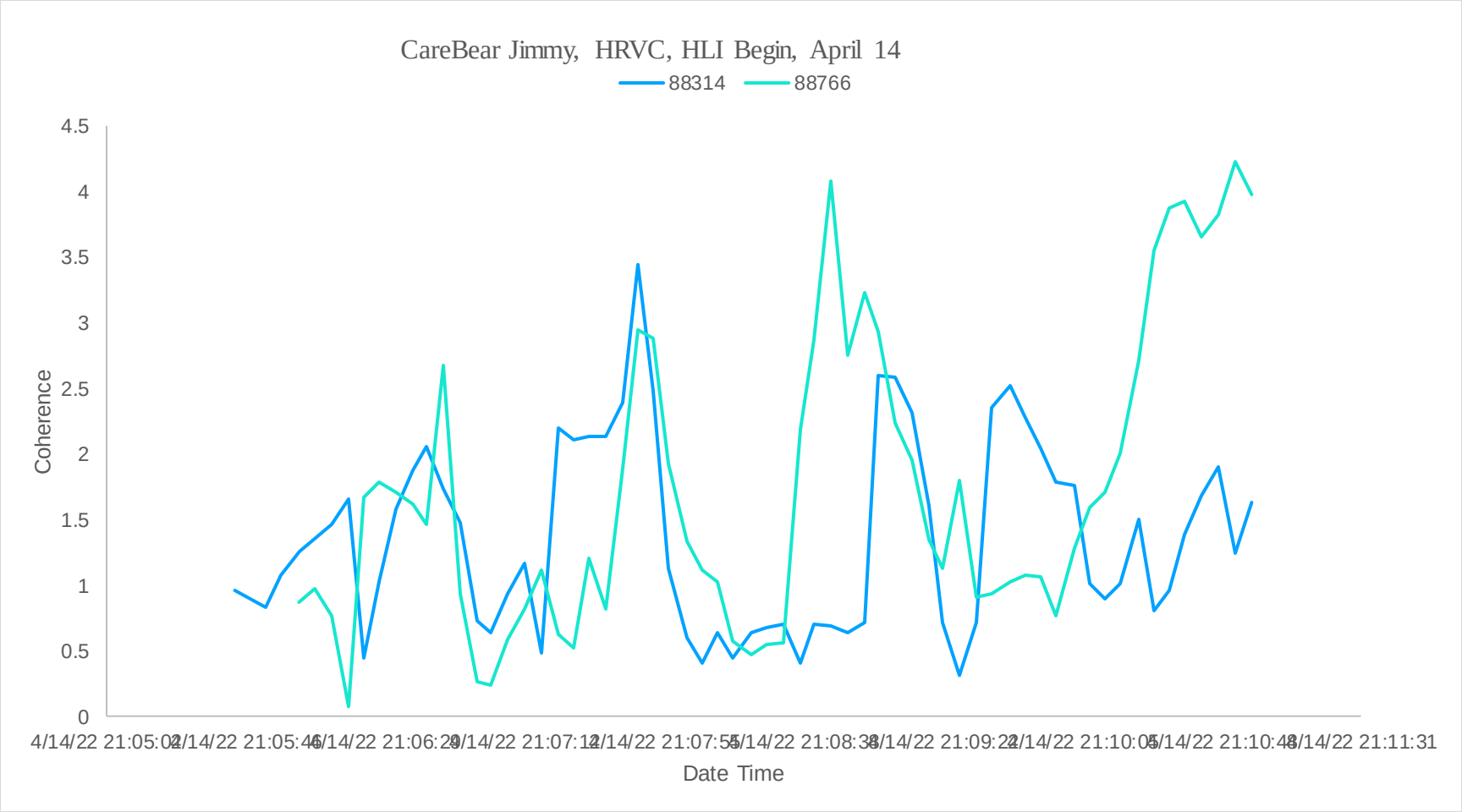
1. Download Global Coherence Initiative (GCI) Application (App) to your Smart Phone
2. Create Account with specific email and password
    a. Provide email address to researcher
3. Open GCI Application
4. Be sure that "Location Services" is turned on in your Settings
5. Once in GCI App
    a. "Join New Group" will give you access to our private group
        i. Enter passcode
    b. Log Out and Back in
    c. Connect Inner Balance sensor to device, if you have not already done so
    d. Go to "My Groups"
        i. Join Heart-Based Therapy Research Group
    e. "Join Session"
        i. Be sure that you see movement on top graph (HRV) as this indicates that the sensor is reading your heart rhythms
    f. Stay connected throughout session
    g. At the end of session, "Stop Session" then "Exit Session" and Exit the GCI App

For follow-up sessions during the study, follow steps 5C through 5E at the beginning of each session, stay connected for entire therapy session (5F), and follow step 5G to end session.

Appendix N

HRVC & IBI Line Charts, HLI, and S&L Intervention Sessions—Dyad 1

This appendix contains six charts for Dyad 1—CareBear and Jimmy.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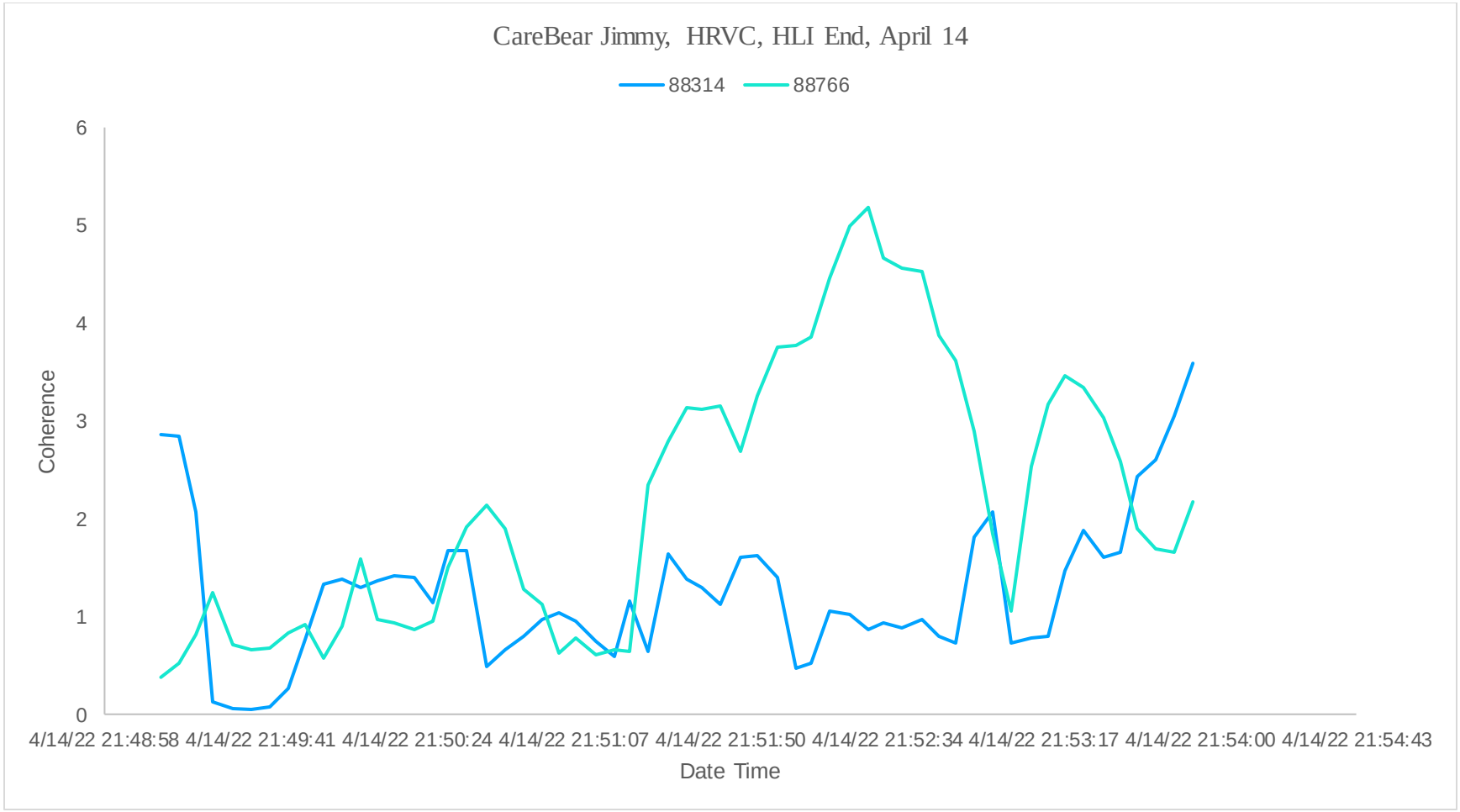
88314
88766
Coherence
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
4/14/22 21:05:02
4/14/22 21:05:46
4/14/22 21:06:29
4/14/22 21:07:12
4/14/22 21:07:55
4/14/22 21:08:38
4/14/22 21:09:22
4/14/22 21:10:05
4/14/22 21:10:48
4/14/22 21:11:31
Date Time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88314
88766
Coherence
6
5
4
3
2
1
0
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4/14/22 21:49:41
4/14/22 21:50:24
4/14/22 21:51:07
4/14/22 21:51:50
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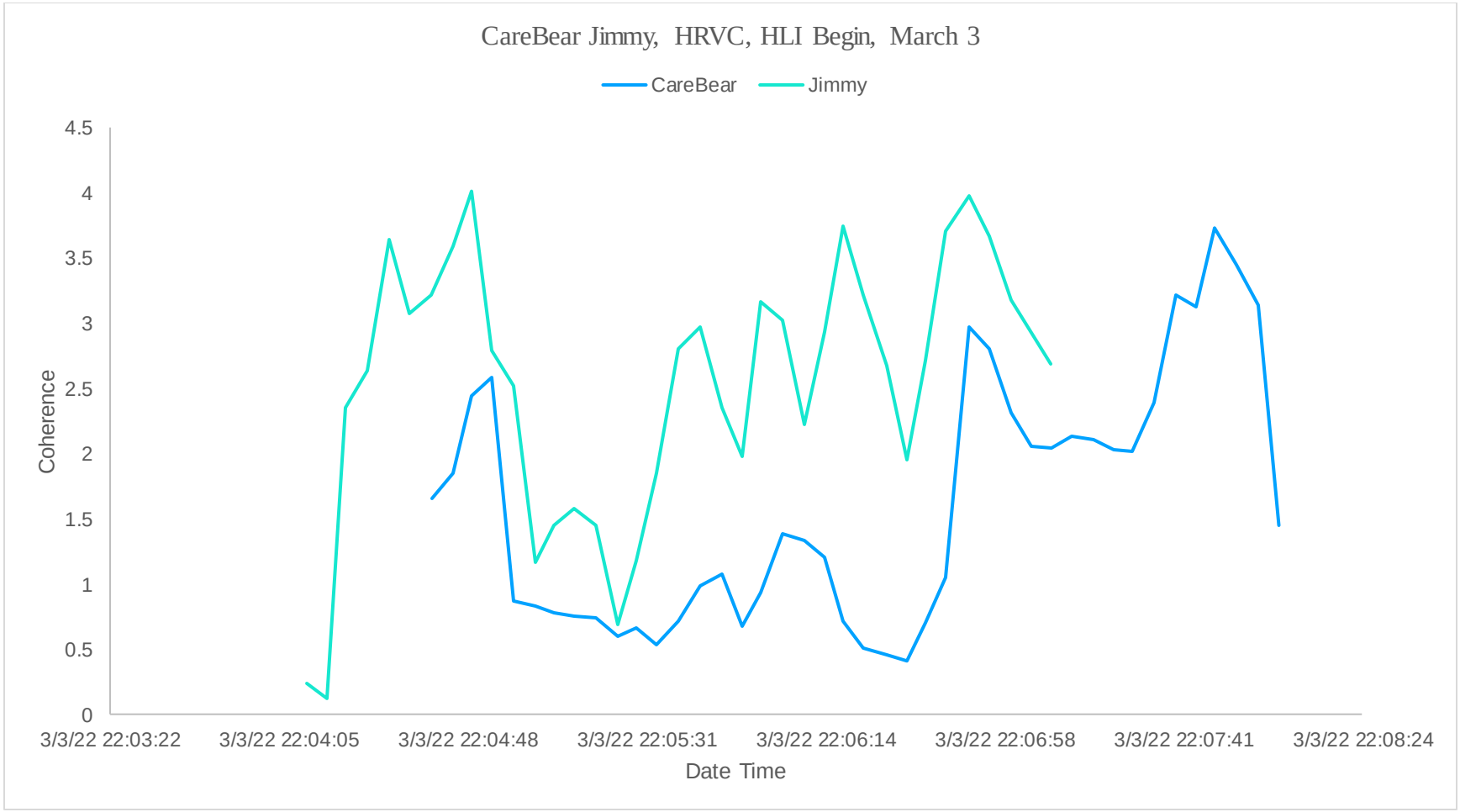
4/14/22 21:54:00
4/14/22 21:54:43
Date Time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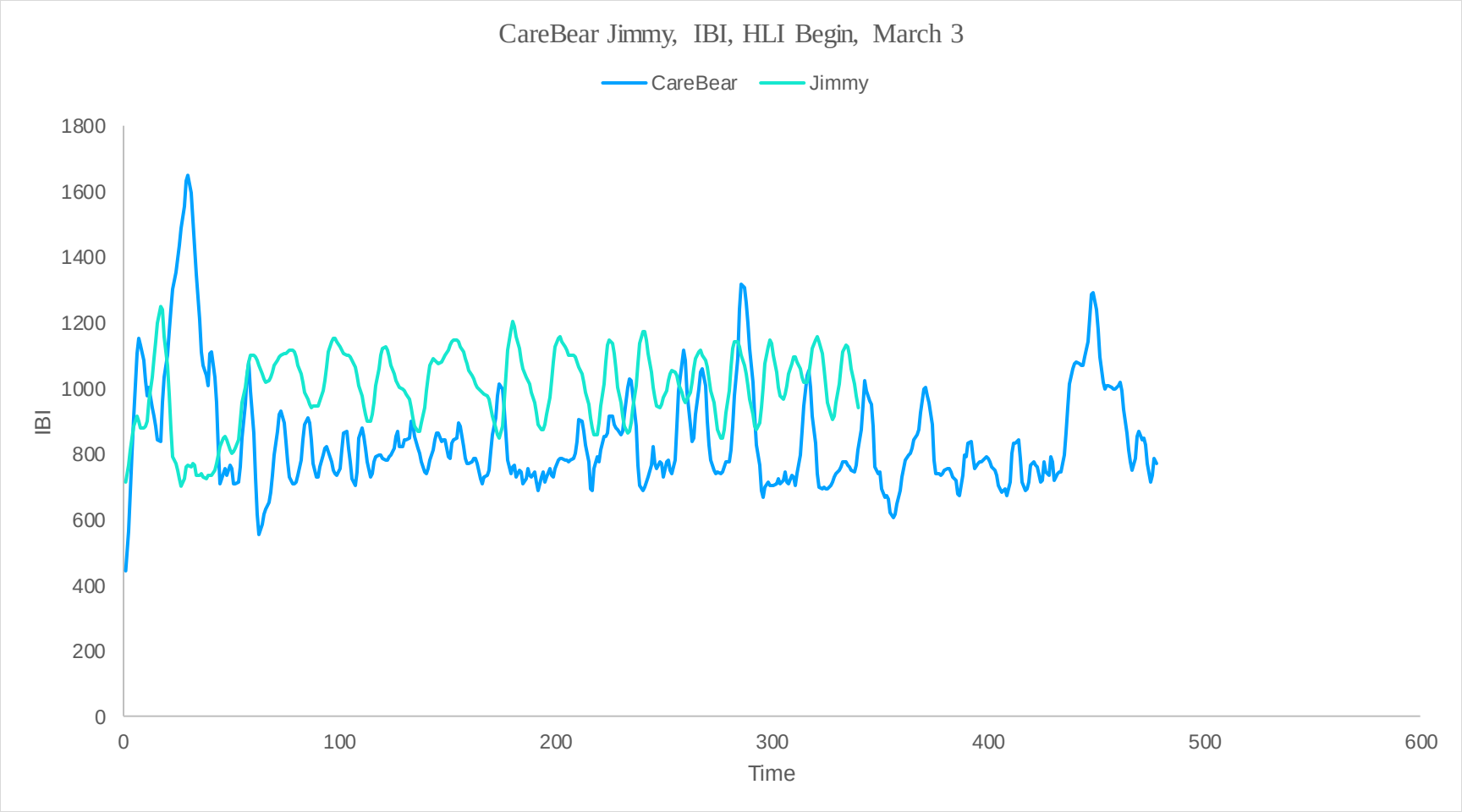
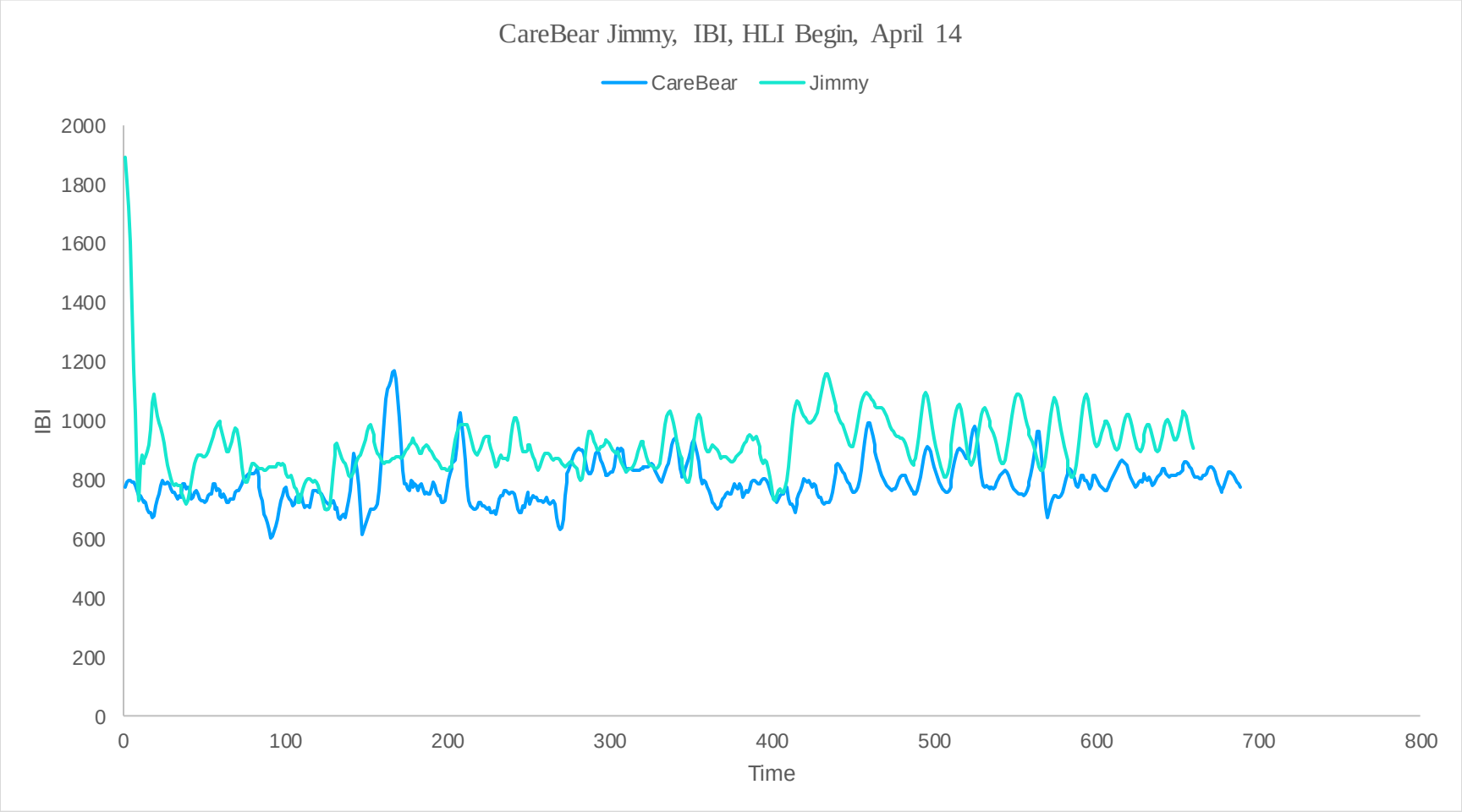
CareBear
Jimmy
Coherence
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
3/3/22 22:03:22
3/3/22 22:04:05
3/3/22 22:04:48
3/3/22 22:05:31
3/3/22 22:06:14
3/3/22 22:06:58
3/3/22 22:07:41
3/3/22 22:08:24
Date Time


CareBear Jimmy, IBI, HLI Begin, March 3
CareBear
Jimmy
IBI
1800
1600
1400
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
Time


CareBear Jimmy, IBI, HLI Begin, April 14
CareBear
Jimmy
IBI
2000
1800
1600
1400
1200
1000
800
600
400
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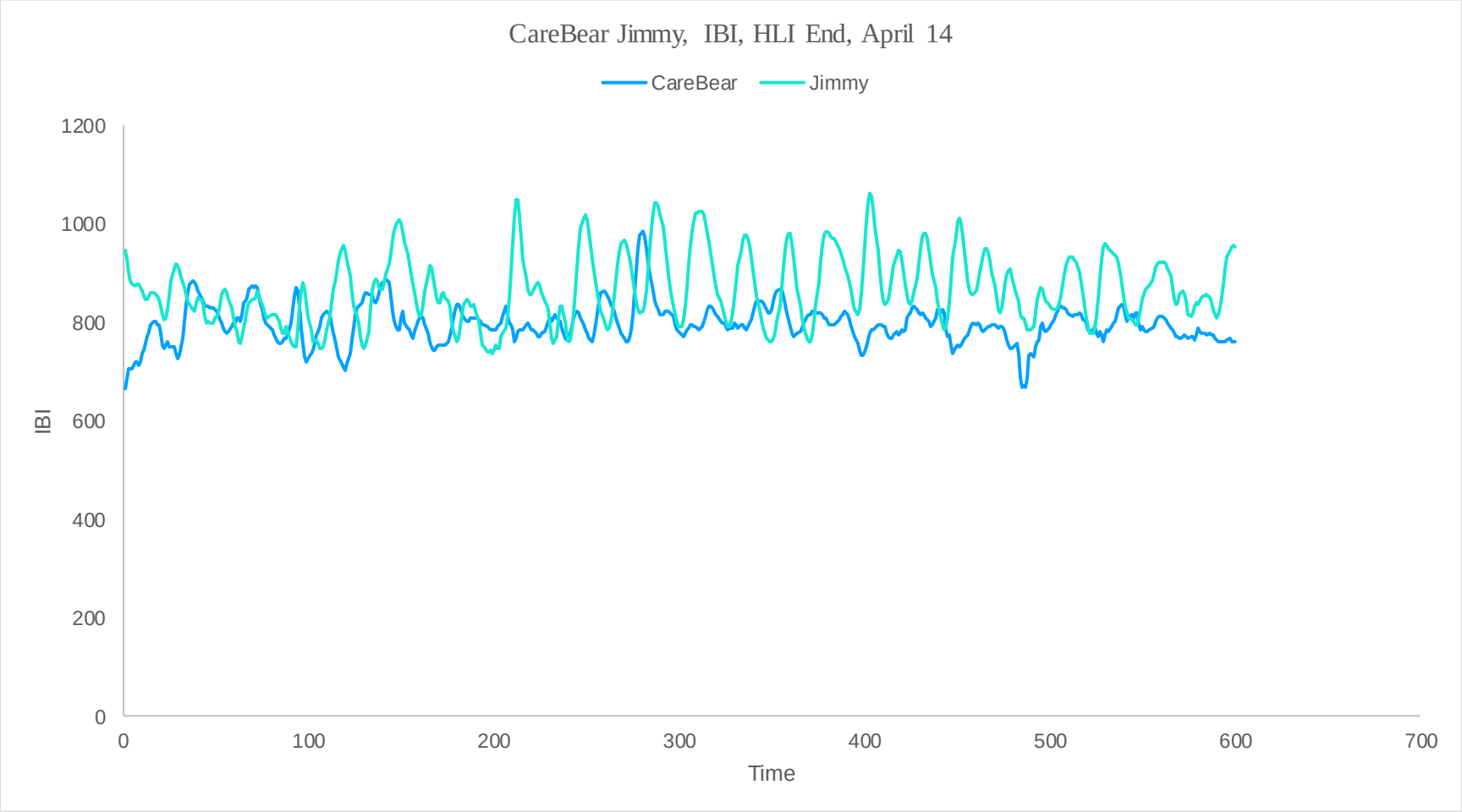
0
100
200
300
400
500
600
700
800
Time

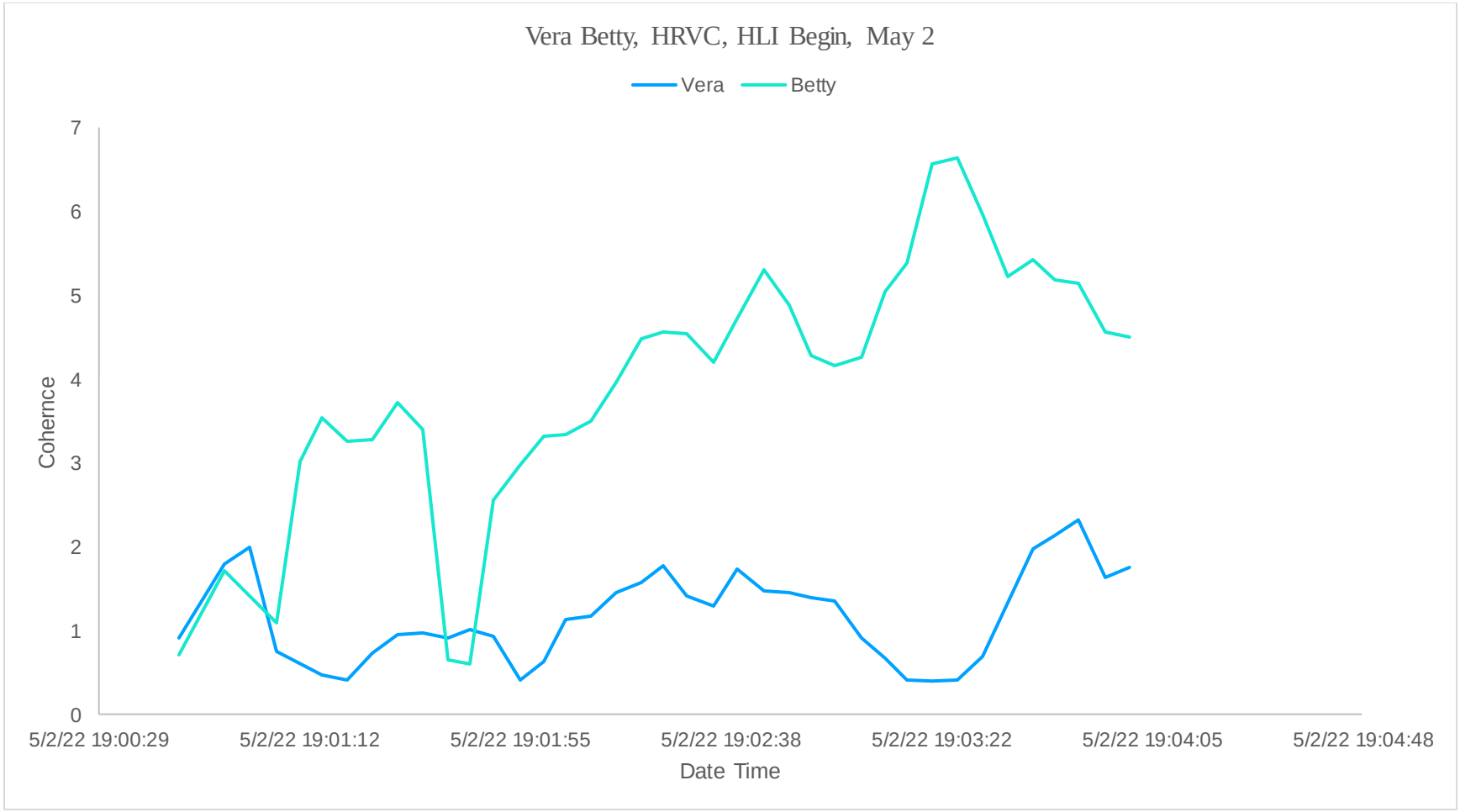

CareBear Jimmy, IBI, HLI End, April 14
CareBear
Jimmy
IBI
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
Time

Appendix O

HRVC & IBI Line Charts, HLI and S&L Intervention Sessions—Dyad 3

This appendix contains 22 charts for Dyad 3—Vera and Betty.

As a reminder to the reader, there are no charts for Dyad 2 (Illona and Luz) because the HRVC data was missing or incomplete, as was discussed previously.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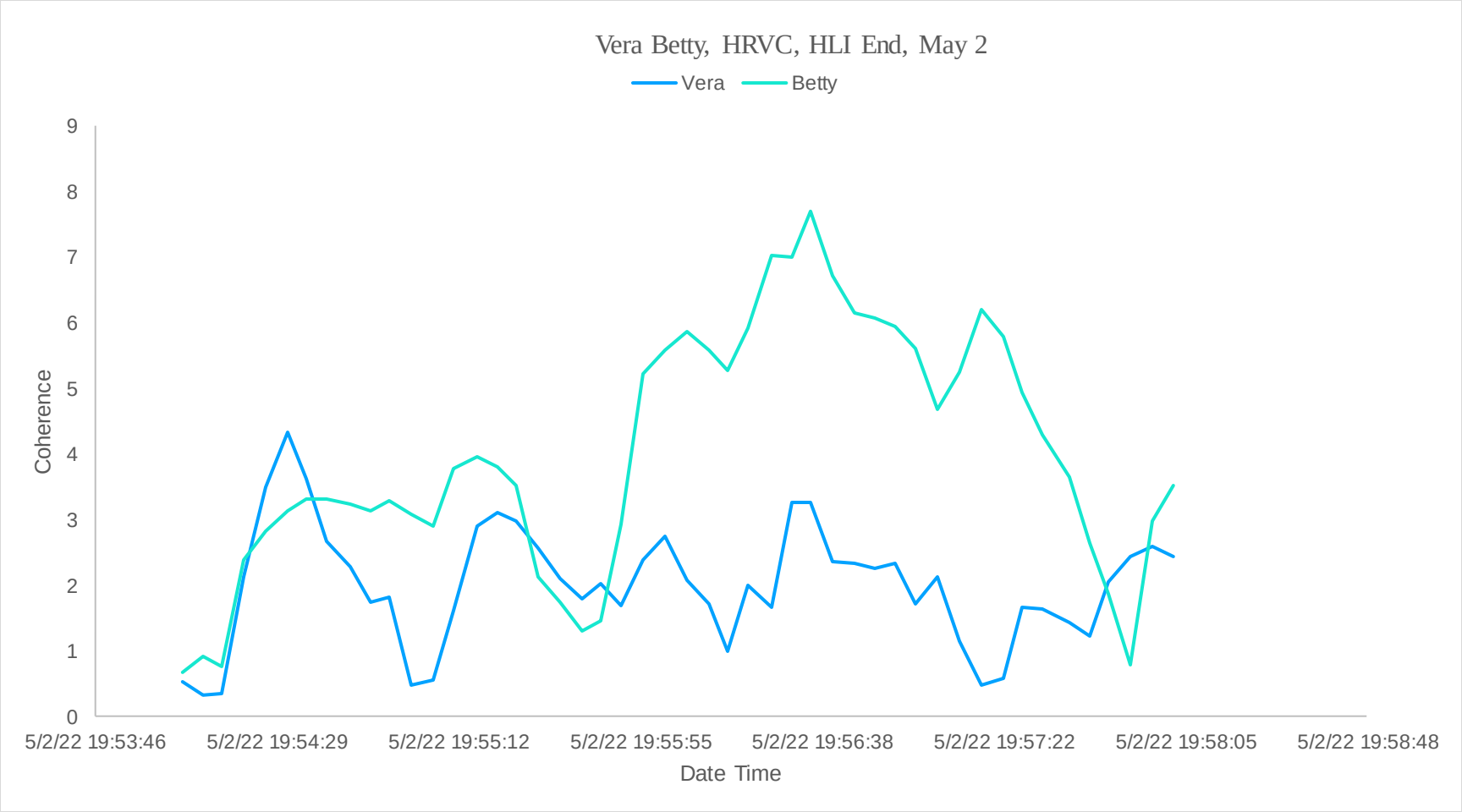
Vera
Betty
Cohernce
7
6
5
4
3
2
1
0
5/2/22 19:00:29
5/2/22 19:01:12
5/2/22 19:01:55
5/2/22 19:02:38
5/2/22 19:03:22
5/2/22 19:04:05
5/2/22 19:04:48
Date Time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Vera
Betty
Coherence
9
8
7
6
5
4
3
2
1
0
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5/2/22 19:54:29
5/2/22 19:55:12
5/2/22 19:55:55
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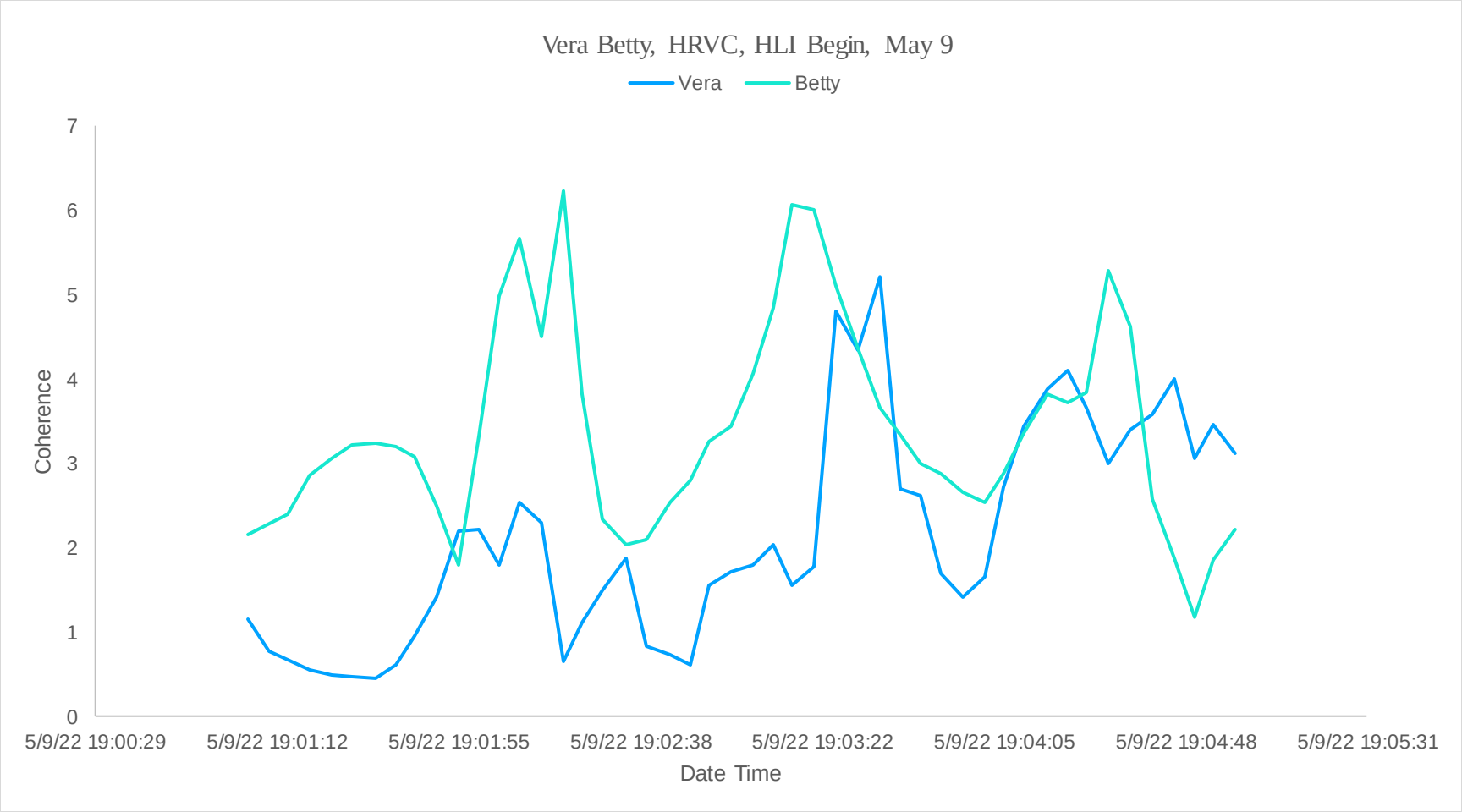
Date Time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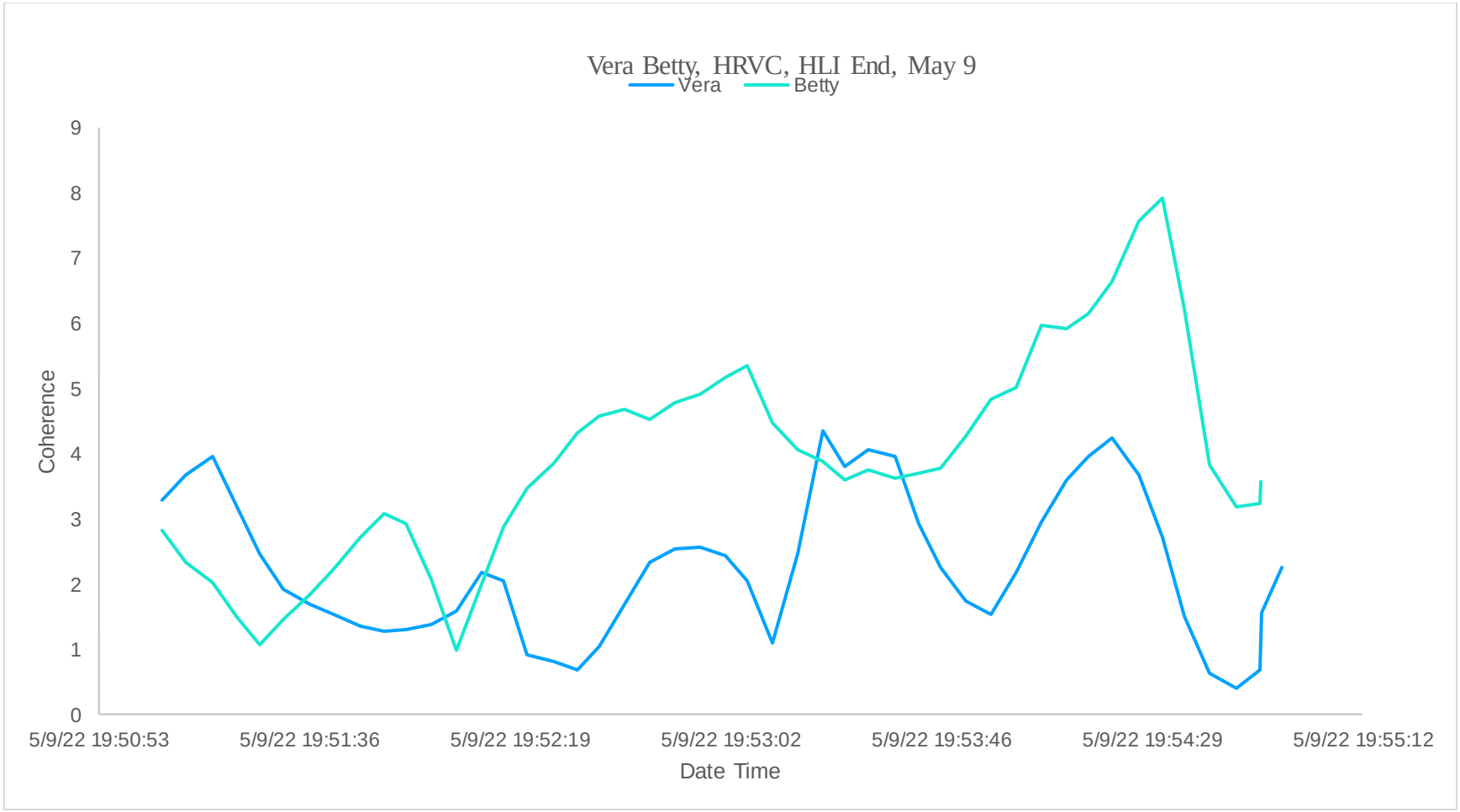
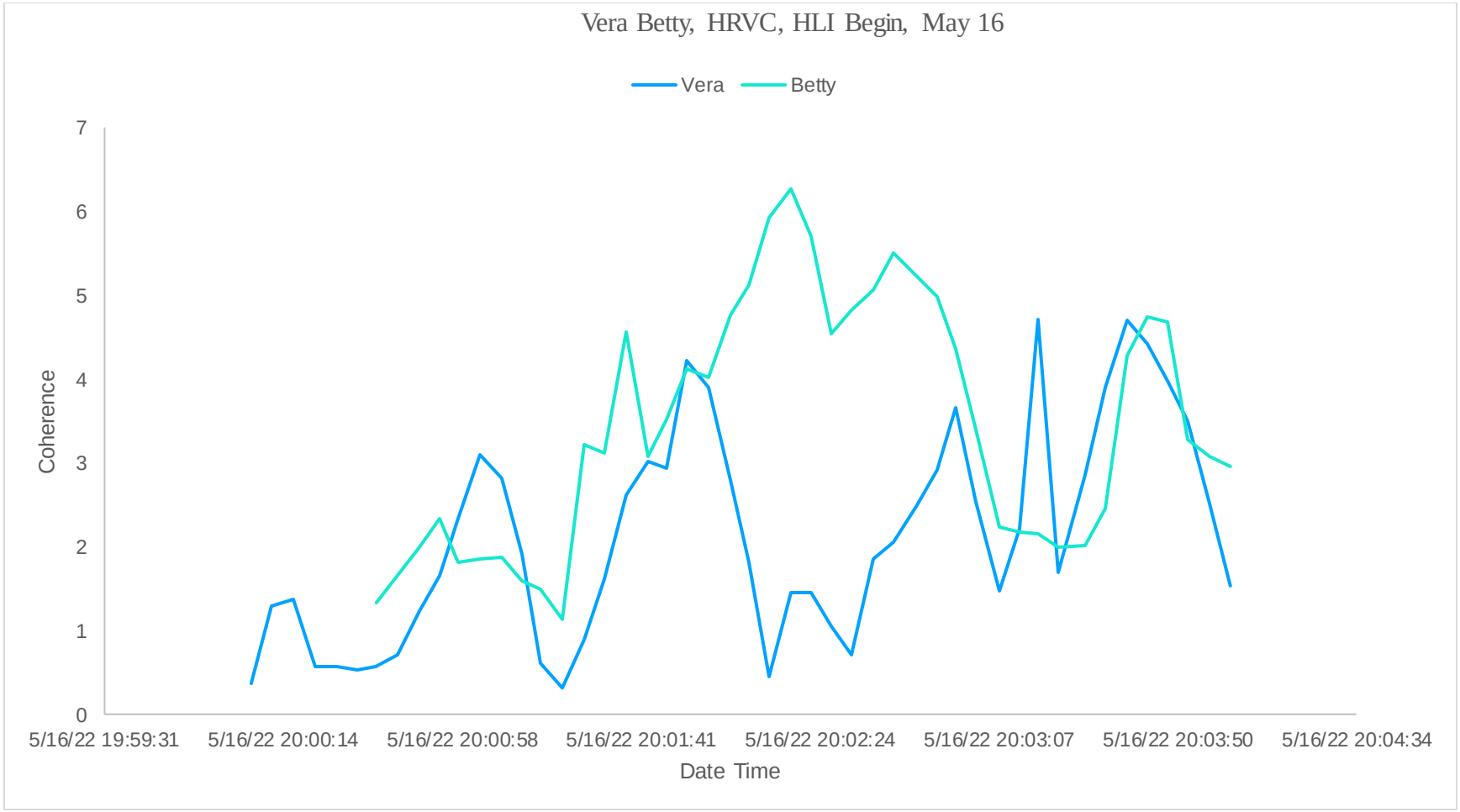
Vera
Betty
Coherence
7
6
5
4
3
2
1
0
5/9/22 19:00:29
5/9/22 19:01:12
5/9/22 19:01:55
5/9/22 19:02:38
5/9/22 19:03:22
5/9/22 19:04:05
5/9/22 19:04:48
5/9/22 19:05:31
Date Time


Vera Betty, HRVC, HLI End, May 9
Vera
Betty
Coherence
9
8
7
6
5
4
3
2
1
0
5/9/22 19:50:53
5/9/22 19:51:36
5/9/22 19:52:19
5/9/22 19:53:02
5/9/22 19:53:46
5/9/22 19:54:29
5/9/22 19:55:12
Date Time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Betty
Coherence
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6
5
4
3
2
1
0
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5/16/22 20:00:14
5/16/22 20:00:58
5/16/22 20:01:41
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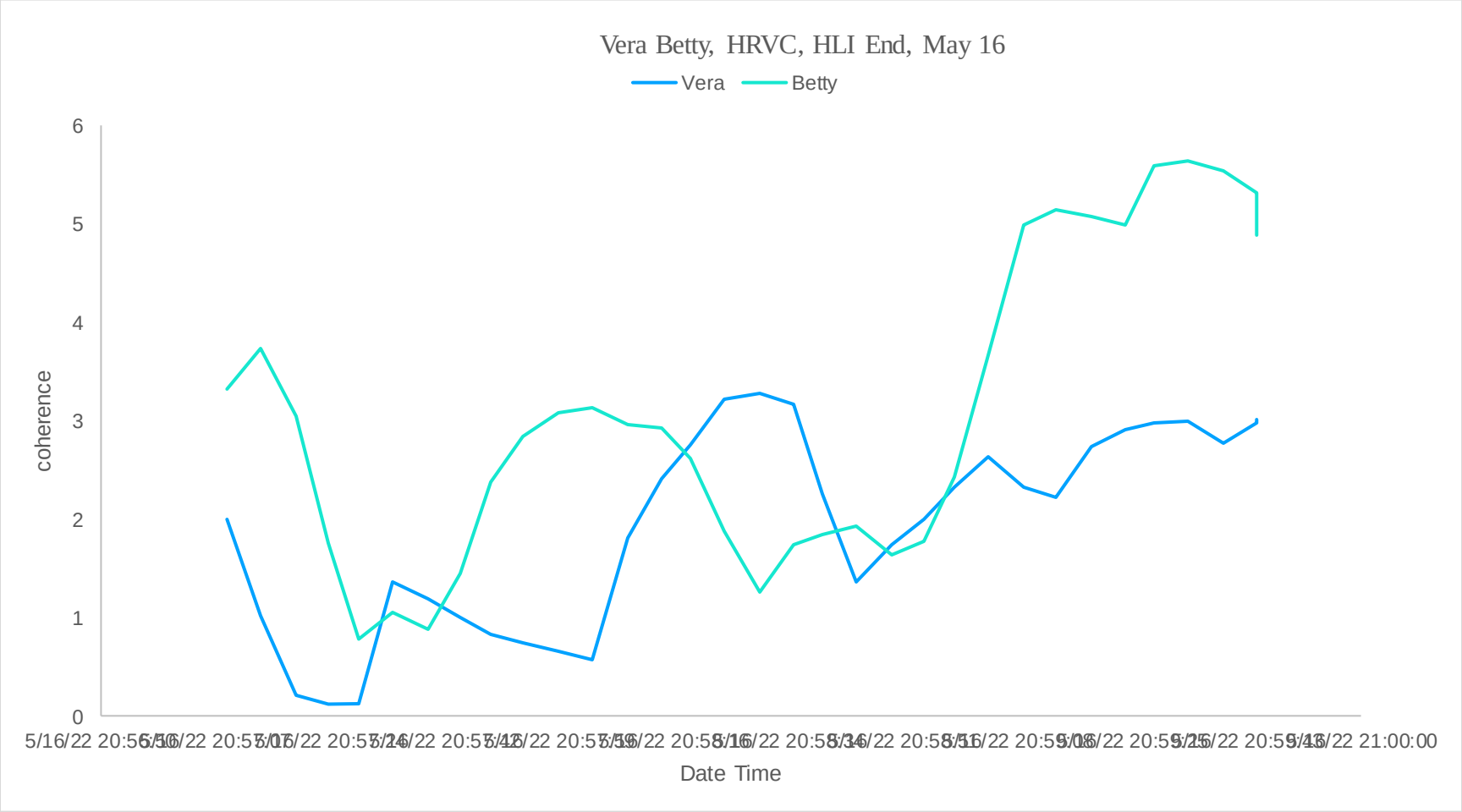
Date Time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Betty
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2
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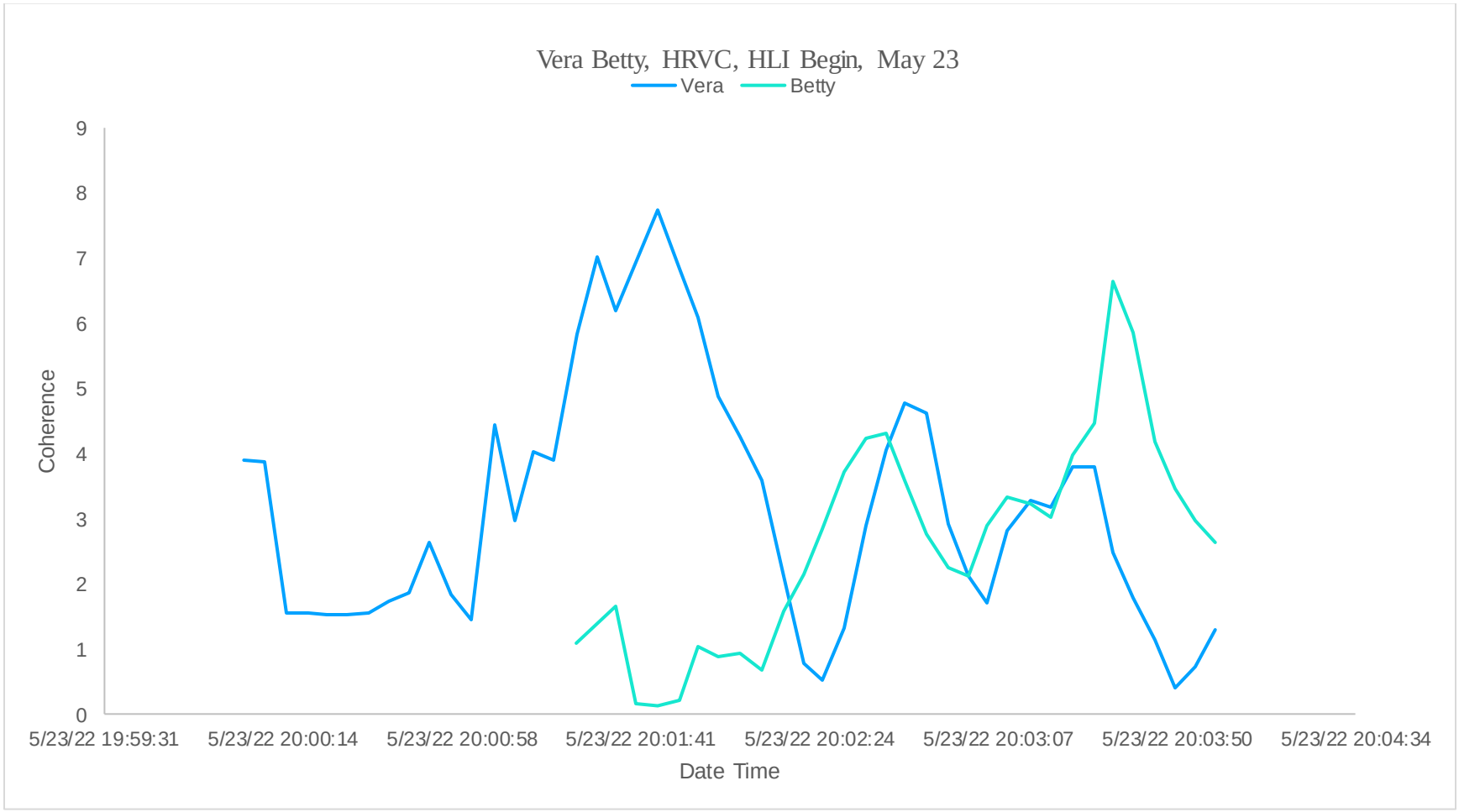
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Betty
Coherence
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8
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6
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3
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5/23/22 20:00:14
5/23/22 20:00:58
5/23/22 20:01:41
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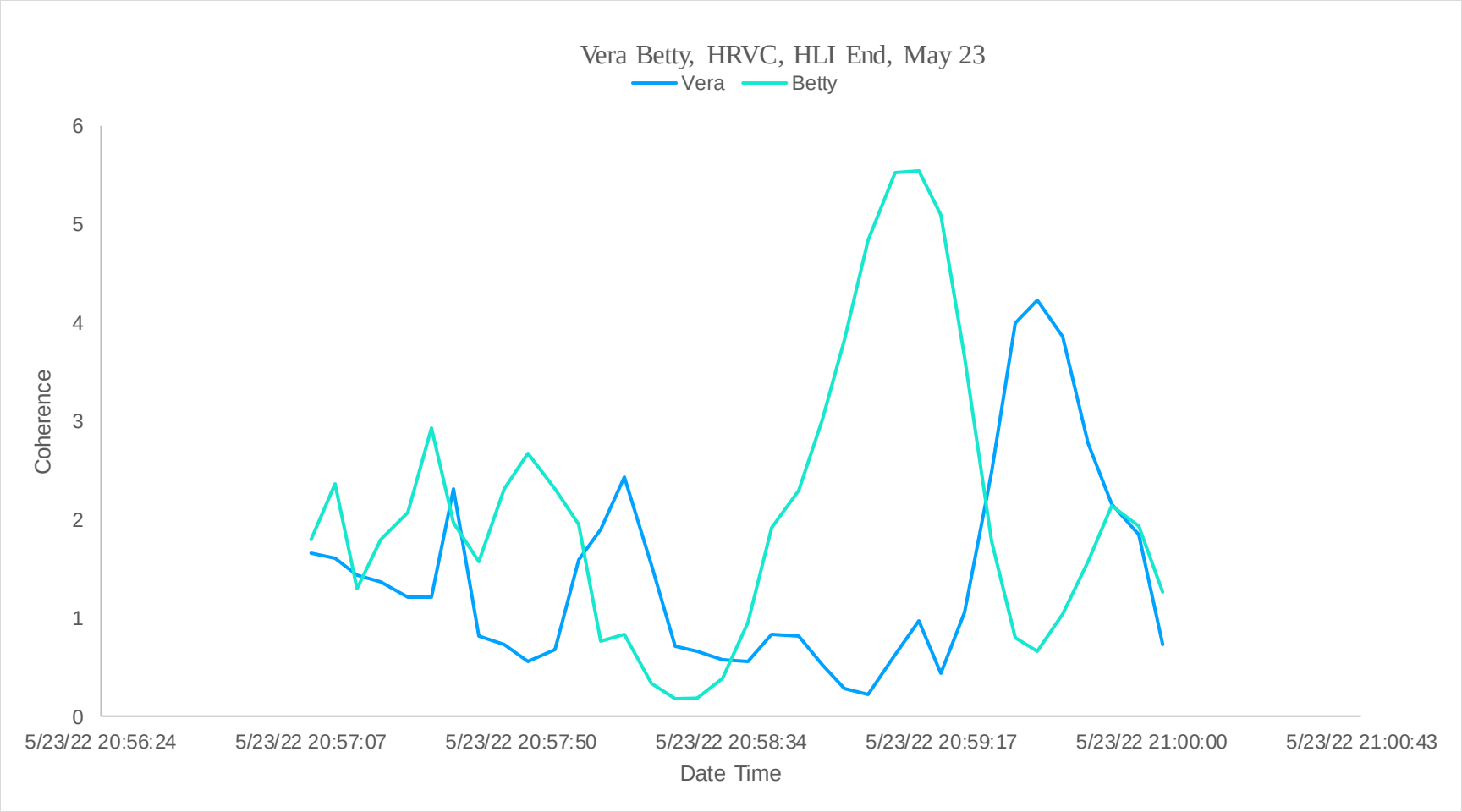
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Betty
Coherence
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5
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3
2
1
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5/23/22 20:57:50
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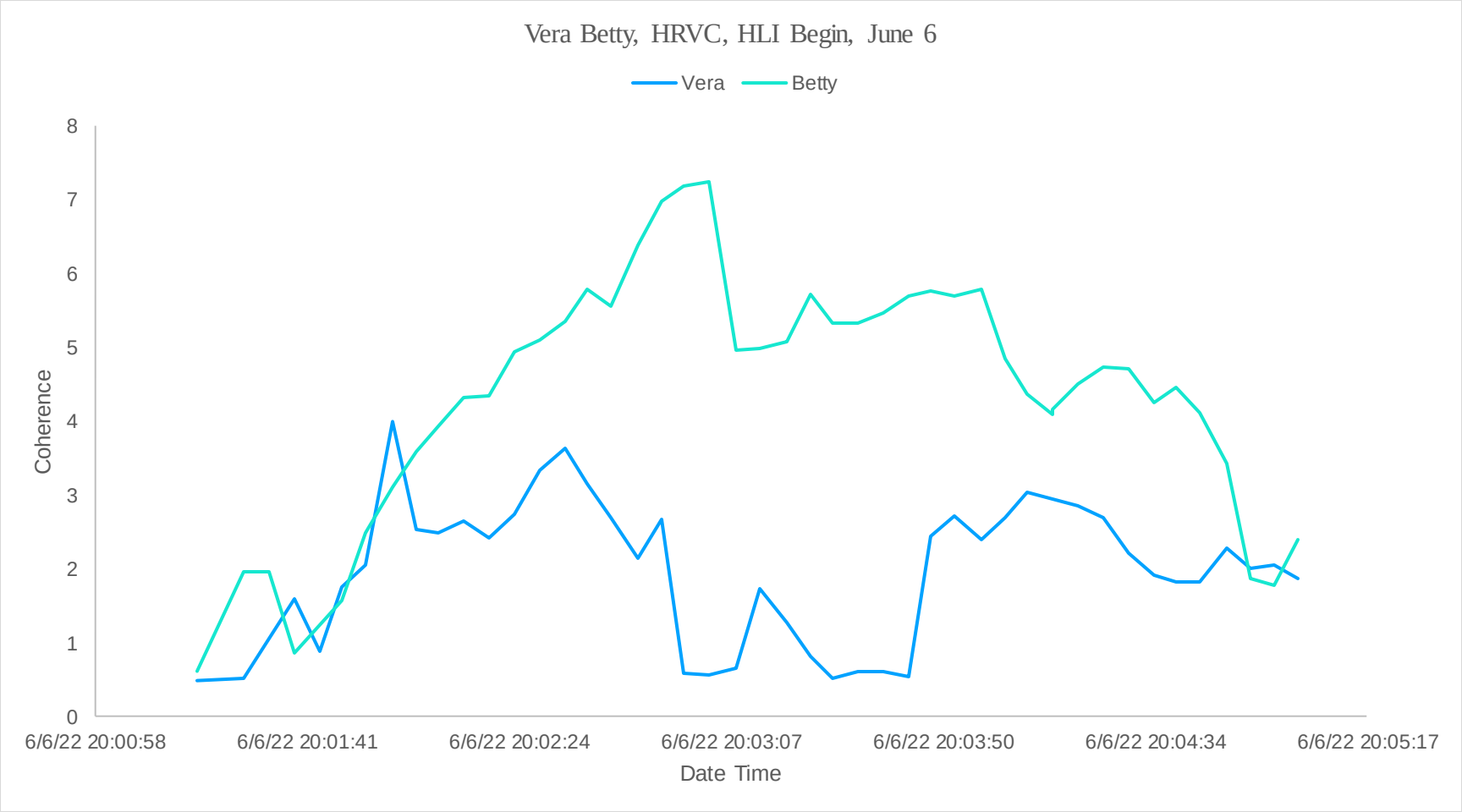
Date Time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Betty
Coherence
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6
5
4
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2
1
0
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6/6/22 20:02:24
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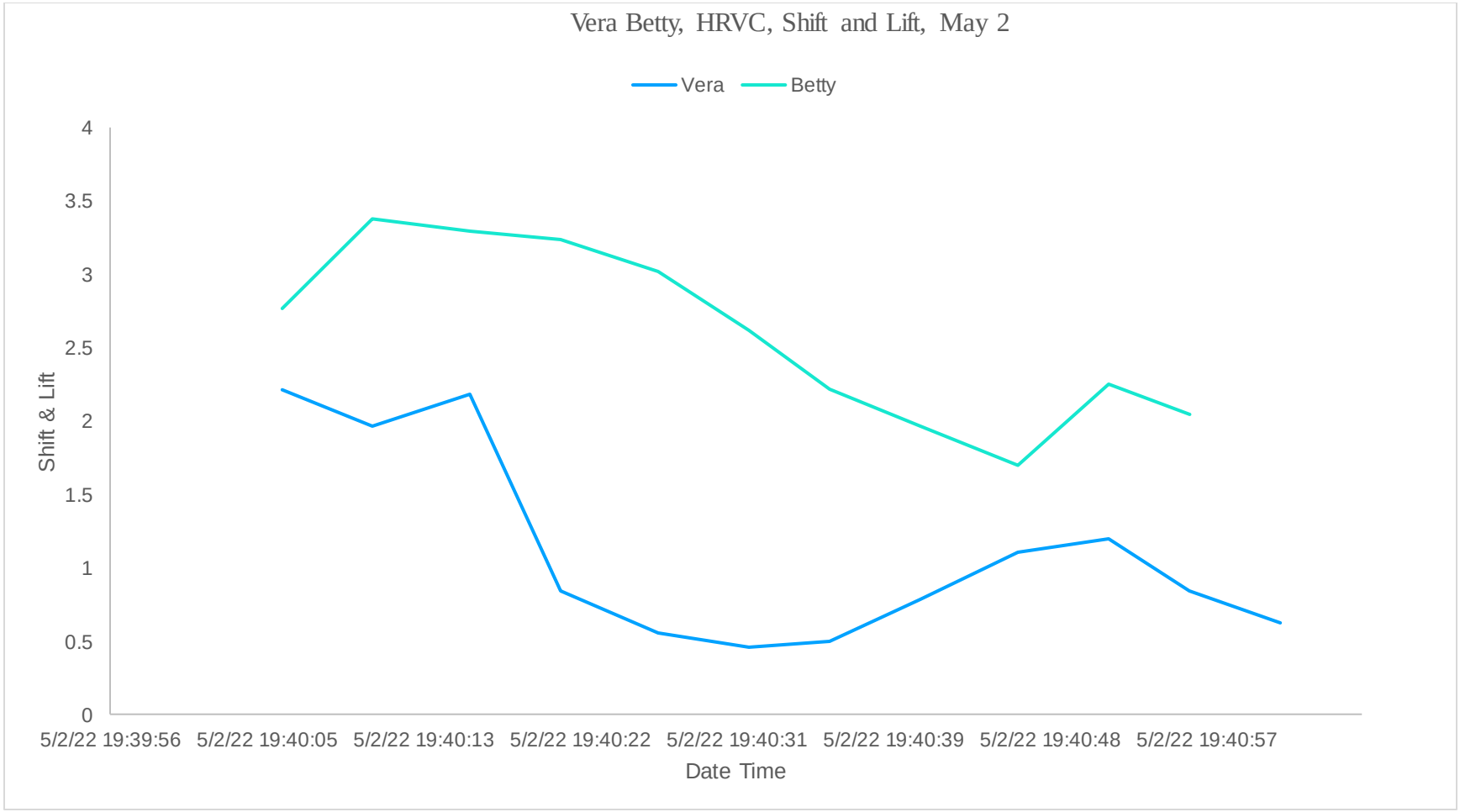
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Vera
Betty
Shift & Lift
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3.5
3
2.5
2
1.5
1
0.5
0
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5/2/22 19:40:05
5/2/22 19:40:13
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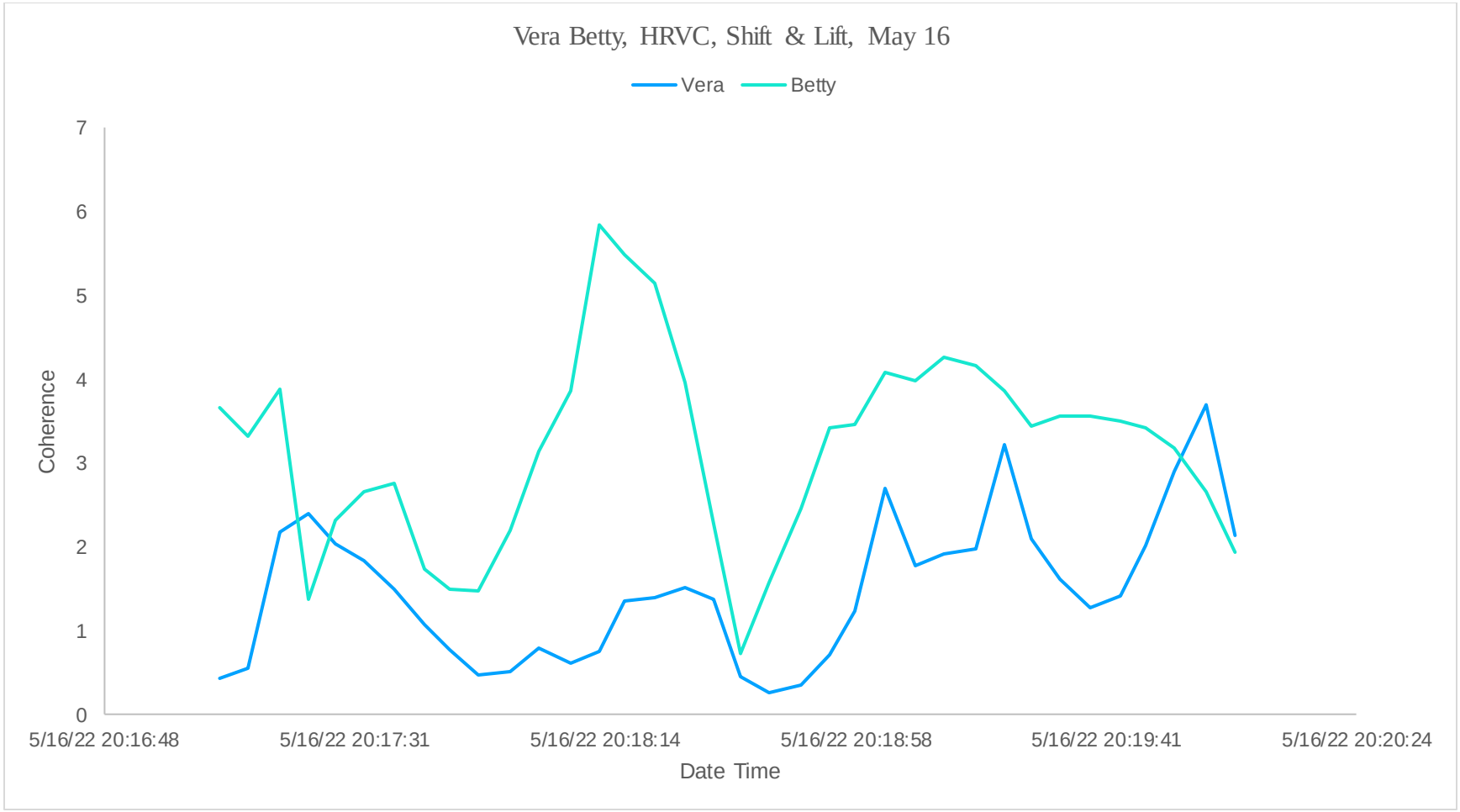
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Vera
Betty
Coherence
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2
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0
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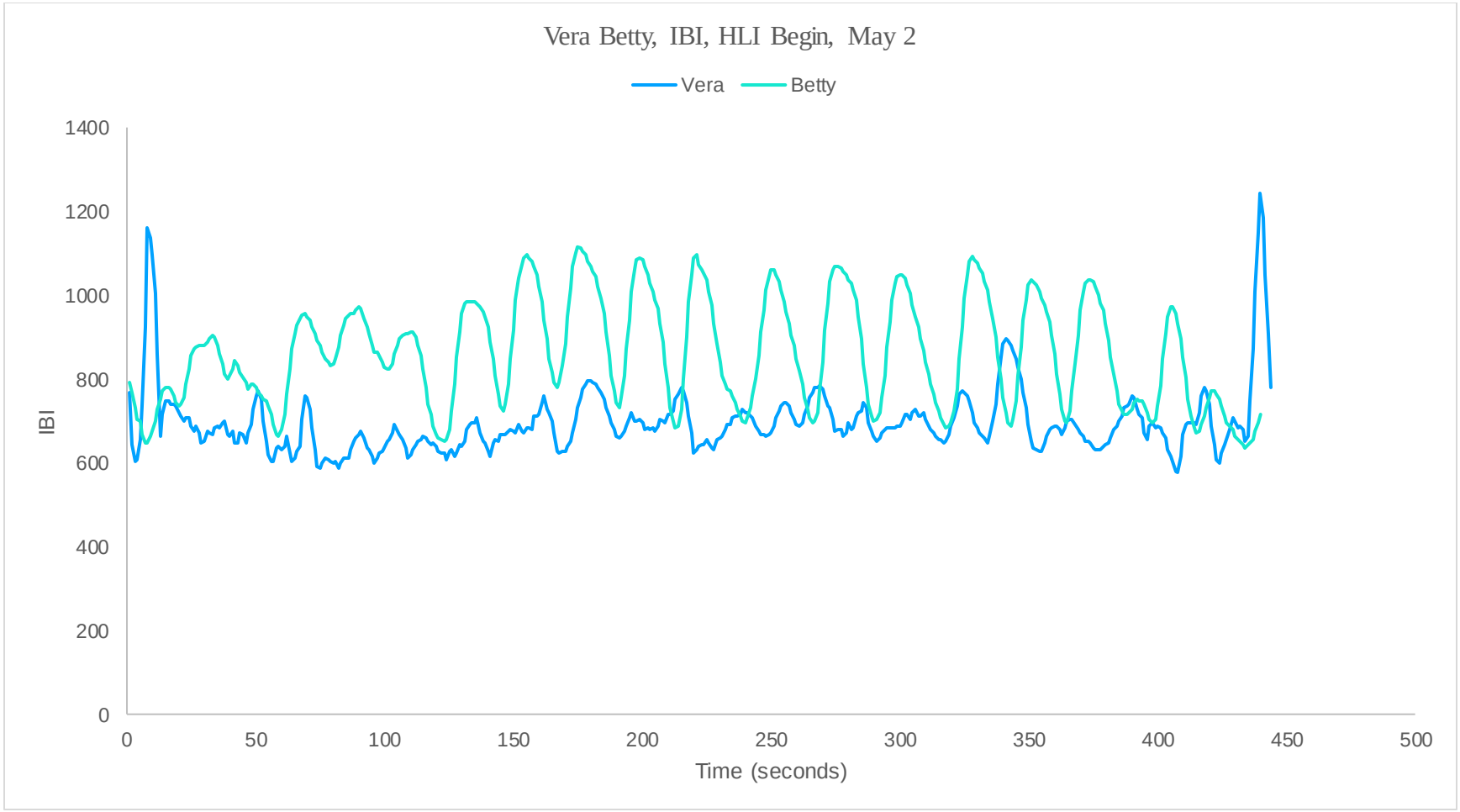
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Vera
Betty
IBI
1400
1200
1000
800
600
400
200
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0
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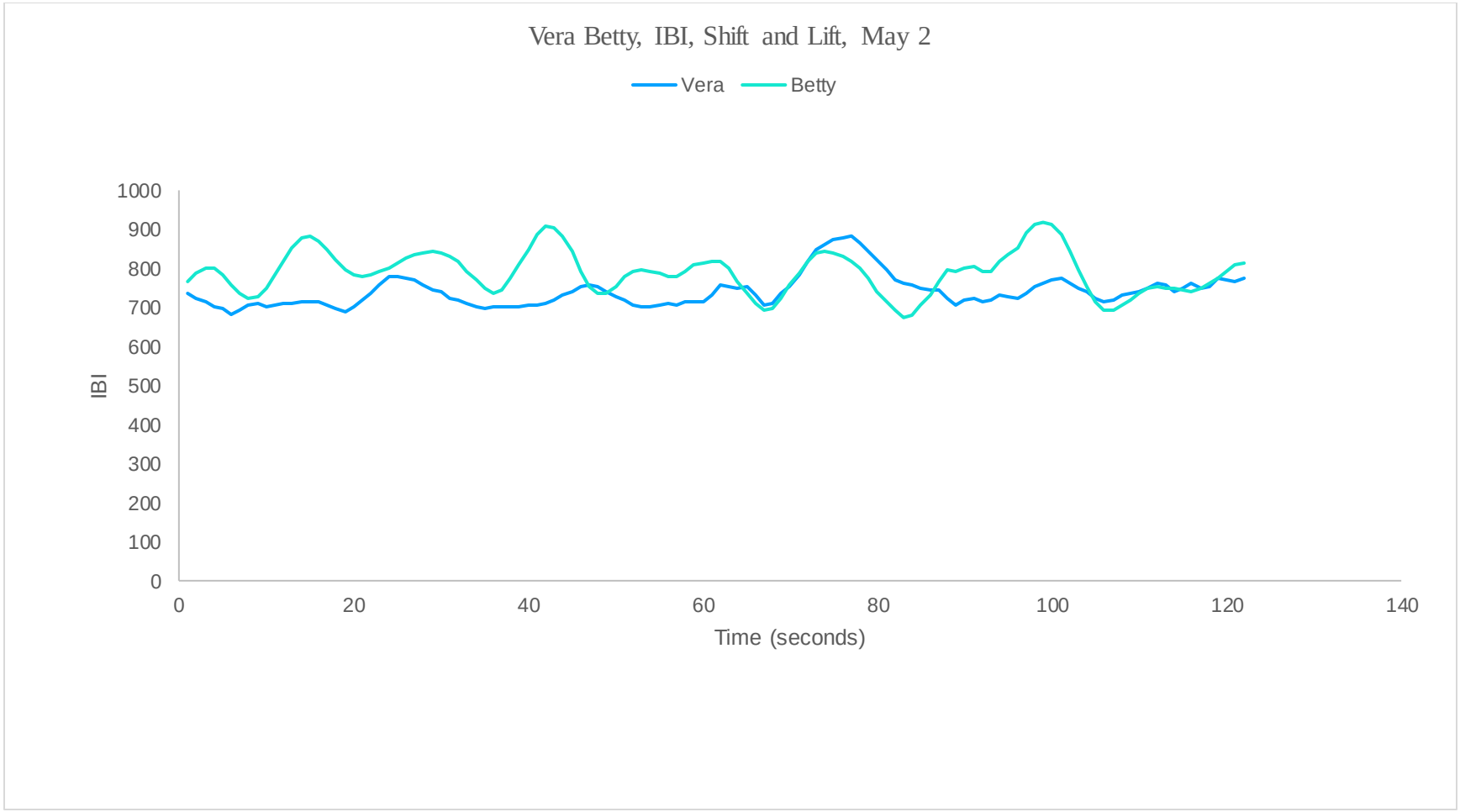
150
200
250
300
350
400
450
500
Time (seconds)


Vera Betty, IBI, Shift and Lift, May 2
Vera
Betty
IBI
1000
900
800
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500
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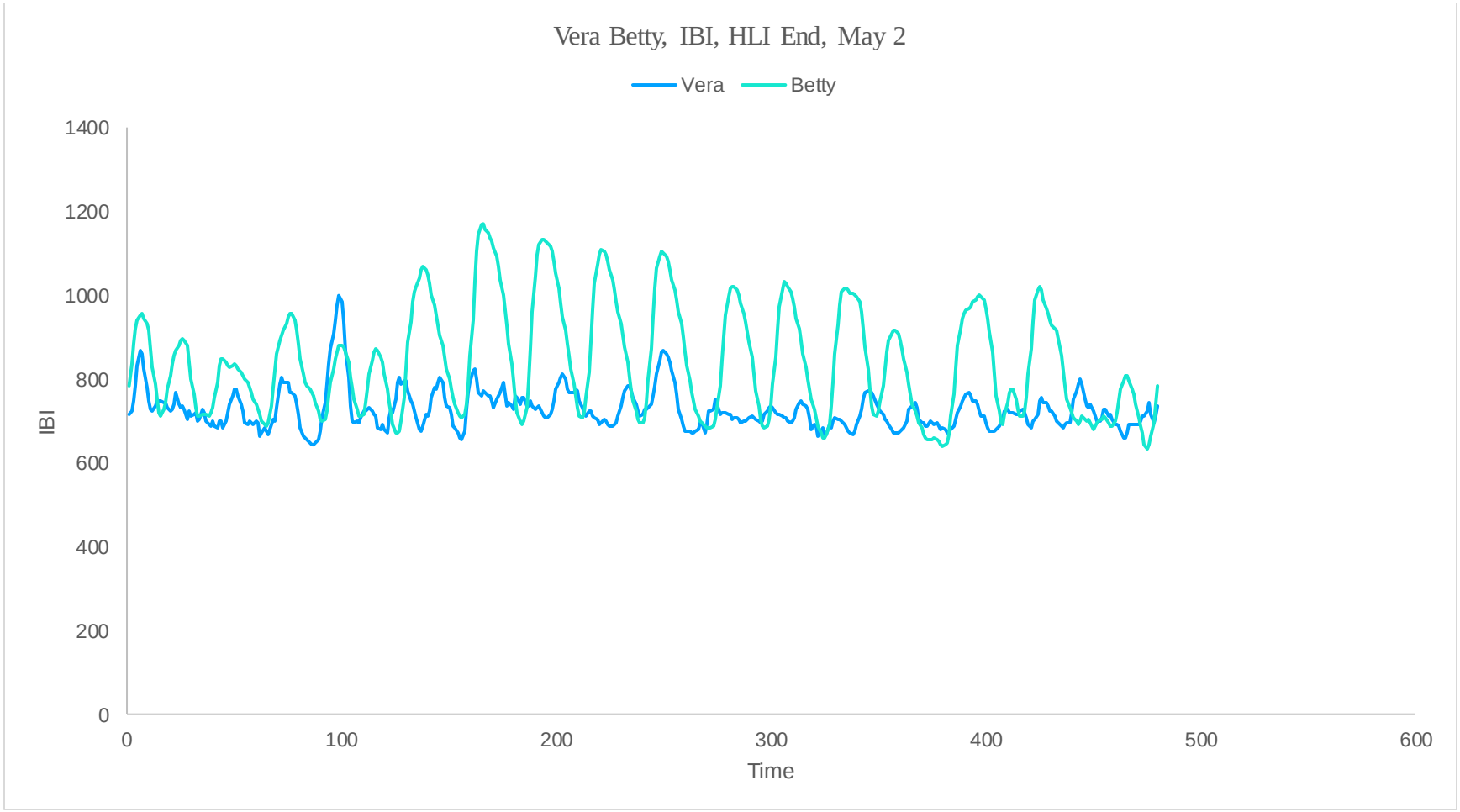
40
60
80
100
120
140
Time (seconds)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Betty
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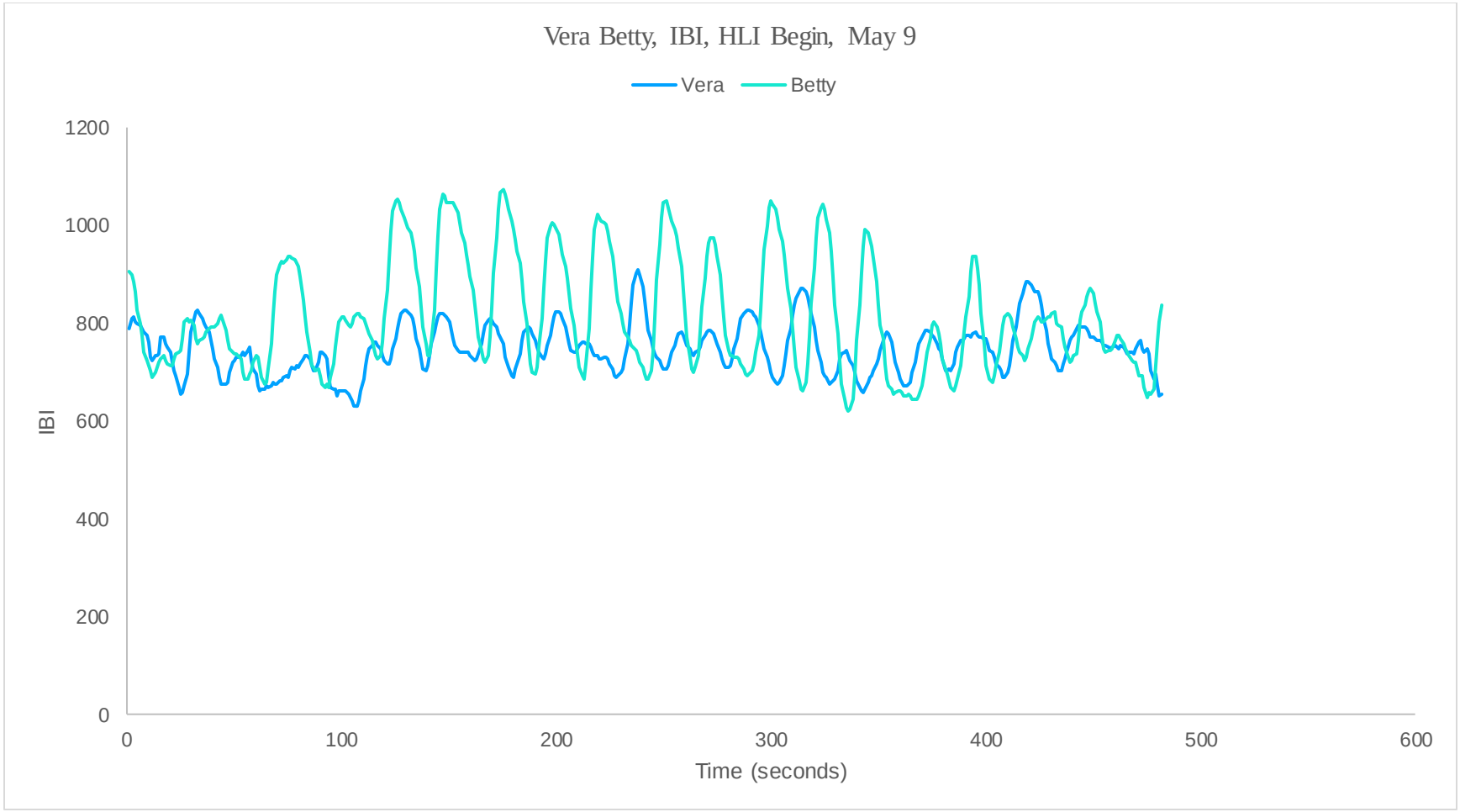
600
Time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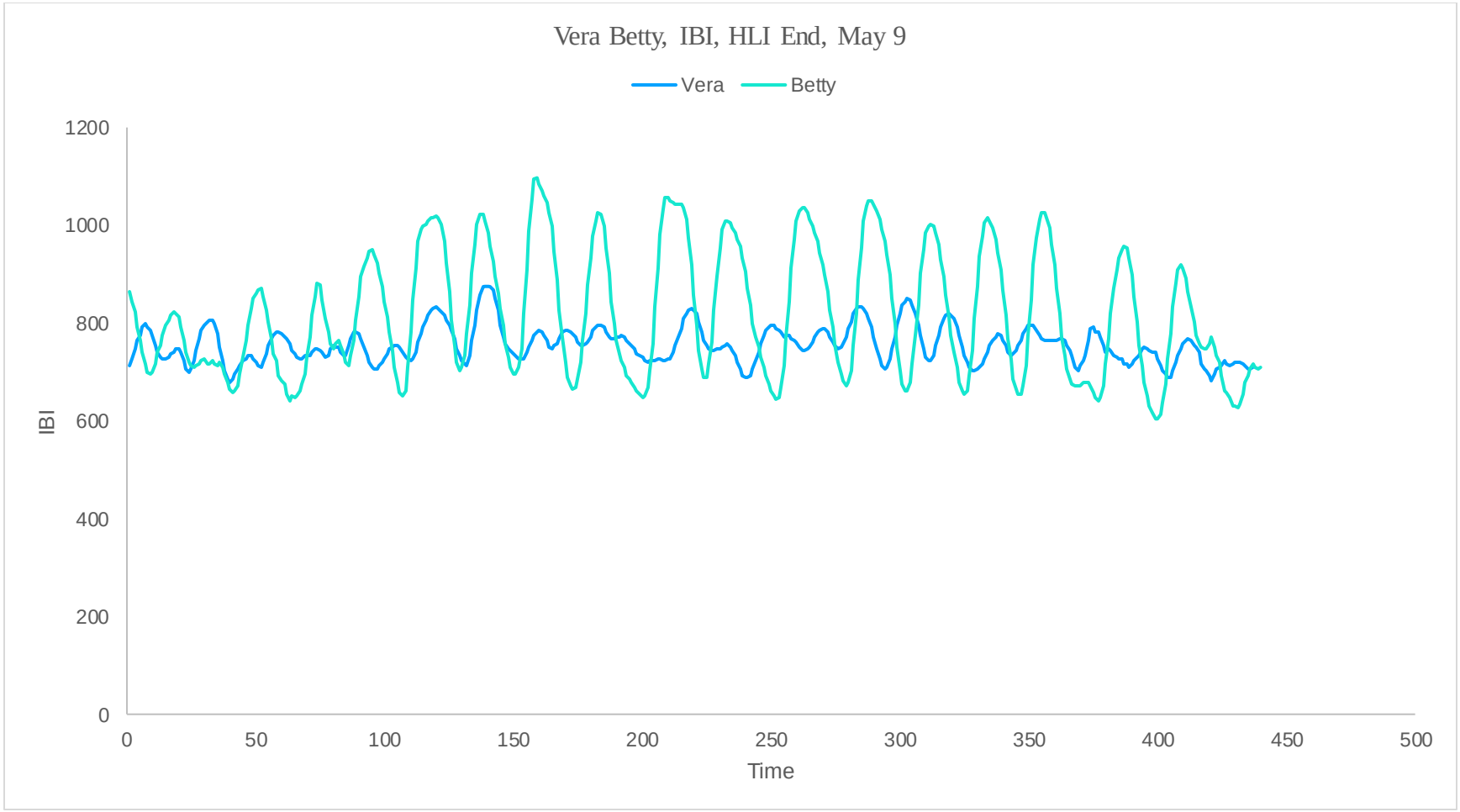
400
500
600
Time (seconds)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Vera
Betty
IBI
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150
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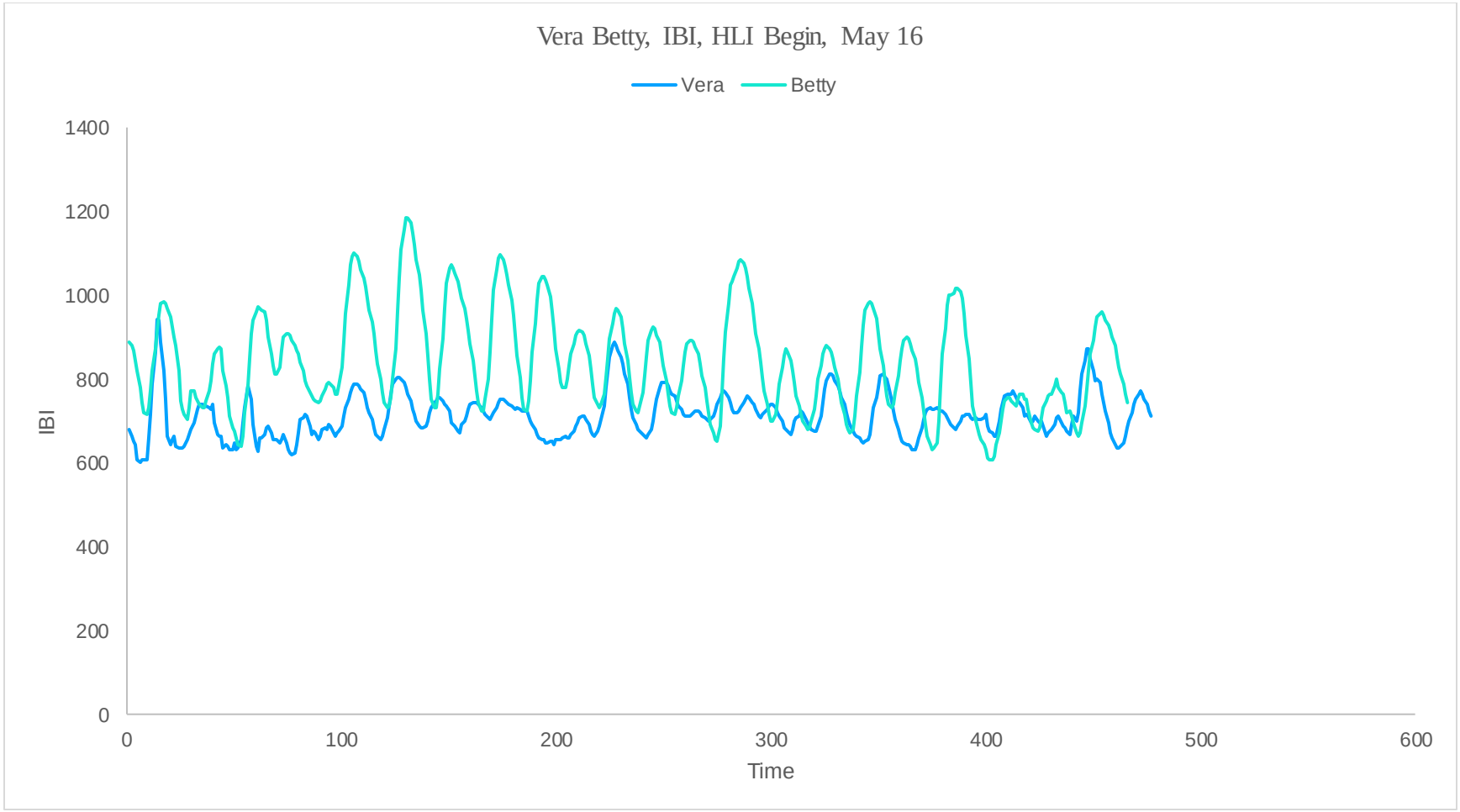
450
500
Time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Vera
Betty
IBI
1400
1200
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800
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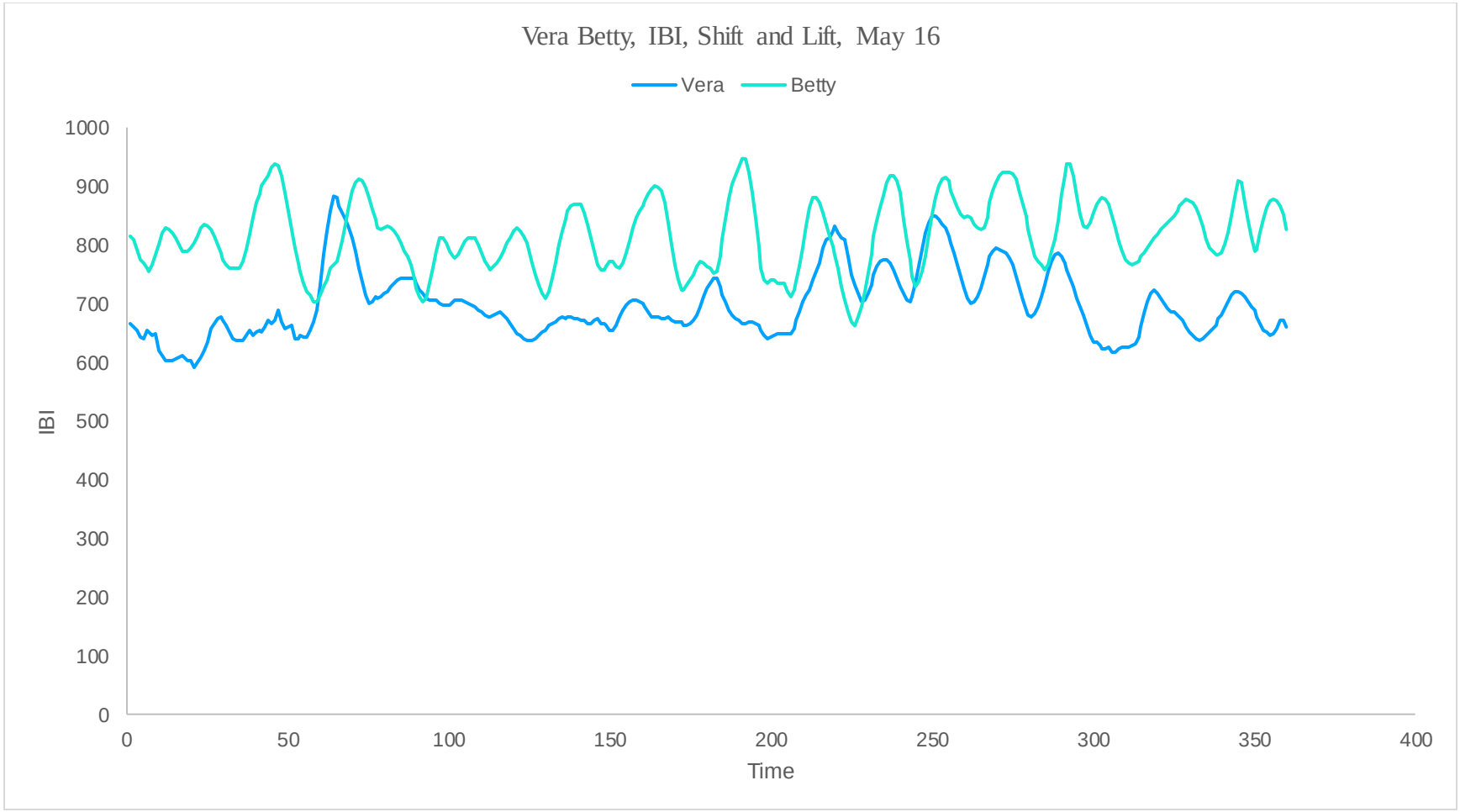
400
500
600
Time


Vera Betty, IBI, Shift and Lift, May 16
Vera
Betty
IBI
1000
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700
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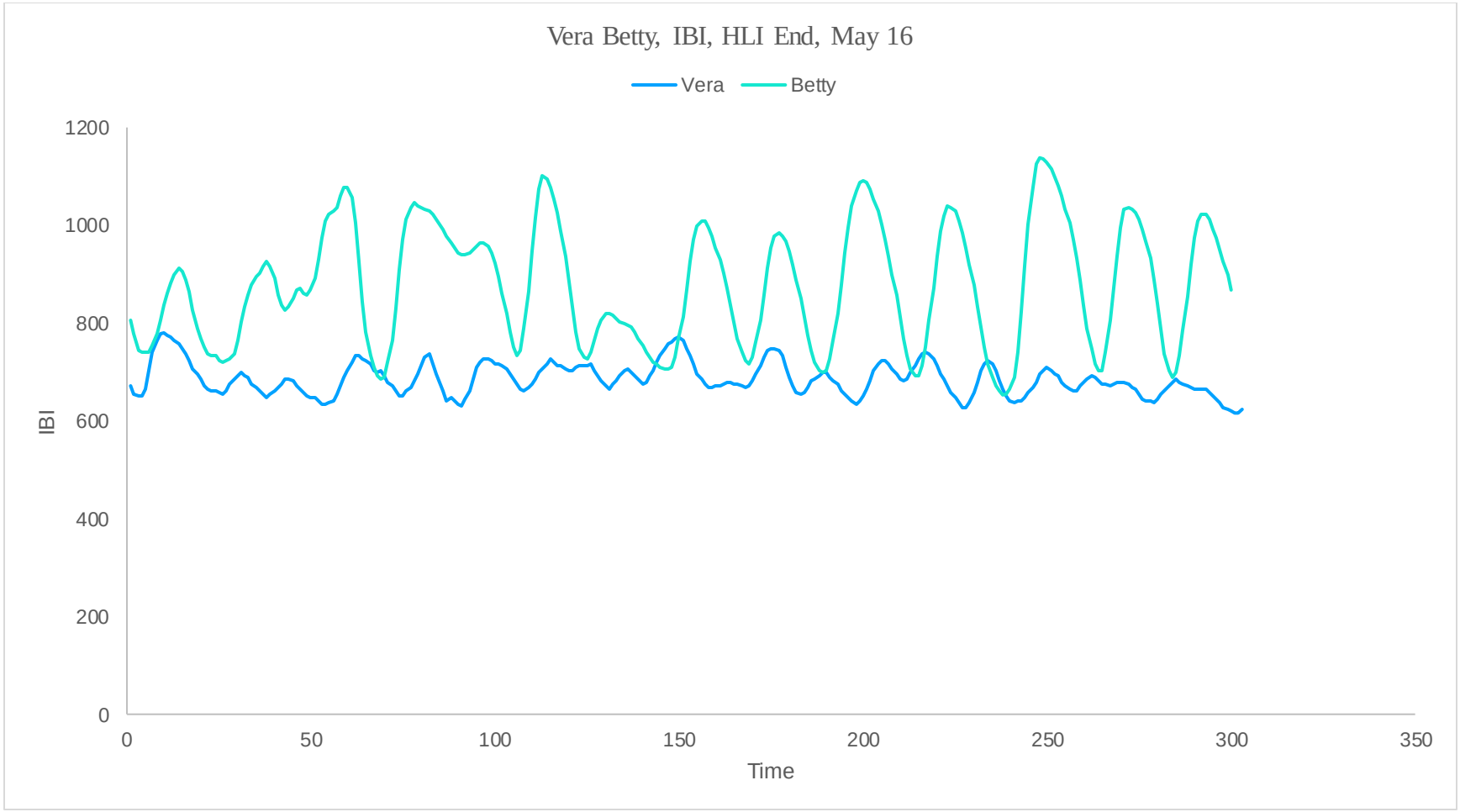
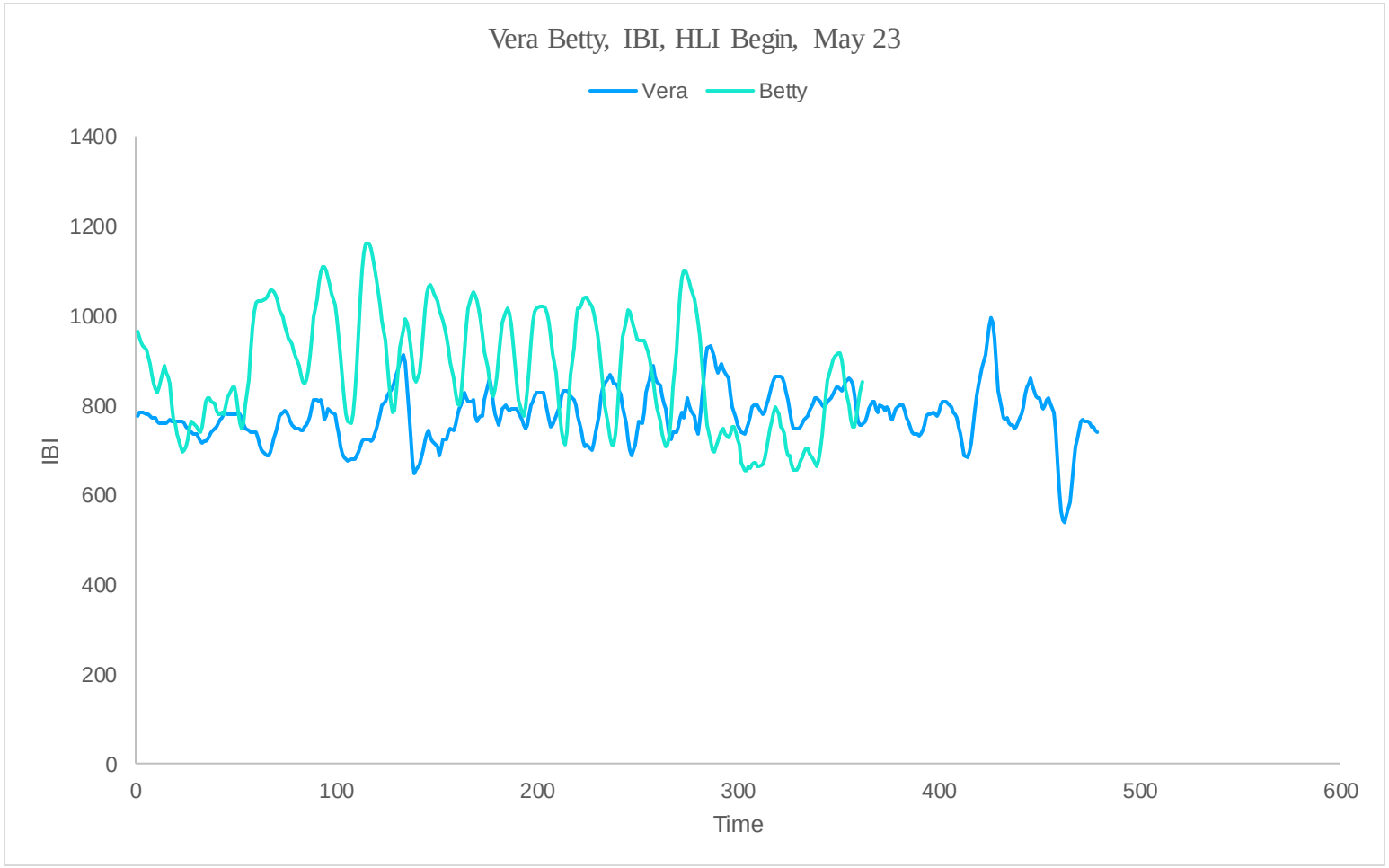
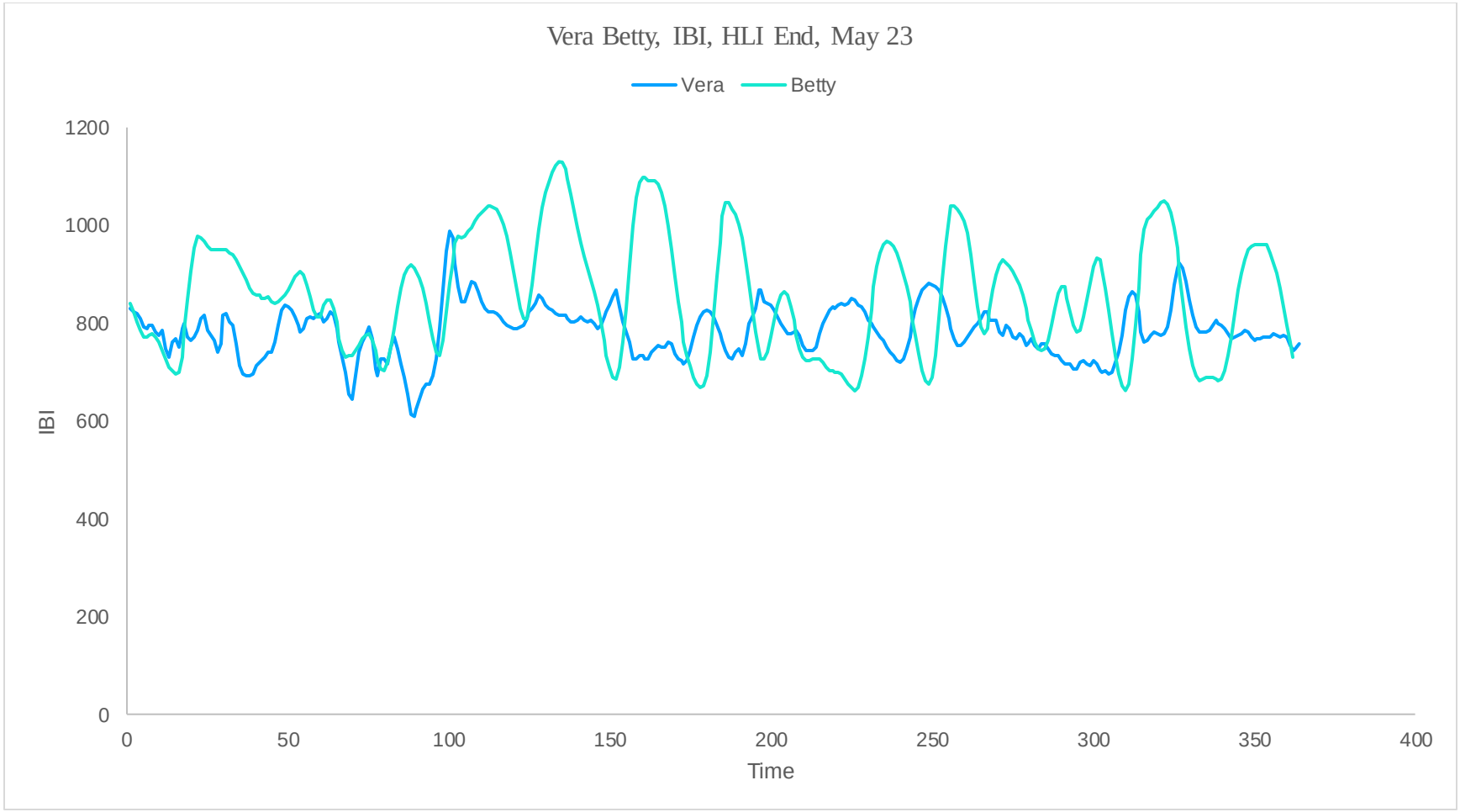
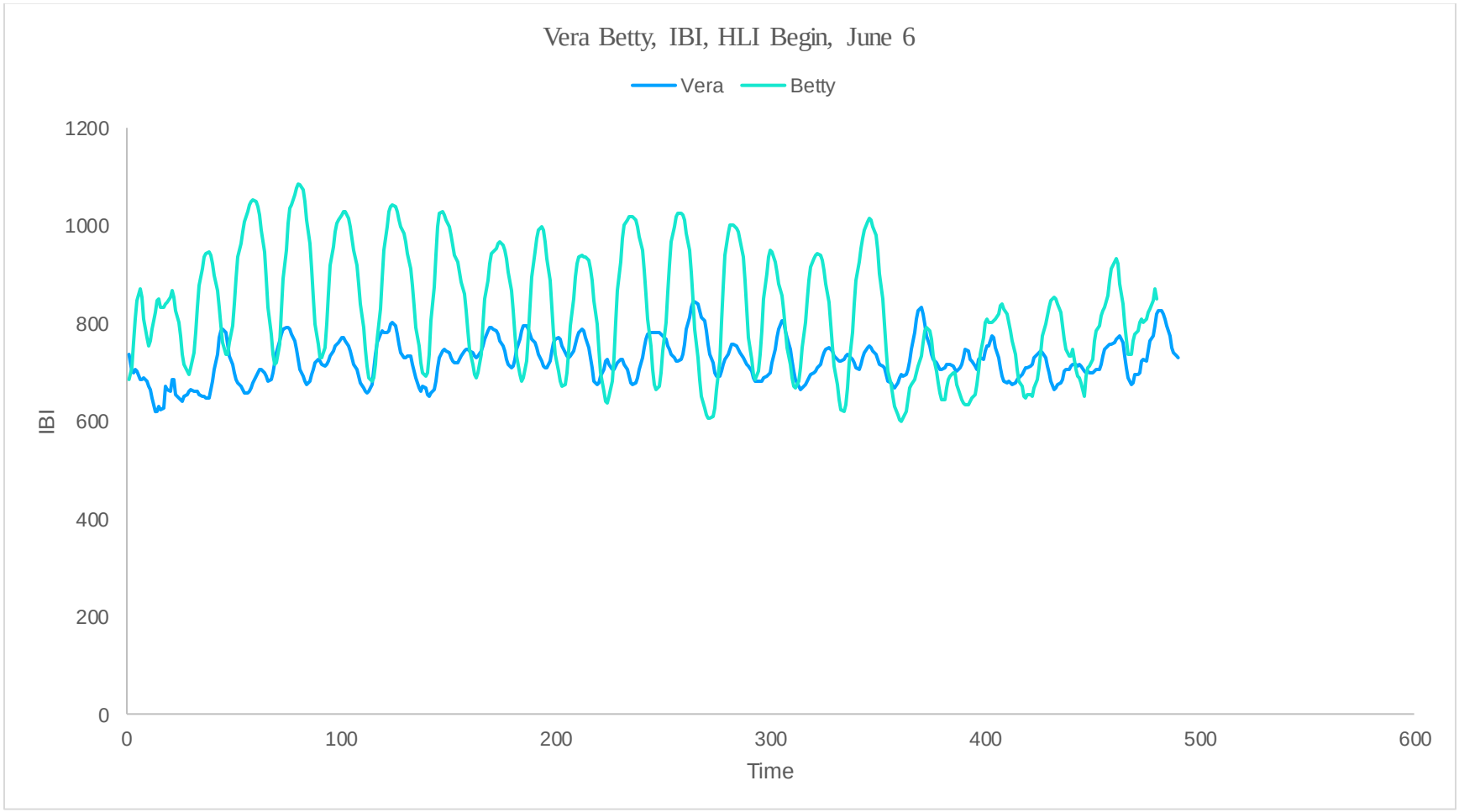
500
400
300
200
100
0
0
50
100
150
200
250
300
350
400
Time


Vera Betty, IBI, HLI End, May 16
Vera
Betty
IBI
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
Time


Vera Betty, IBI, HLI Begin, May 23
Vera
Betty
IBI
1400
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
Time

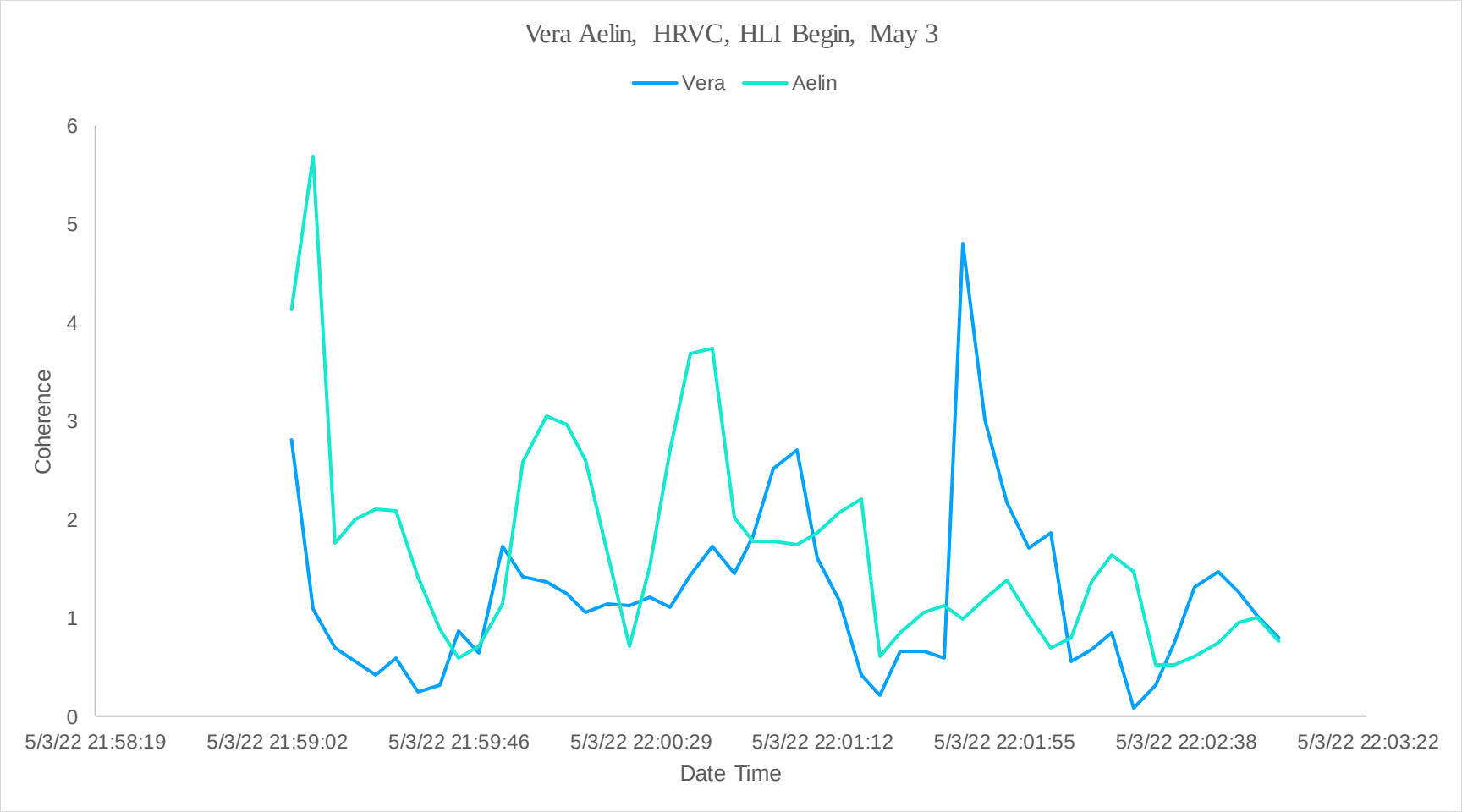

Vera Betty, IBI, HLI End, May 23
Vera
Betty
IBI
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
400
Time

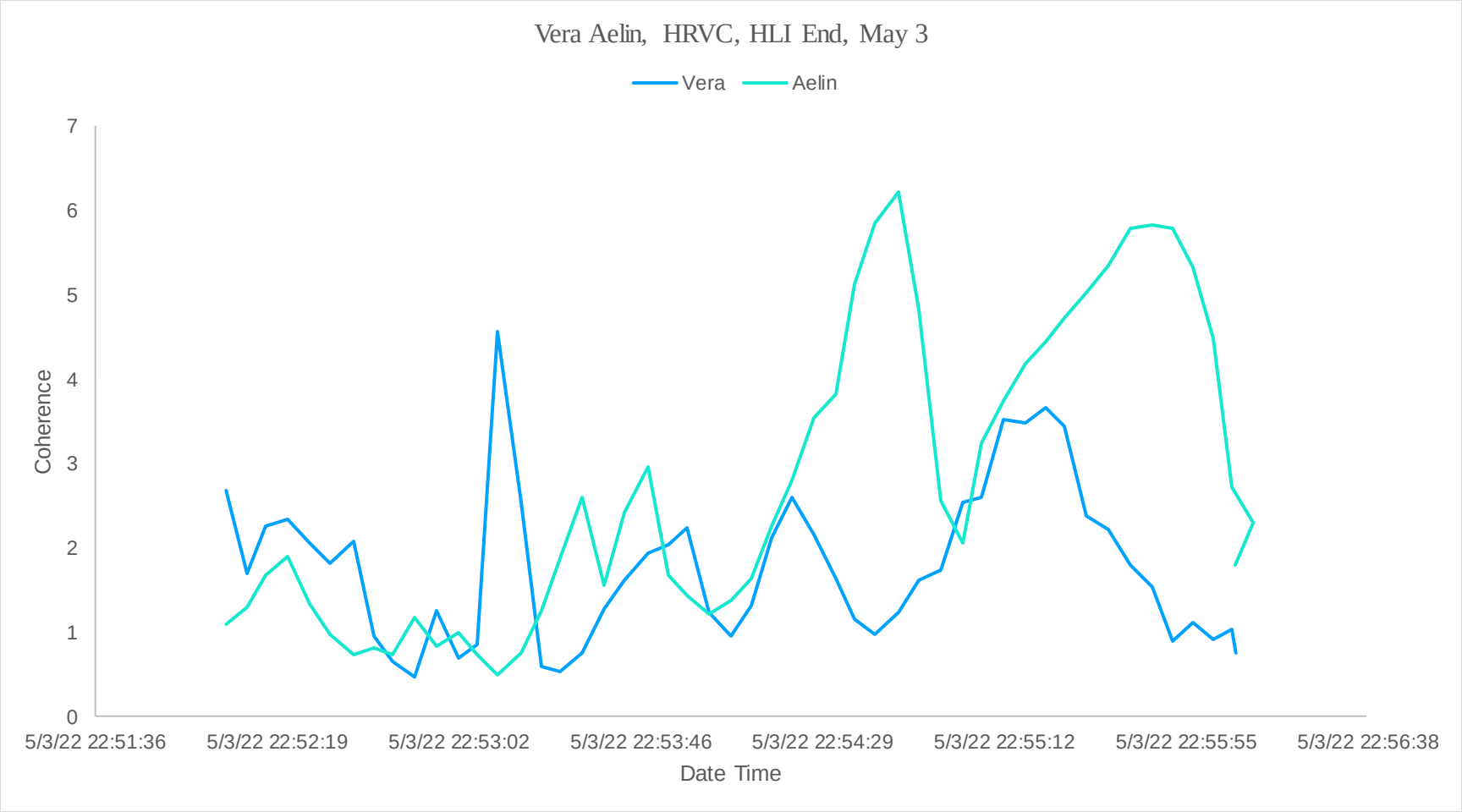

Vera Betty, IBI, HLI Begin, June 6
Vera
Betty
IBI
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
Time

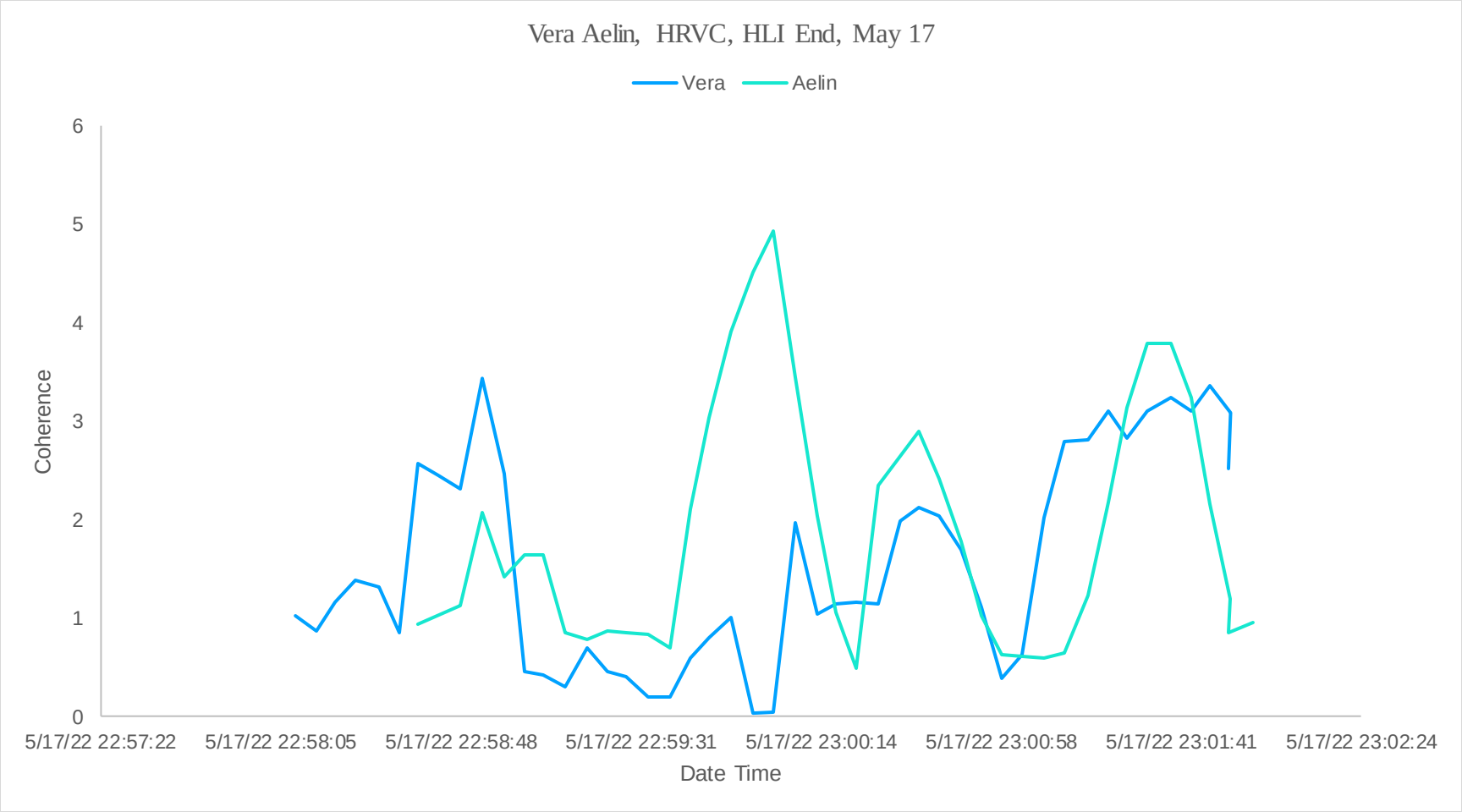
Appendix P

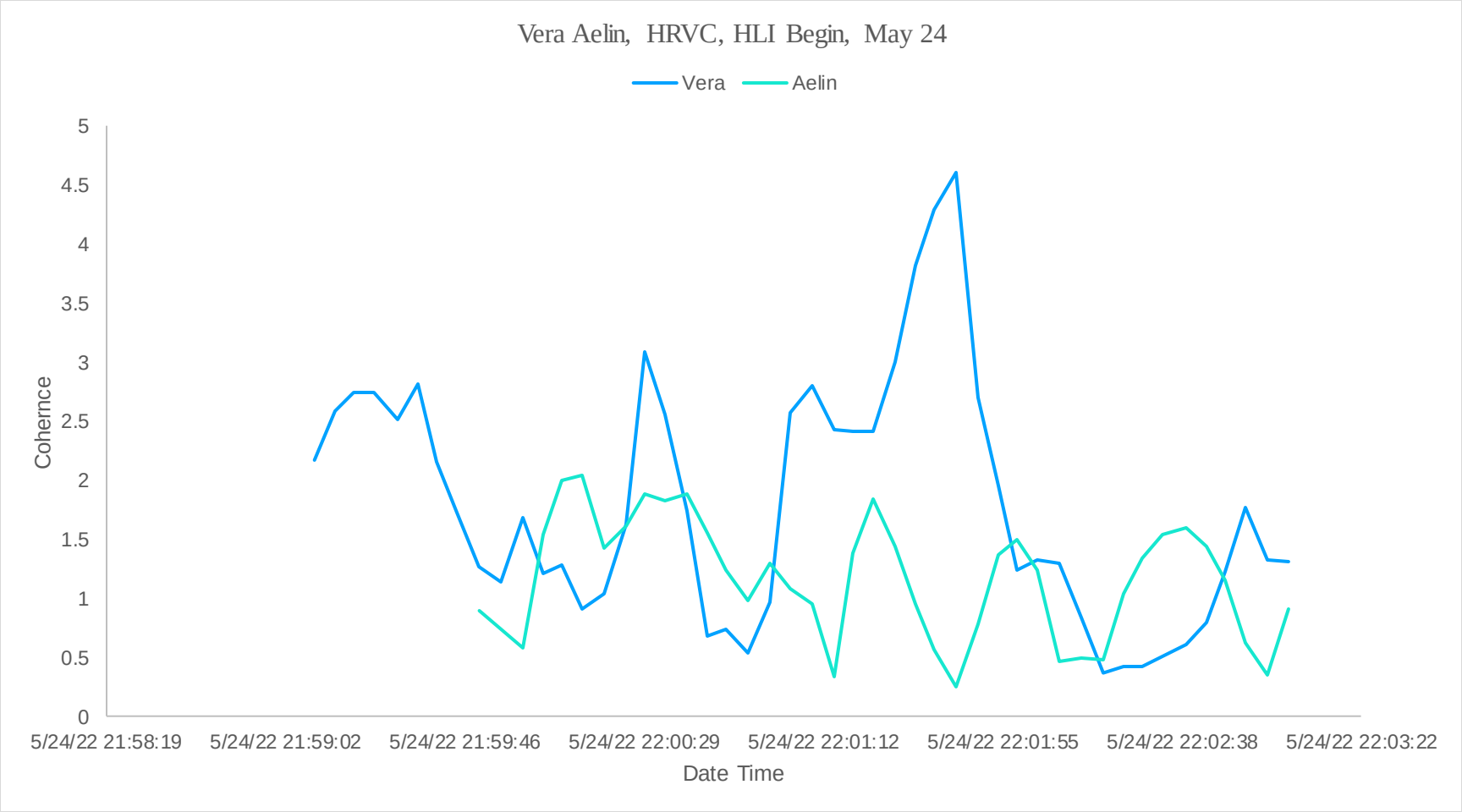
HRVC & IBI Line Charts, HLI, and S&L Intervention Sessions—Dyad 4

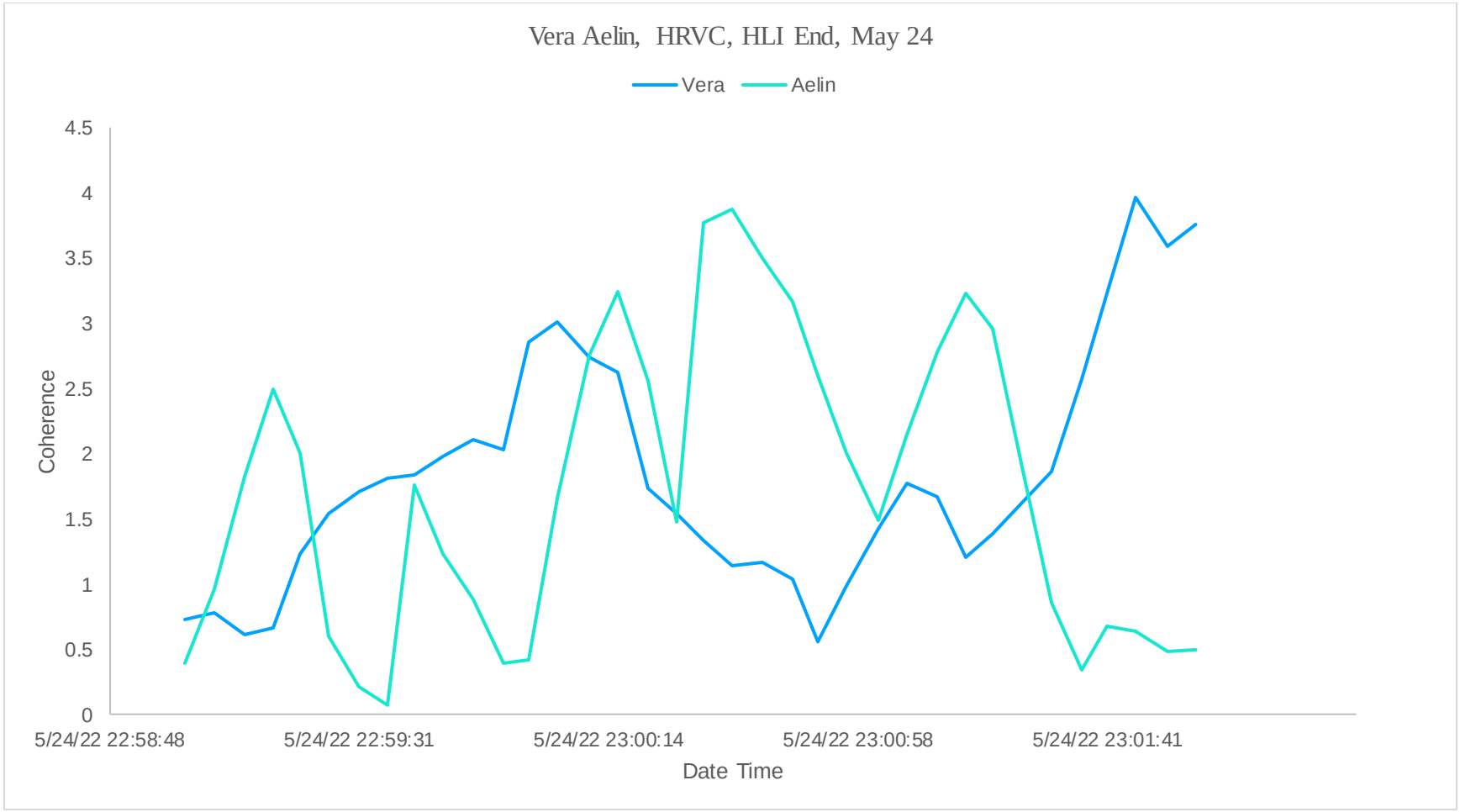
This appendix contains 13 charts for Dyad 4—Vera and Aelin.

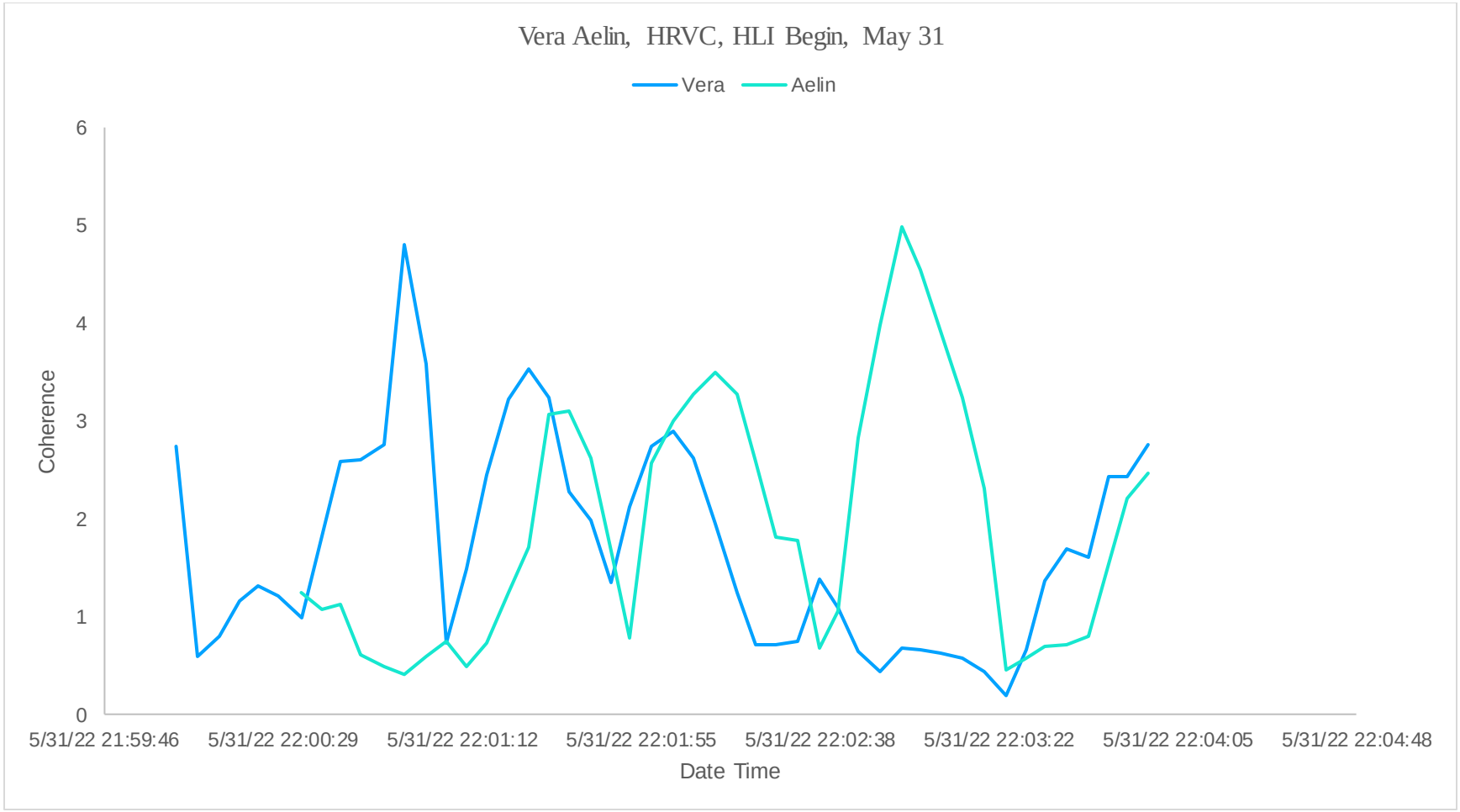

Vera Aelin, HRVC, HLI Begin, May 3
Vera
Aelin
Coherence
6
5
4
3
2
1
0
5/3/22 21:58:19
5/3/22 21:59:02
5/3/22 21:59:46
5/3/22 22:00:29
5/3/22 22:01:12
5/3/22 22:01:55
5/3/22 22:02:38
5/3/22 22:03:22
Date Time

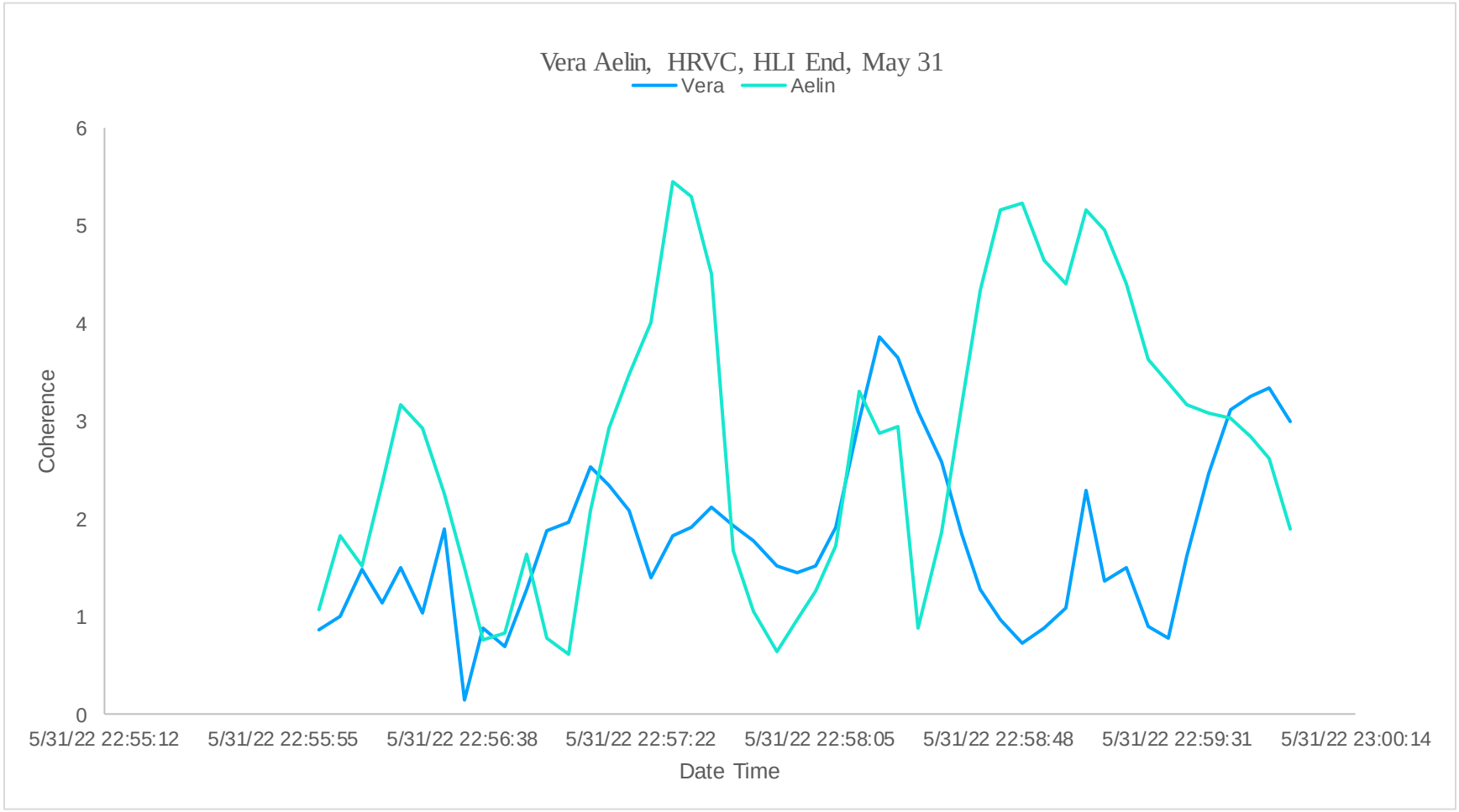

Vera Aelin, HRVC, HLI End, May 3
Vera
Aelin
Coherence
0
1
2
3
4
5
6
7
5/3/22 22:51:36
5/3/22 22:52:19
5/3/22 22:53:02
5/3/22 22:53:46
5/3/22 22:54:29
5/3/22 22:55:12
5/3/22 22:55:55
5/3/22 22:56:38
Date Time

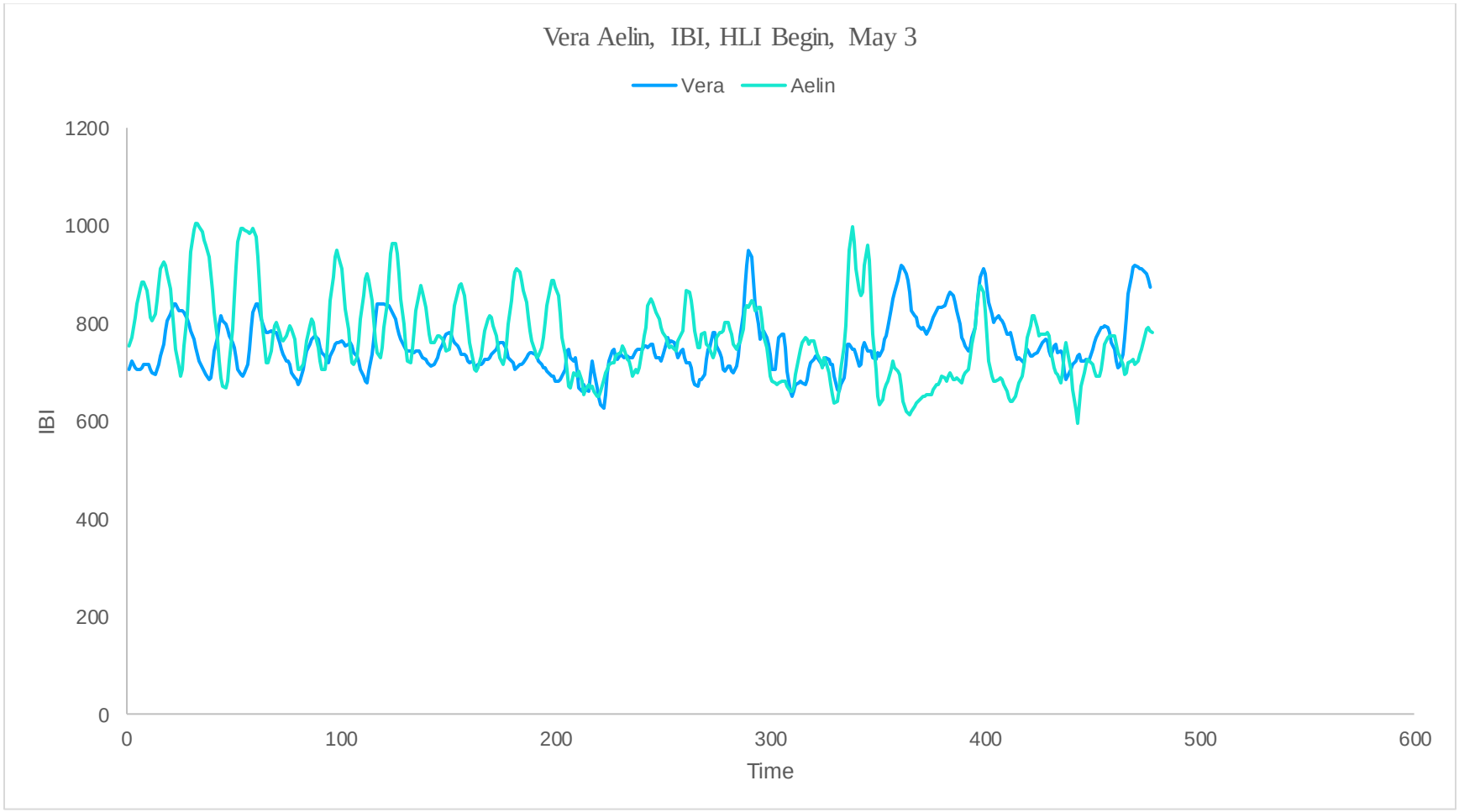

Vera Aelin, HRVC, HLI End, May 17
Vera
Aelin
Coherence
6
5
4
3
2
1
0
5/17/22 22:57:22
5/17/22 22:58:05
5/17/22 22:58:48
5/17/22 22:59:31
5/17/22 23:00:14
5/17/22 23:00:58
5/17/22 23:01:41
5/17/22 23:02:24
Date Time

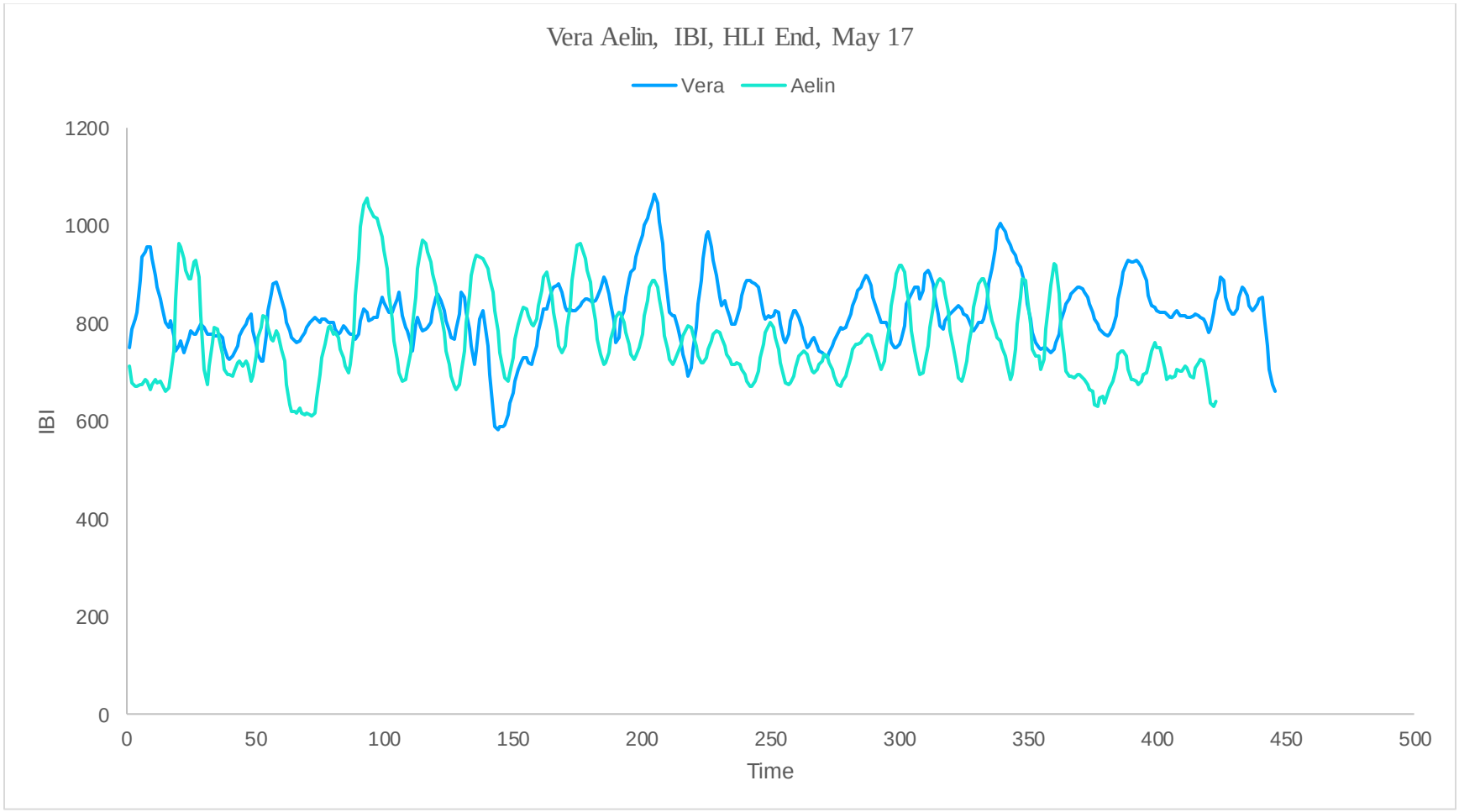

Vera Aelin, HRVC, HLI Begin, May 24
Vera
Aelin
Cohernce
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
5/24/22 21:58:19
5/24/22 21:59:02
5/24/22 21:59:46
5/24/22 22:00:29
5/24/22 22:01:12
5/24/22 22:01:55
5/24/22 22:02:38
5/24/22 22:03:22
Date Time

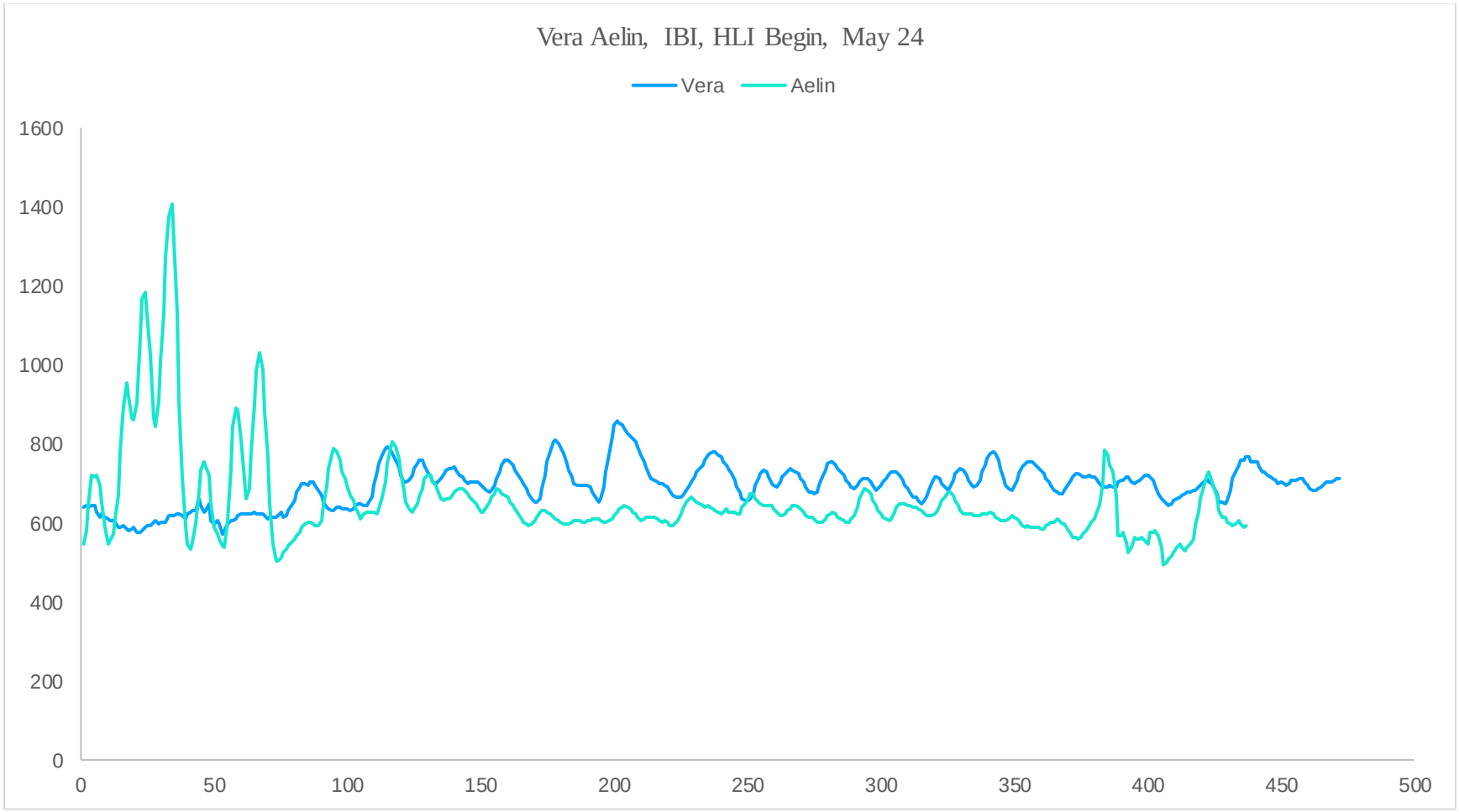

Vera Aelin, HRVC, HLI End, May 24
Vera
Aelin
Coherence
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
5/24/22 22:58:48
5/24/22 22:59:31
5/24/22 23:00:14
5/24/22 23:00:58
5/24/22 23:01:41
Date Time

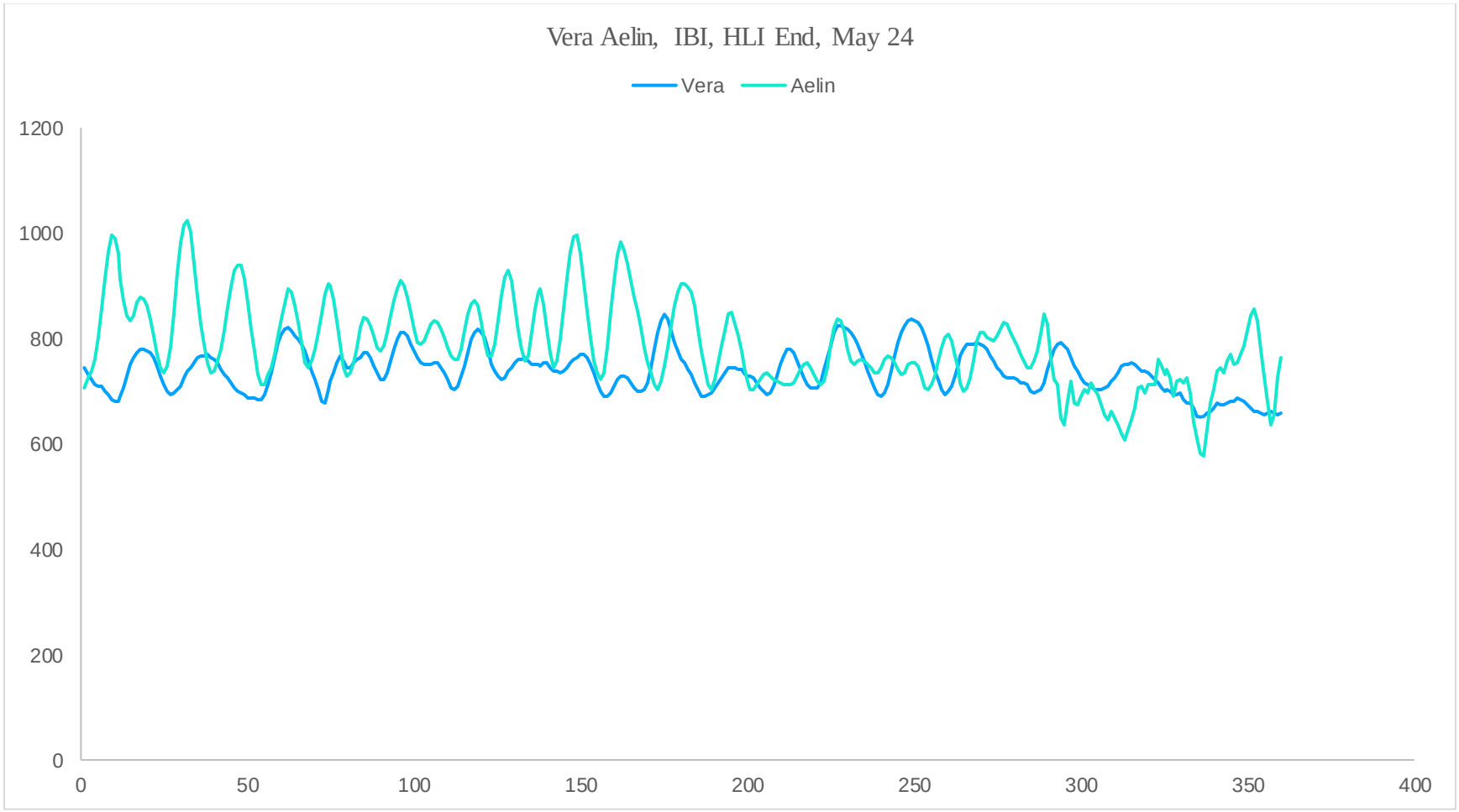

Vera Aelin, HRVC, HLI Begin, May 31
Vera
Aelin
Coherence
6
5
4
3
2
1
0
5/31/22 21:59:46
5/31/22 22:00:29
5/31/22 22:01:12
5/31/22 22:01:55
5/31/22 22:02:38
5/31/22 22:03:22
5/31/22 22:04:05
5/31/22 22:04:48
Date Time

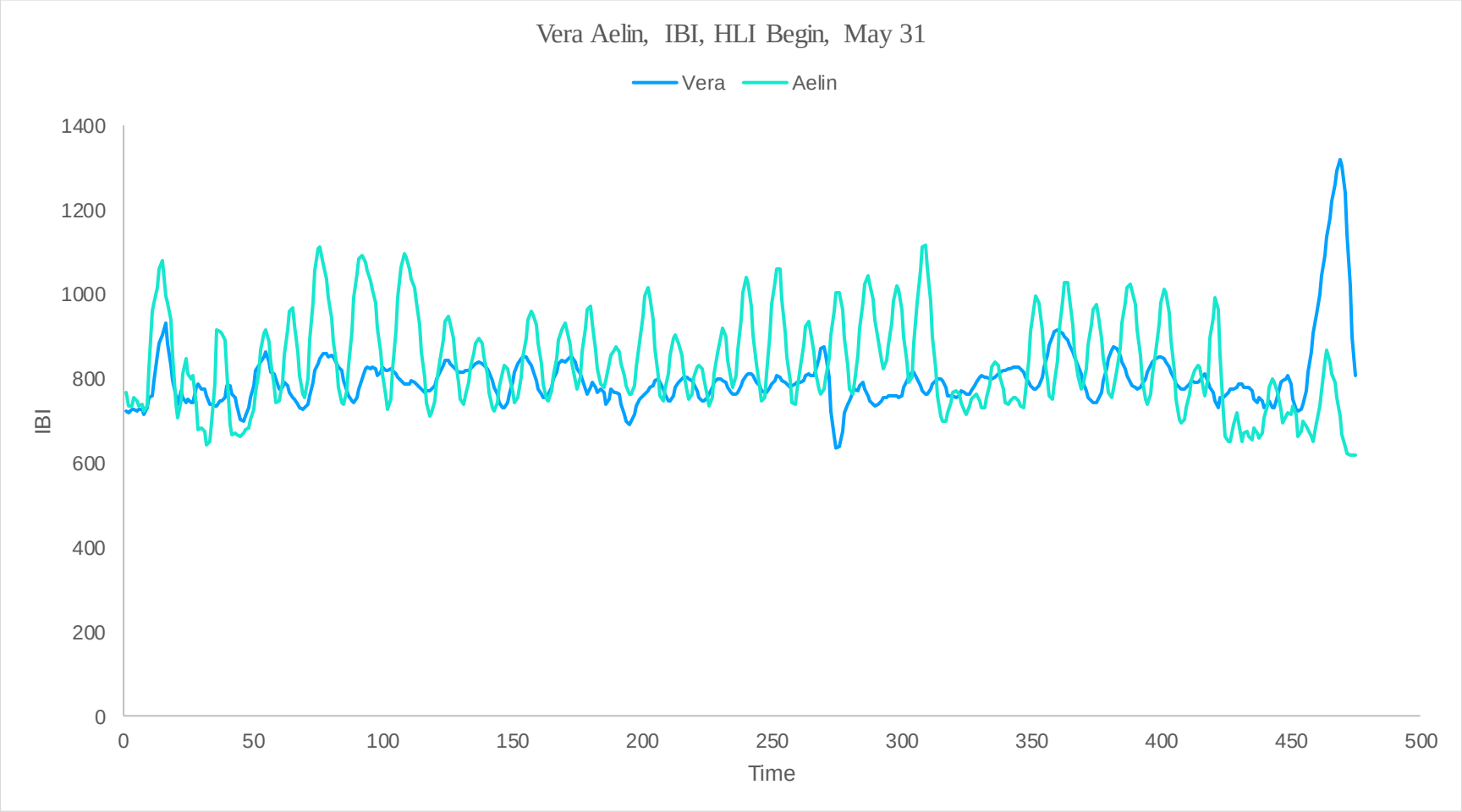

Vera Aelin, HRVC, HLI End, May 31
Vera
Aelin
Coherence
6
5
4
3
2
1
0
5/31/22 22:55:12
5/31/22 22:55:55
5/31/22 22:56:38
5/31/22 22:57:22
5/31/22 22:58:05
5/31/22 22:58:48
5/31/22 22:59:31
5/31/22 23:00:14
Date Time

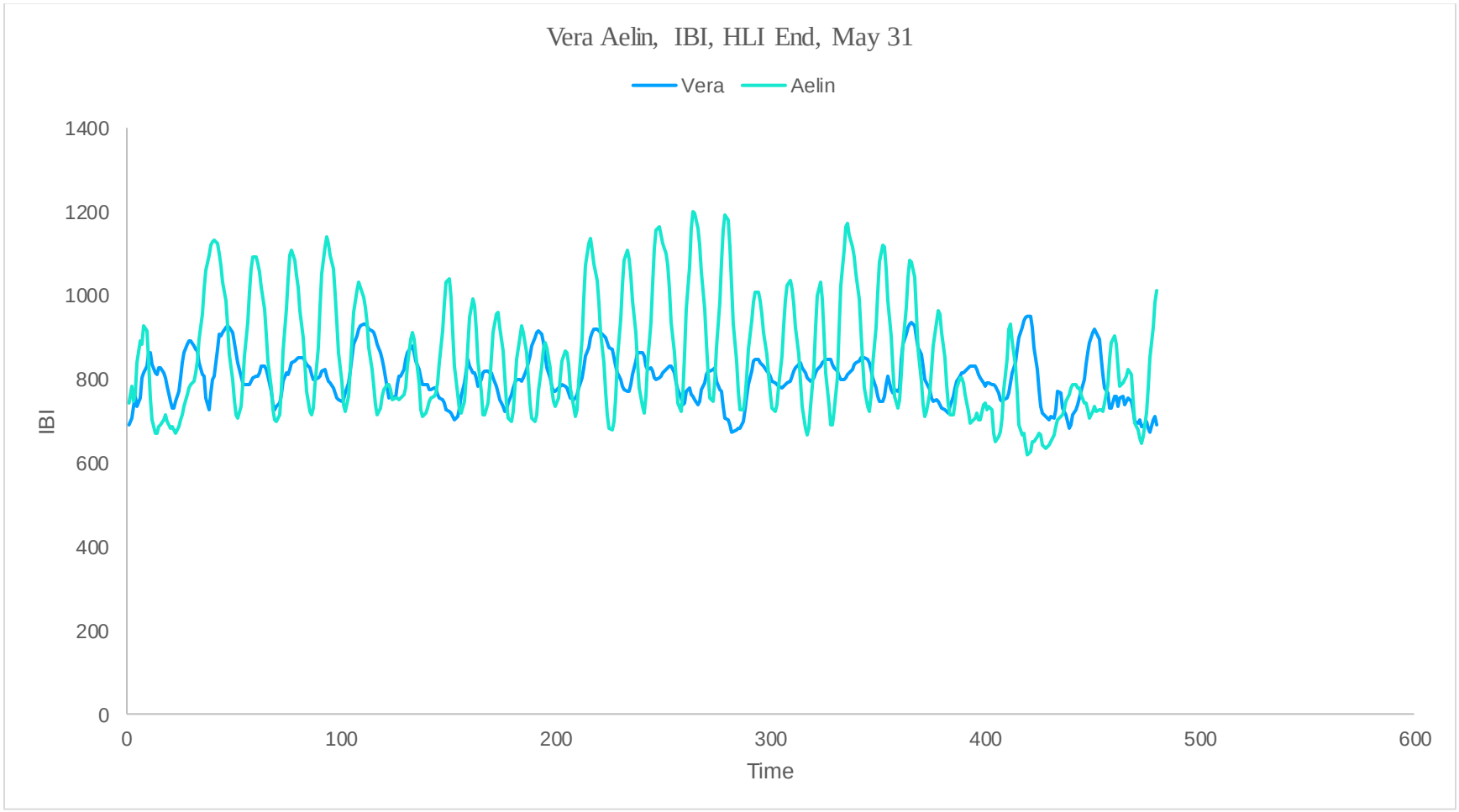

Vera Aelin, IBI, HLI Begin, May 3
Vera
Aelin
IBI
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
Time


Vera Aelin, IBI, HLI End, May 17
Vera
Aelin
IBI
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
400
450
500
Time


Vera Aelin, IBI, HLI Begin, May 24
Vera
Aelin
1600
1400
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
400
450
500


Vera Aelin, IBI, HLI End, May 24
Vera
Aelin
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
400

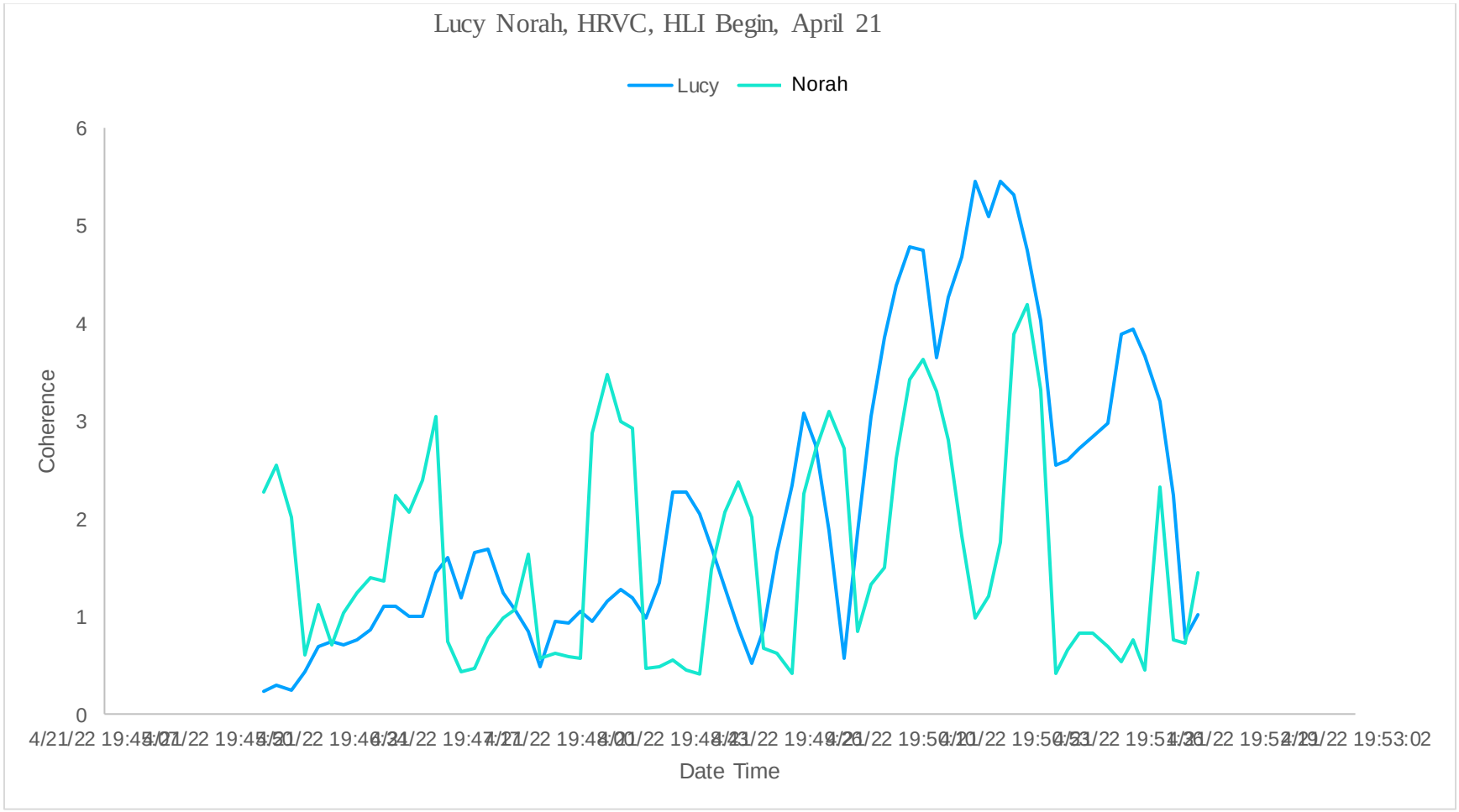

Vera Aelin, IBI, HLI Begin, May 31
Vera
Aelin
IBI
1400
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
400
450
500
Time

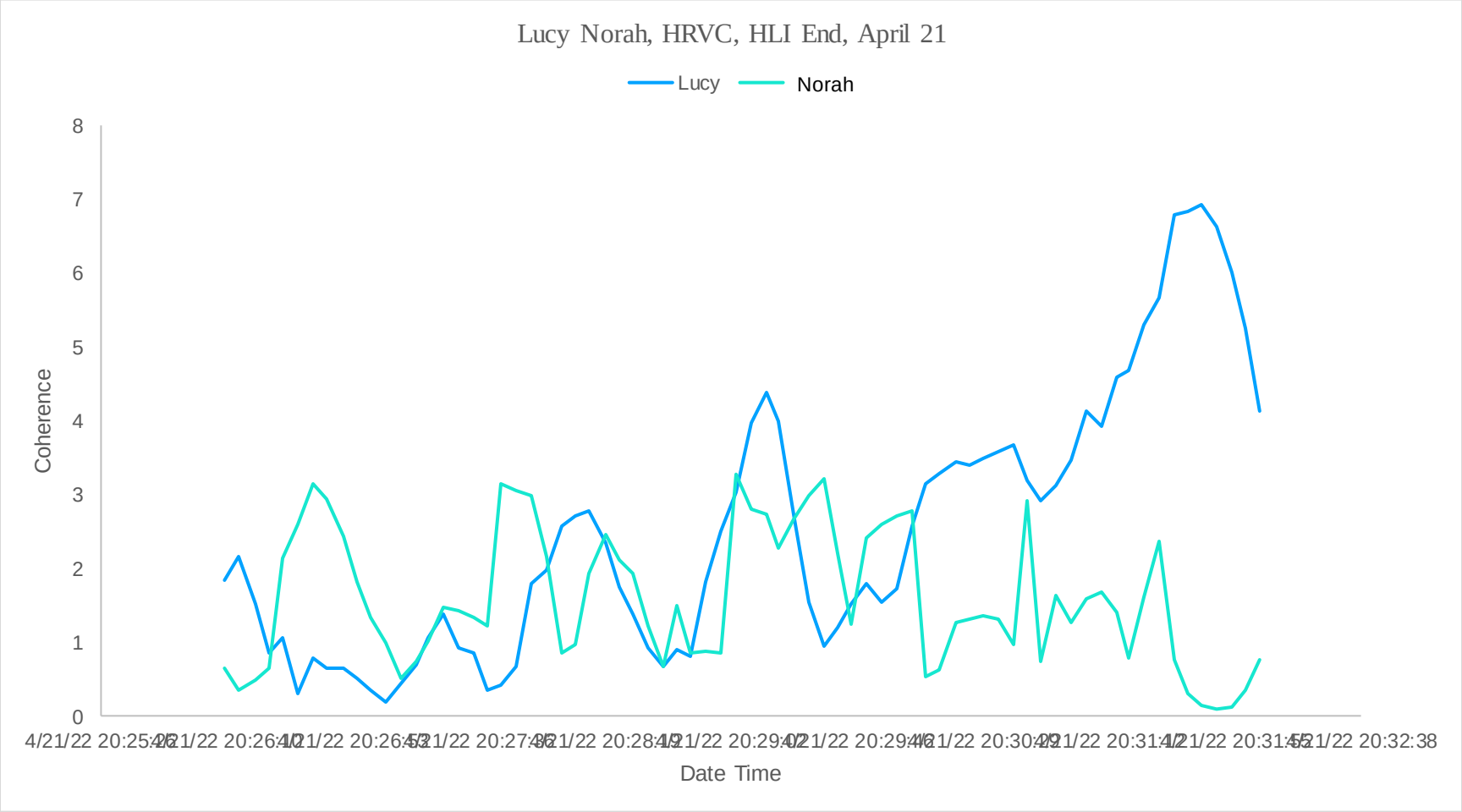

Vera Aelin, IBI, HLI End, May 31
Vera
Aelin
1400
1200
1000
800
600
400
200
0
IBI
0
100
200
300
400
500
600
Time

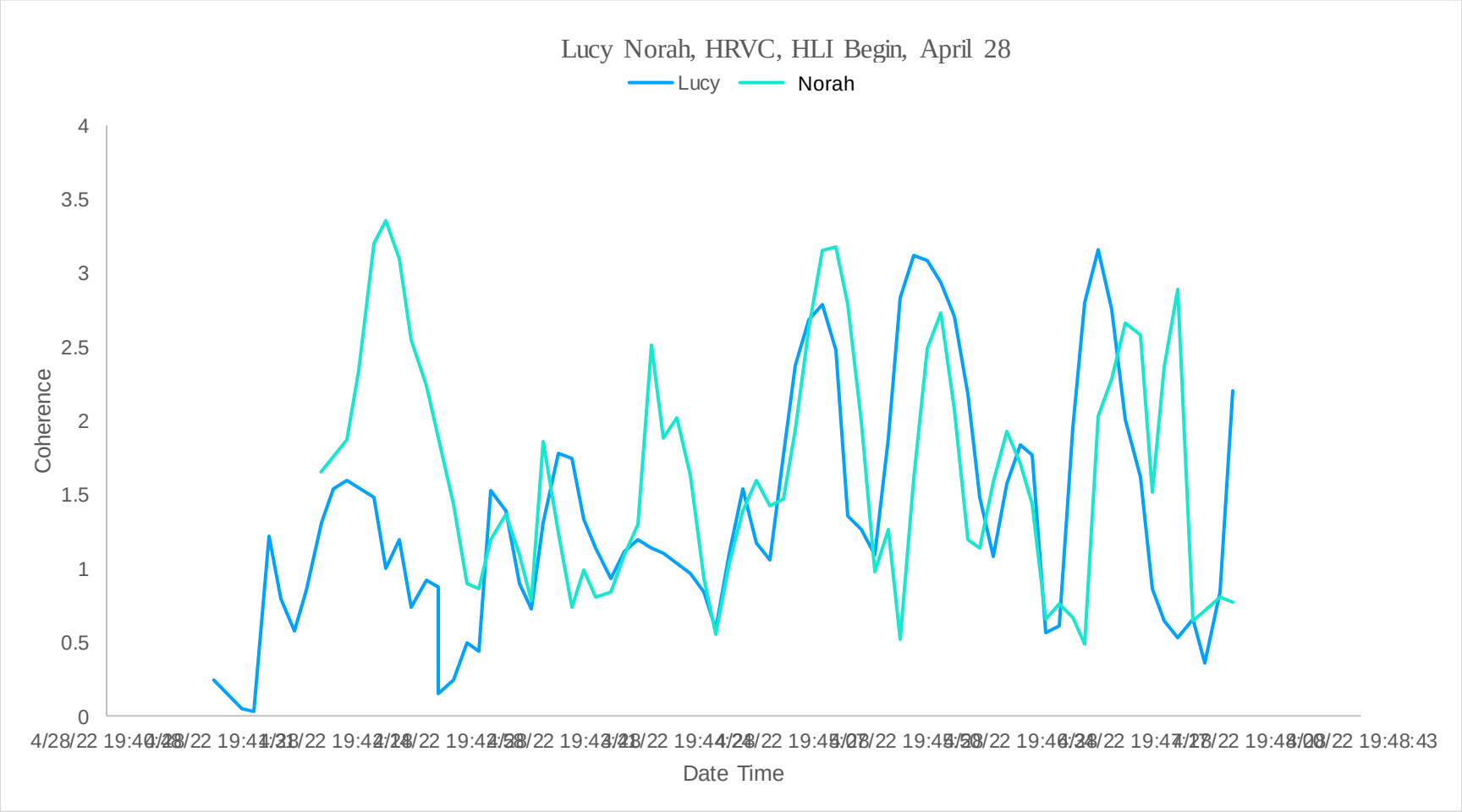
Appendix Q

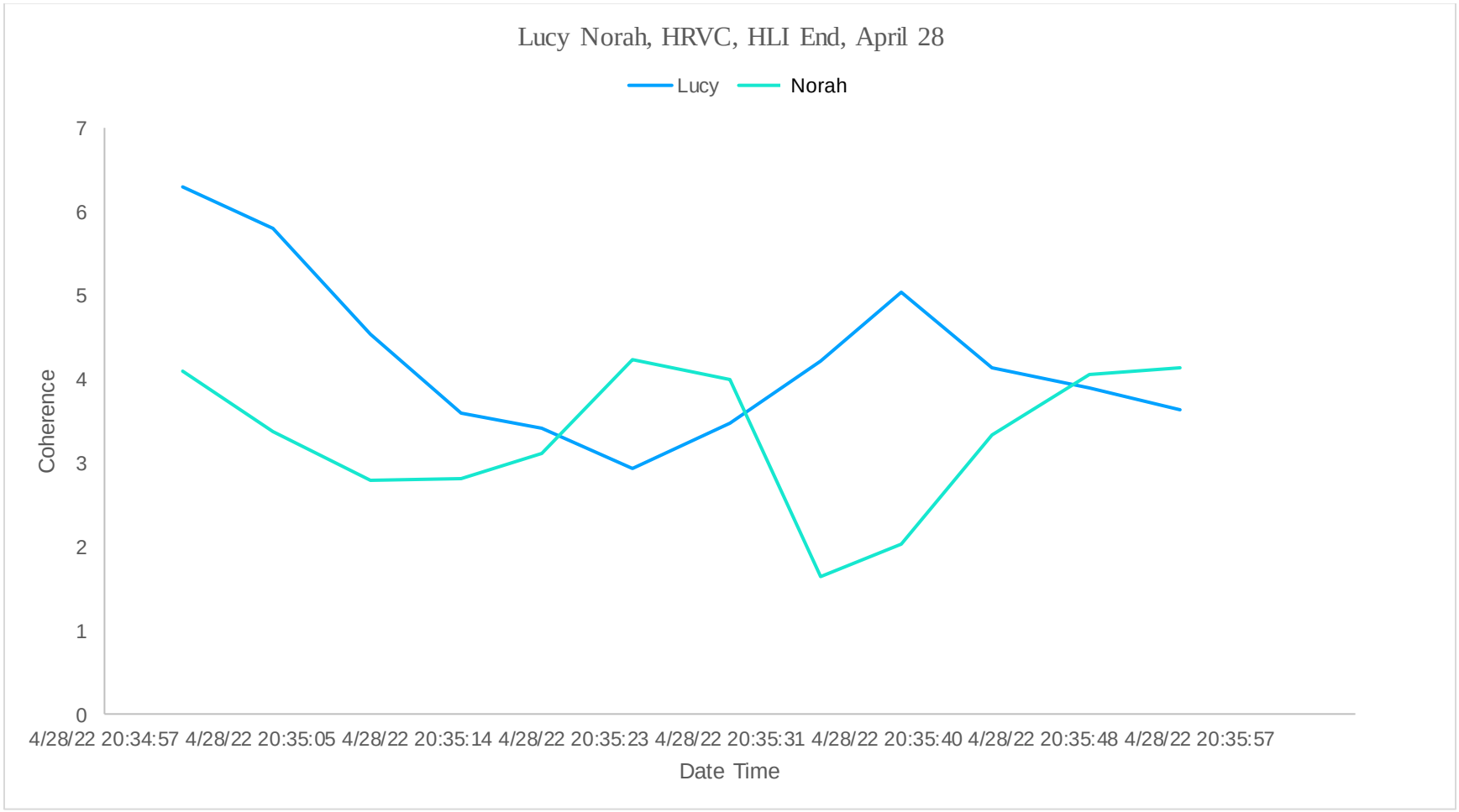
HRVC & IBI Line Charts, HLI, and S&L Intervention Sessions—Dyad 5

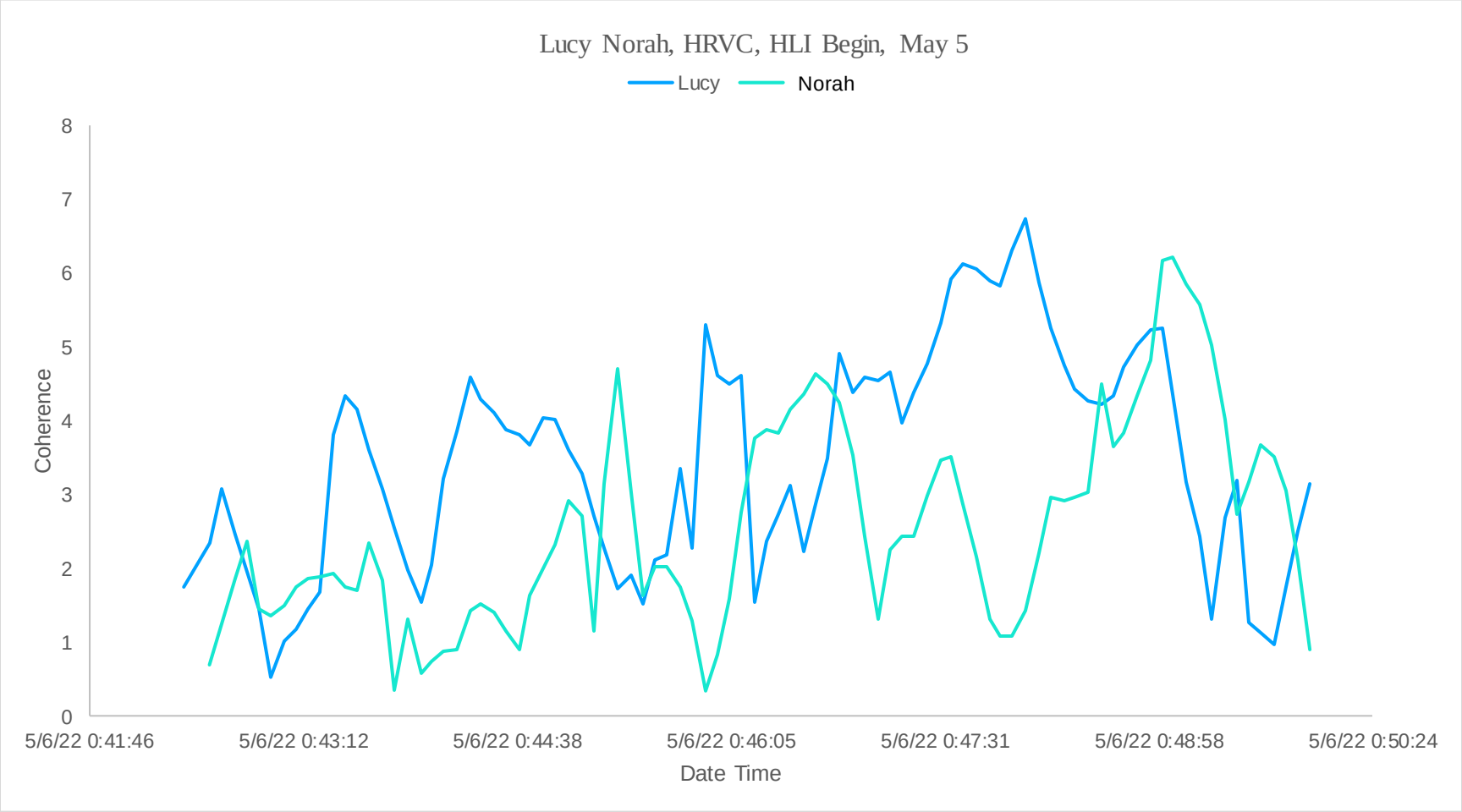
This appendix contains 26 charts for Dyad 5—Lucy and Norah.

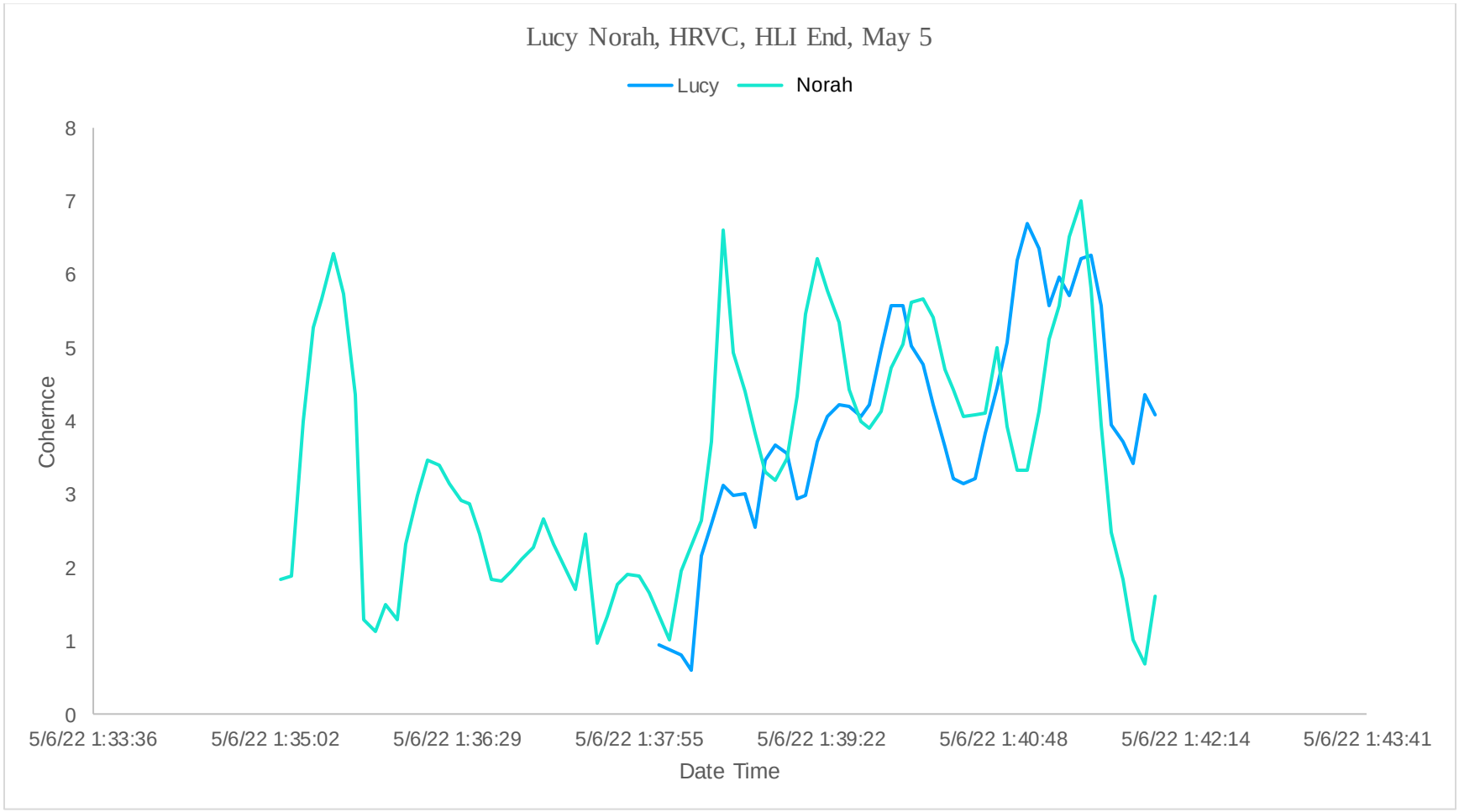

Lucy Norah, HRVC, HLI Begin, April 21
Lucy
Norah
Coherence
0
1
2
3
4
5
6
Date Time

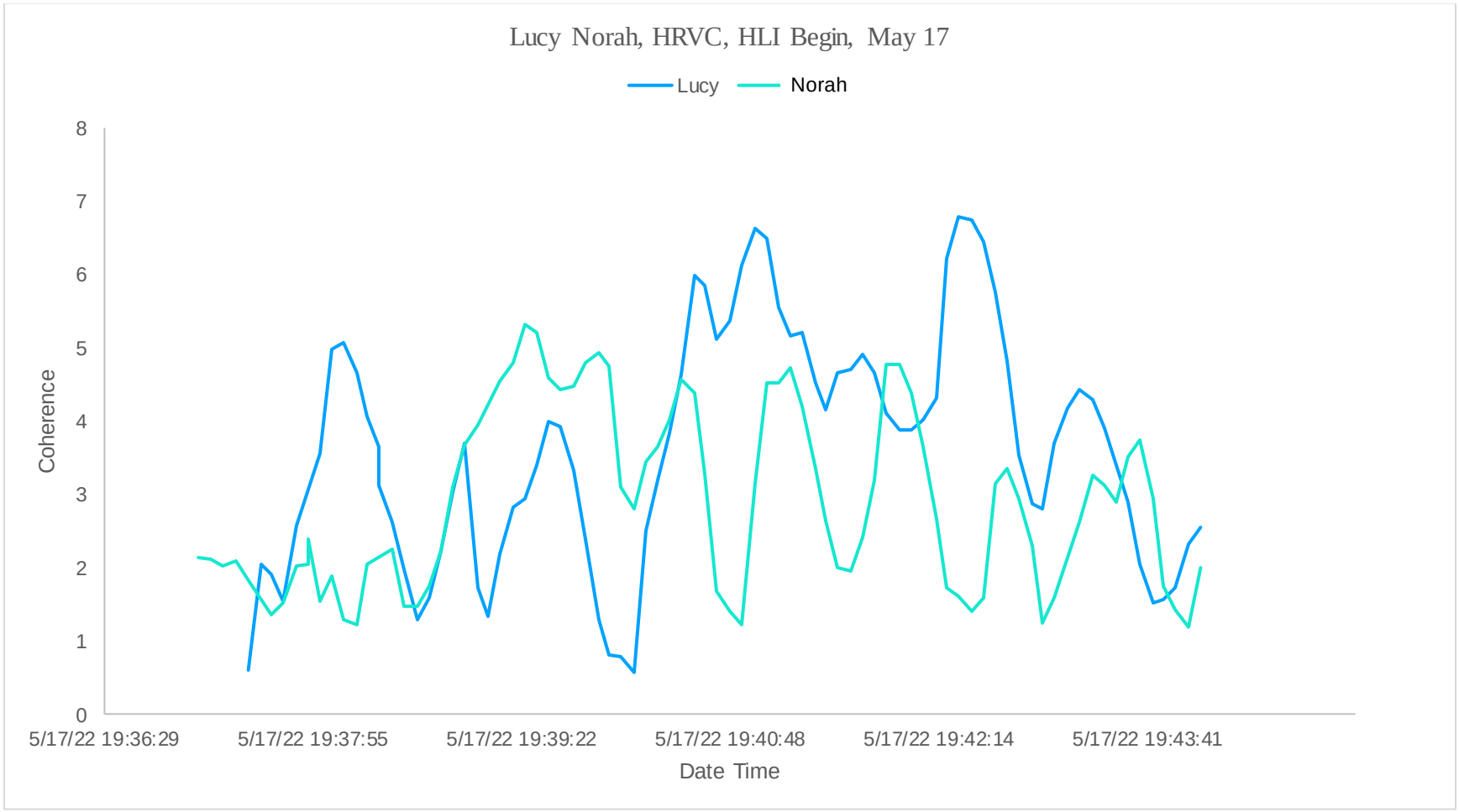

Lucy Norah, HRVC, HLI End, April 21
Lucy
Norah
Coherence
8
7
6
5
4
3
2
1
0
4/21/22 20:25:46
4/21/22 20:26:46
4/21/22 20:27:46
4/21/22 20:28:46
4/21/22 20:29:46
4/21/22 20:30:46
4/21/22 20:31:46
4/21/22 20:32:38
Date Time

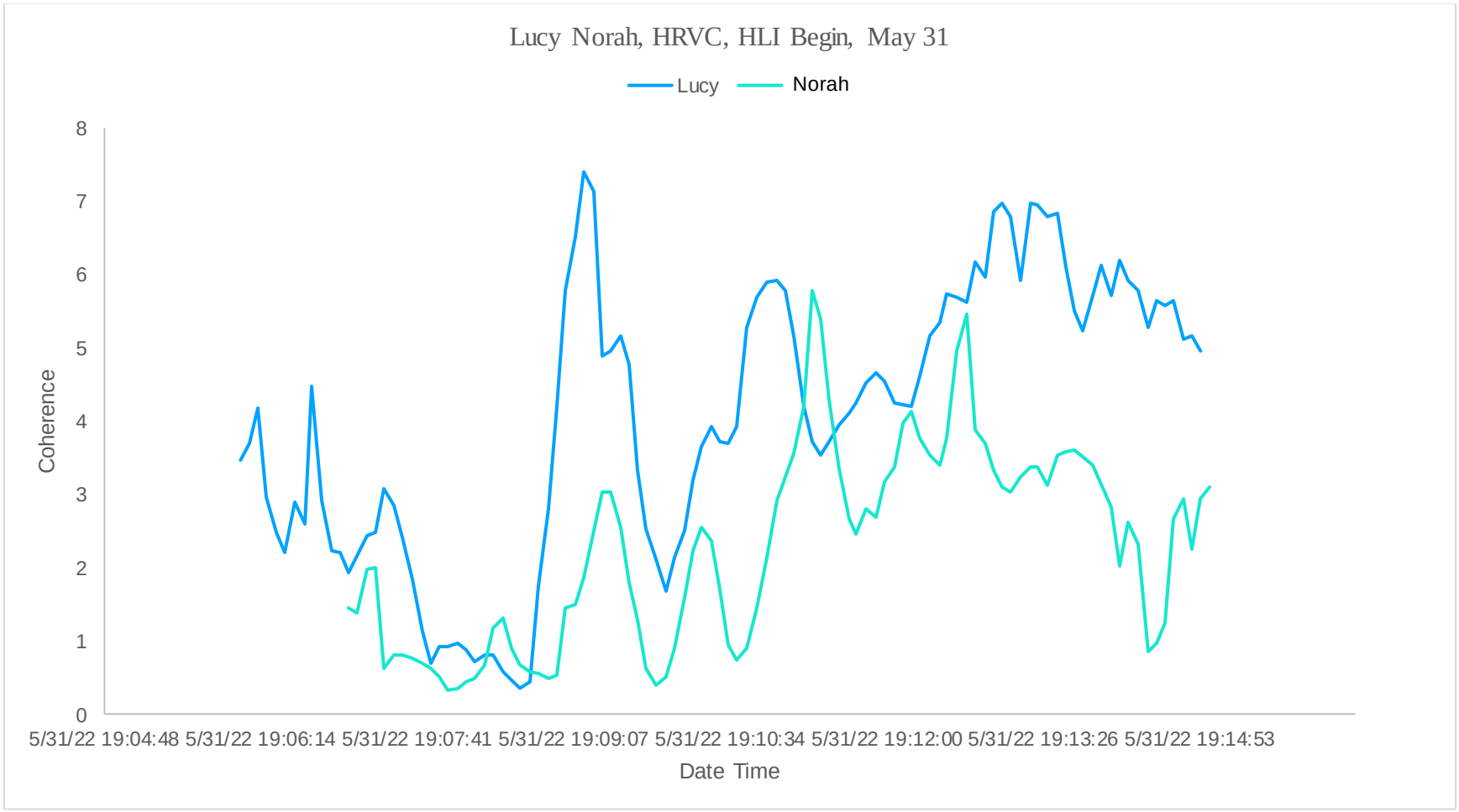

Lucy Norah, HRVC, HLI Begin, April 28
Lucy
Norah
Coherence
4
3.5
3
2.5
2
1.5
1
0.5
0
4/28/22 19:48:43
Date Time

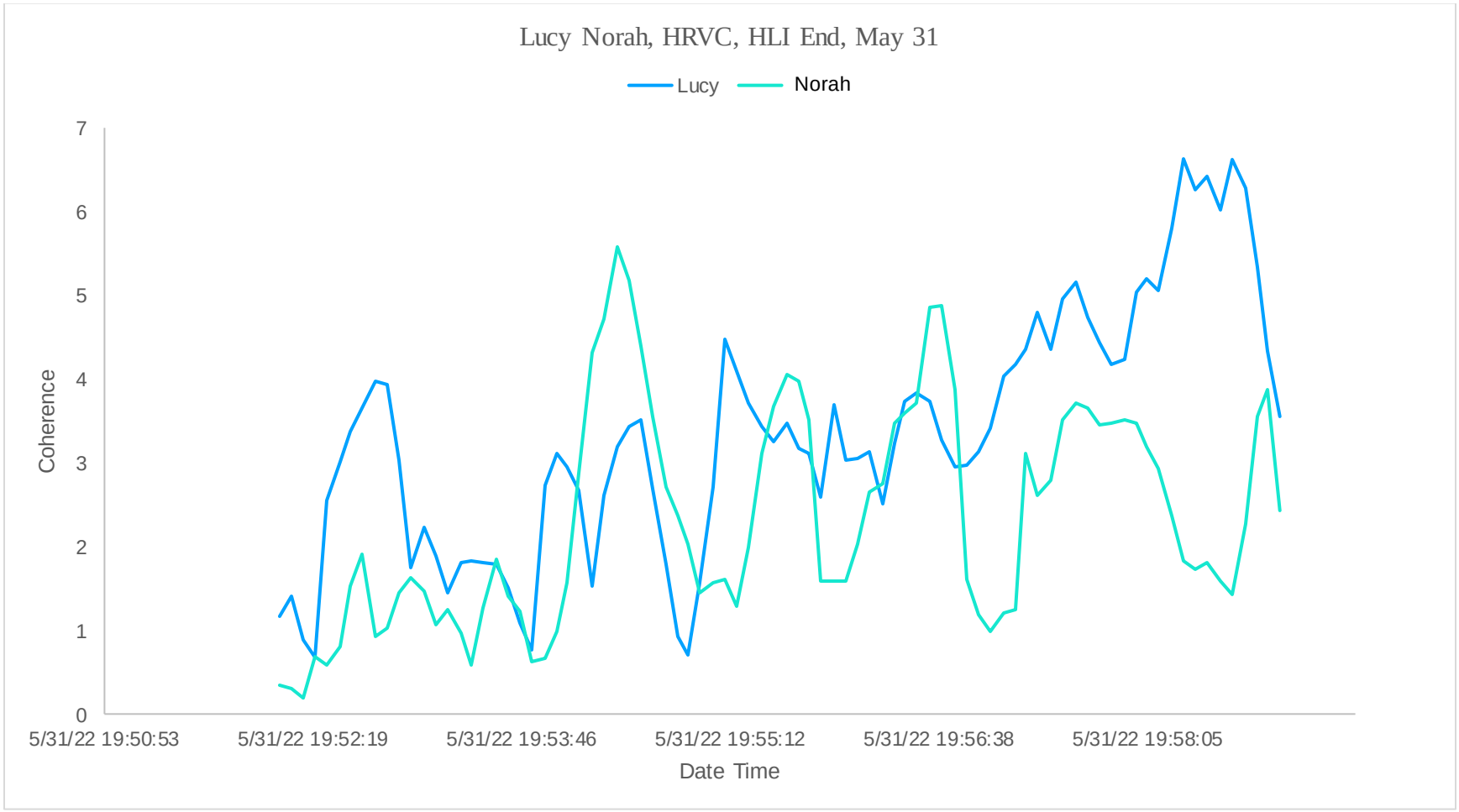

Lucy Norah, HRVC, HLI End, April 28
Lucy
Norah
Coherence
7
6
5
4
3
2
1
0
4/28/22 20:34:57
4/28/22 20:35:05
4/28/22 20:35:14
4/28/22 20:35:23
4/28/22 20:35:31
4/28/22 20:35:40
4/28/22 20:35:48
4/28/22 20:35:57
Date Time

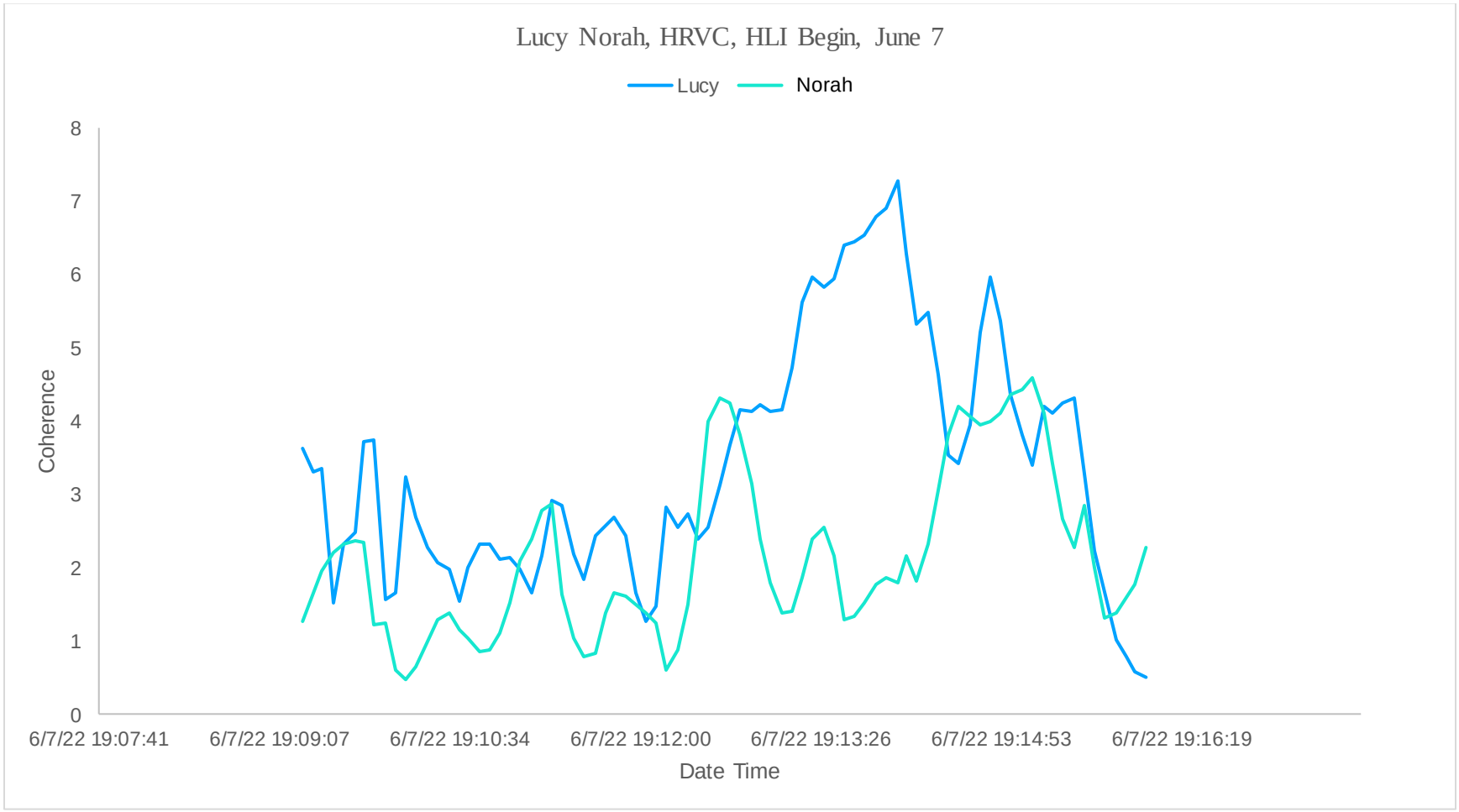

Lucy Norah, HRVC, HLI Begin, May 5
Lucy
Norah
Coherence
8
7
6
5
4
3
2
1
0
5/6/22 0:41:46
5/6/22 0:43:12
5/6/22 0:44:38
5/6/22 0:46:05
5/6/22 0:47:31
5/6/22 0:48:58
5/6/22 0:50:24
Date Time

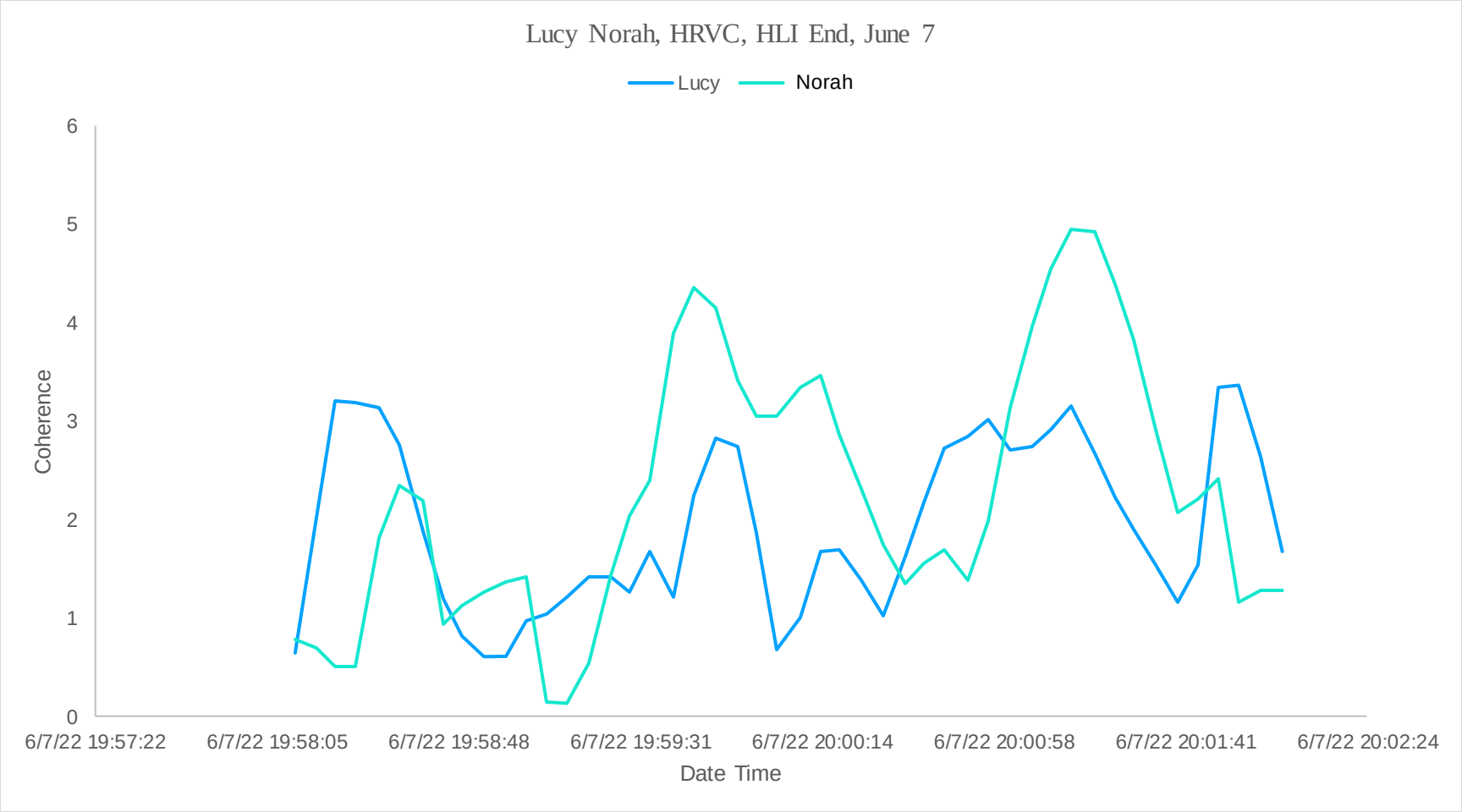

Lucy Norah, HRVC, HLI End, May 5
Lucy
Norah
Cohernce
8
7
6
5
4
3
2
1
0
5/6/22 1:33:36
5/6/22 1:35:02
5/6/22 1:36:29
5/6/22 1:37:55
5/6/22 1:39:22
5/6/22 1:40:48
5/6/22 1:42:14
5/6/22 1:43:41
Date Time

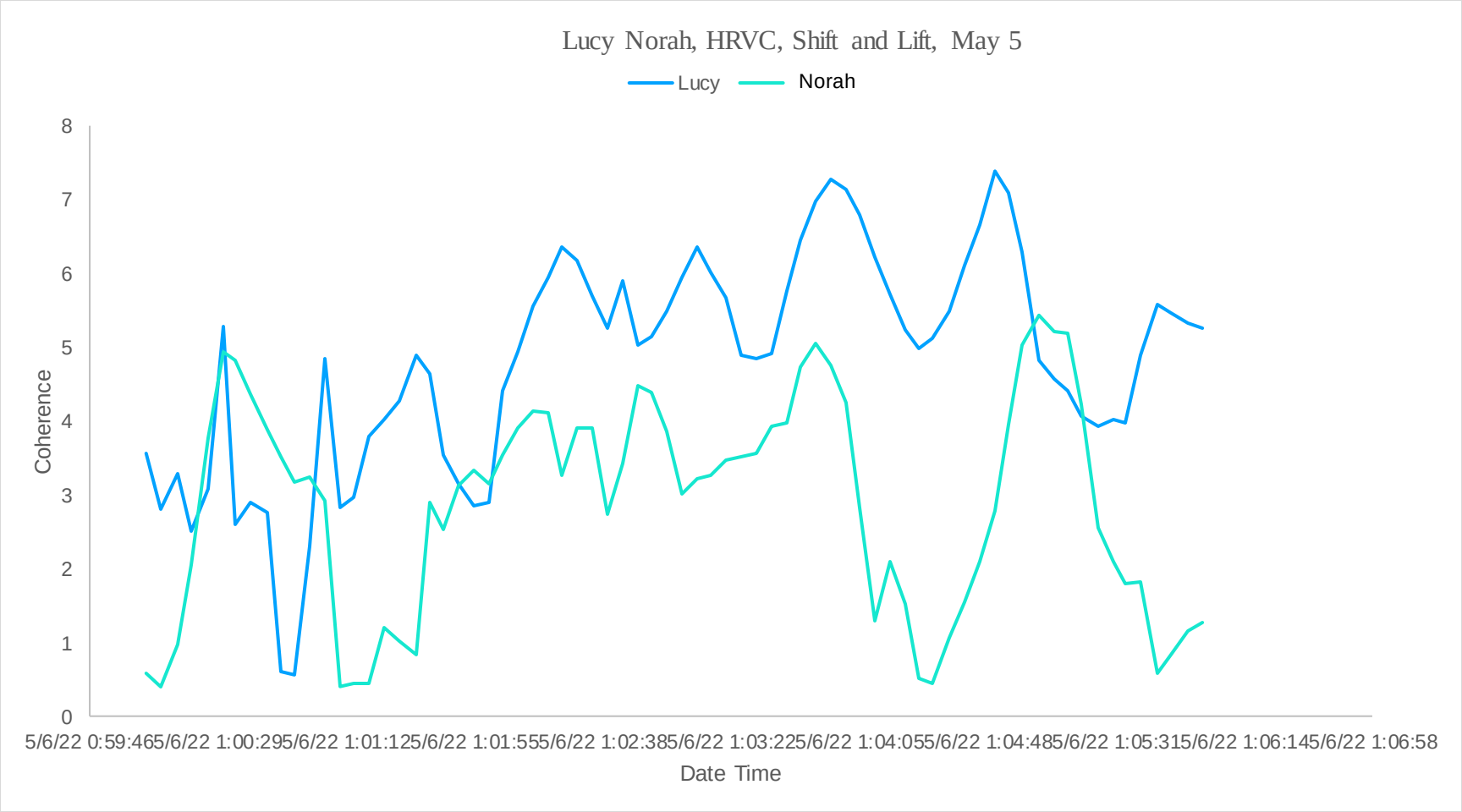

Lucy Norah, HRVC, HLI Begin, May 17
Lucy
Norah
Coherence
8
7
6
5
4
3
2
1
0
5/17/22 19:36:29
5/17/22 19:37:55
5/17/22 19:39:22
5/17/22 19:40:48
5/17/22 19:42:14
5/17/22 19:43:41
Date Time

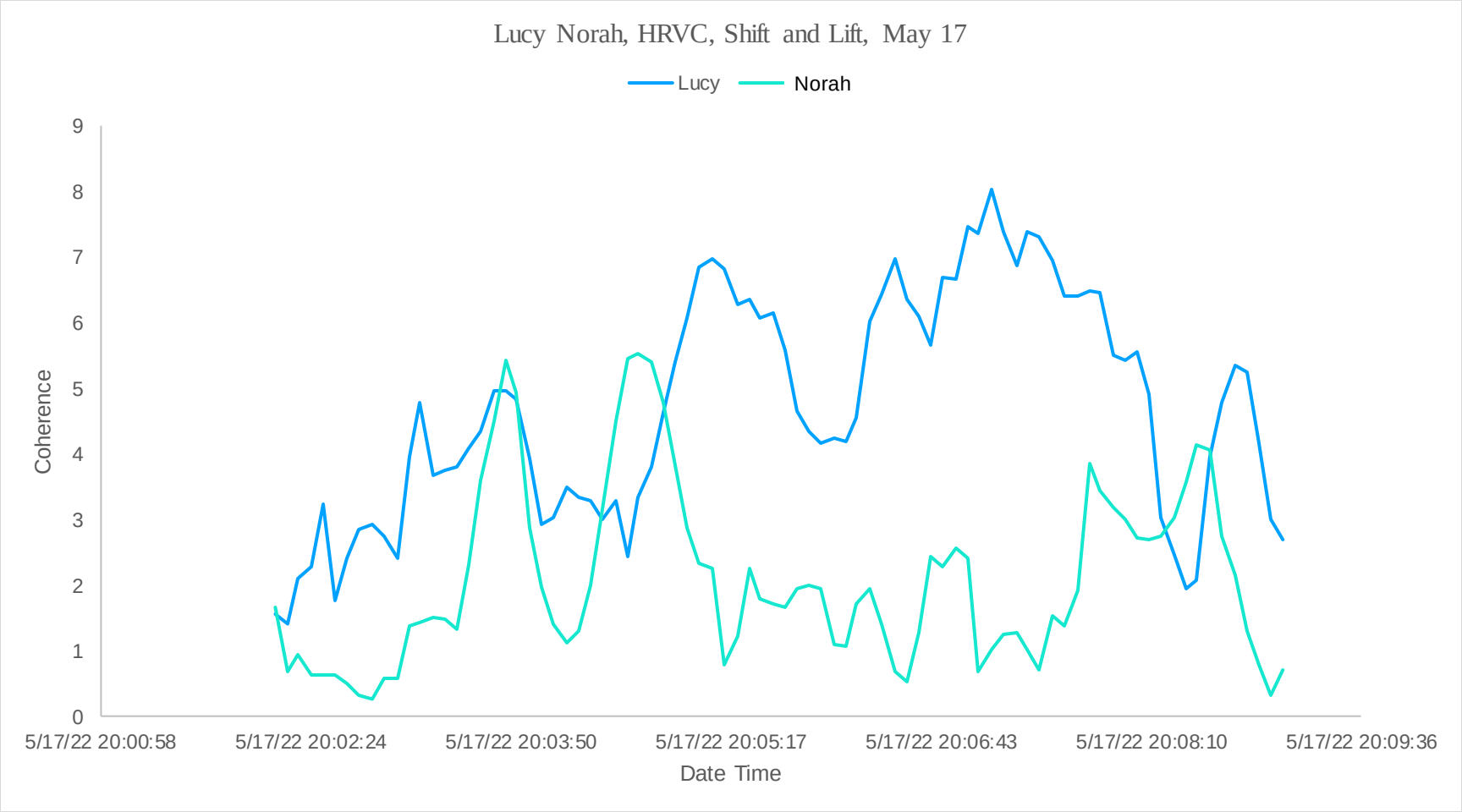

Lucy Norah, HRVC, HLI Begin, May 31
Lucy
Norah
Coherence
8
7
6
5
4
3
2
1
0
5/31/22 19:04:48
5/31/22 19:06:14
5/31/22 19:07:41
5/31/22 19:09:07
5/31/22 19:10:34
5/31/22 19:12:00
5/31/22 19:13:26
5/31/22 19:14:53
Date Time

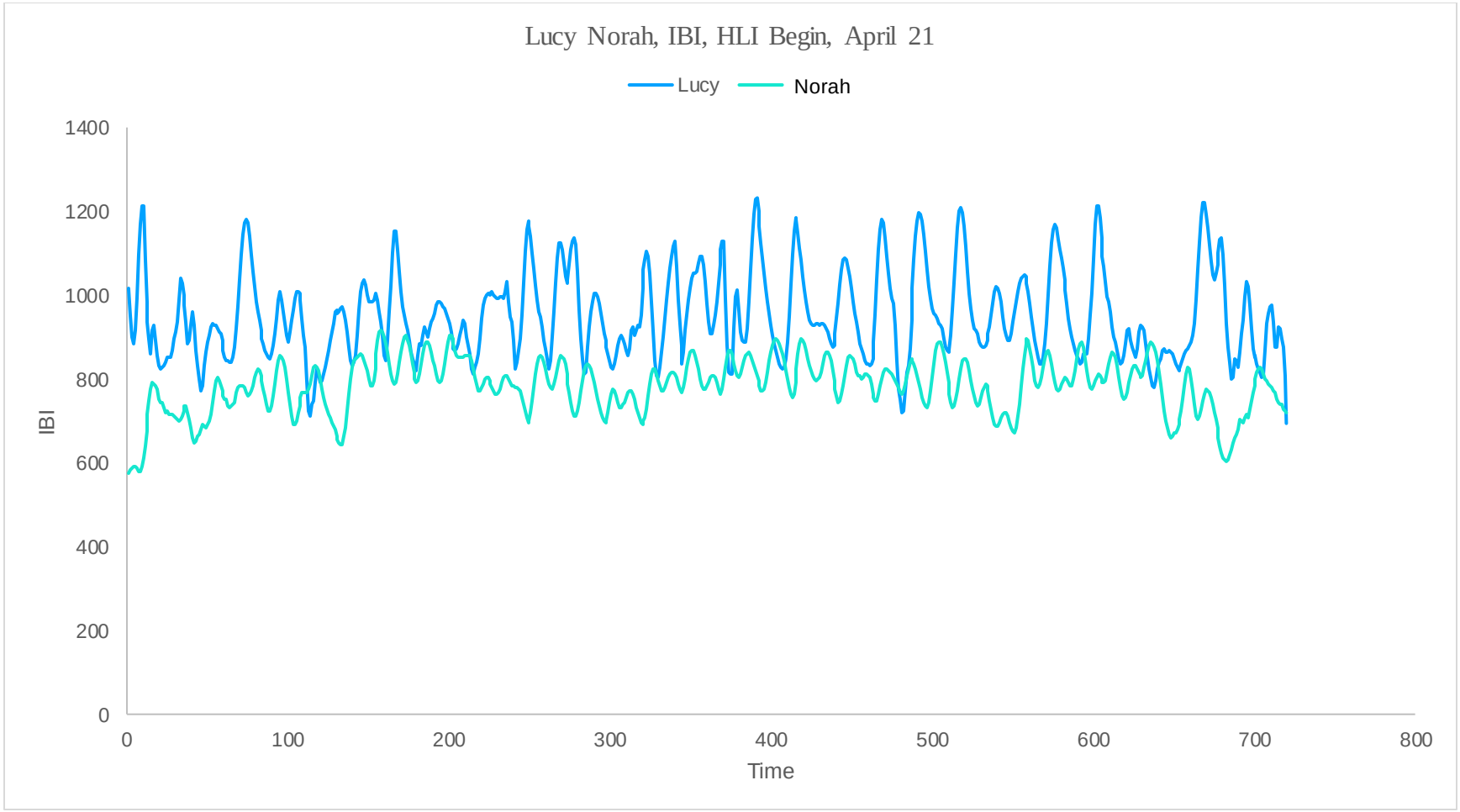

Lucy Norah, HRVC, HLI End, May 31
Lucy
Norah
Coherence
7
6
5
4
3
2
1
0
5/31/22 19:50:53
5/31/22 19:52:19
5/31/22 19:53:46
5/31/22 19:55:12
5/31/22 19:56:38
5/31/22 19:58:05
Date Time

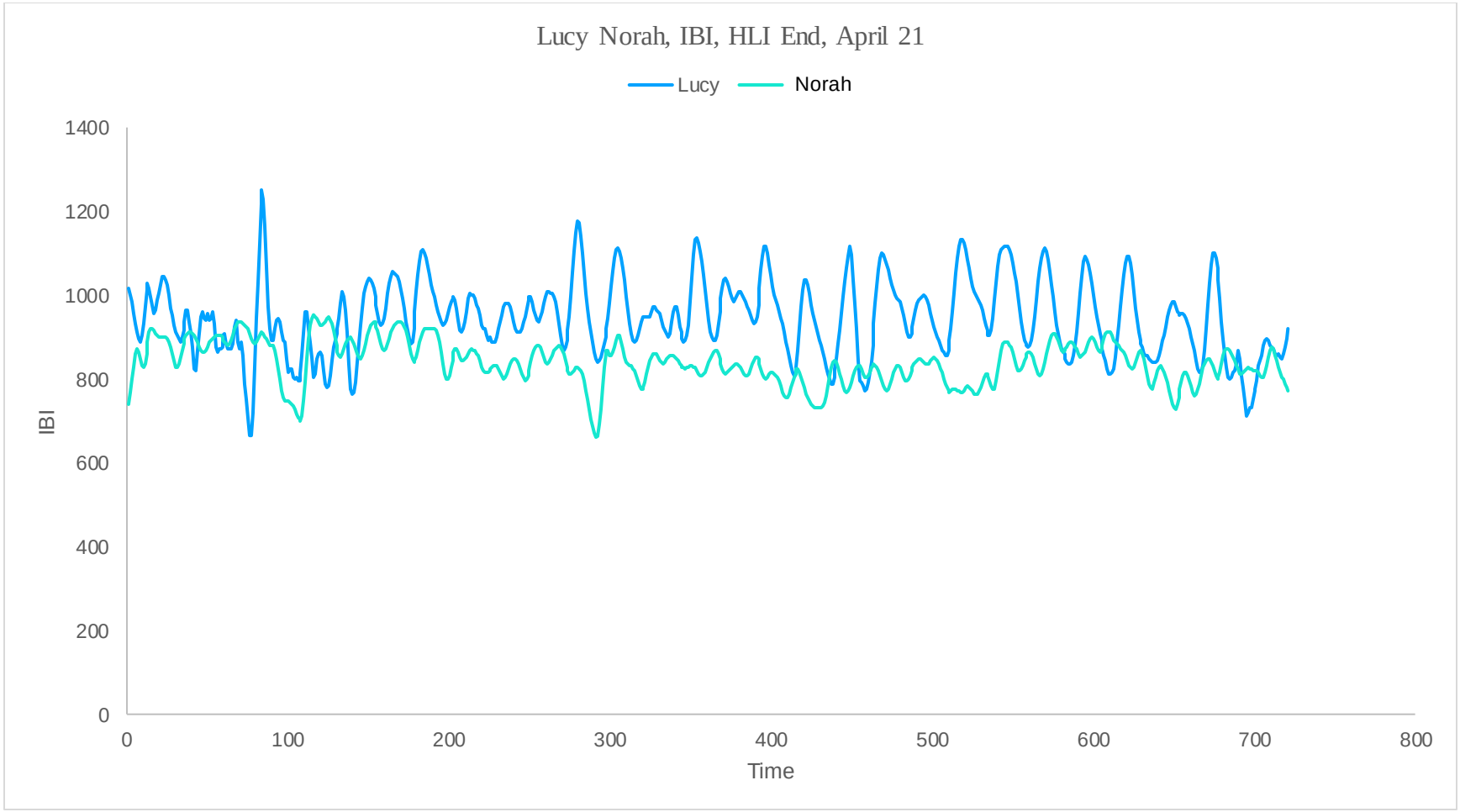

Lucy Norah, HRVC, HLI Begin, June 7
Lucy
Norah
Coherence
8
7
6
5
4
3
2
1
0
6/7/22 19:07:41
6/7/22 19:09:07
6/7/22 19:10:34
6/7/22 19:12:00
6/7/22 19:13:26
6/7/22 19:14:53
6/7/22 19:16:19
Date Time

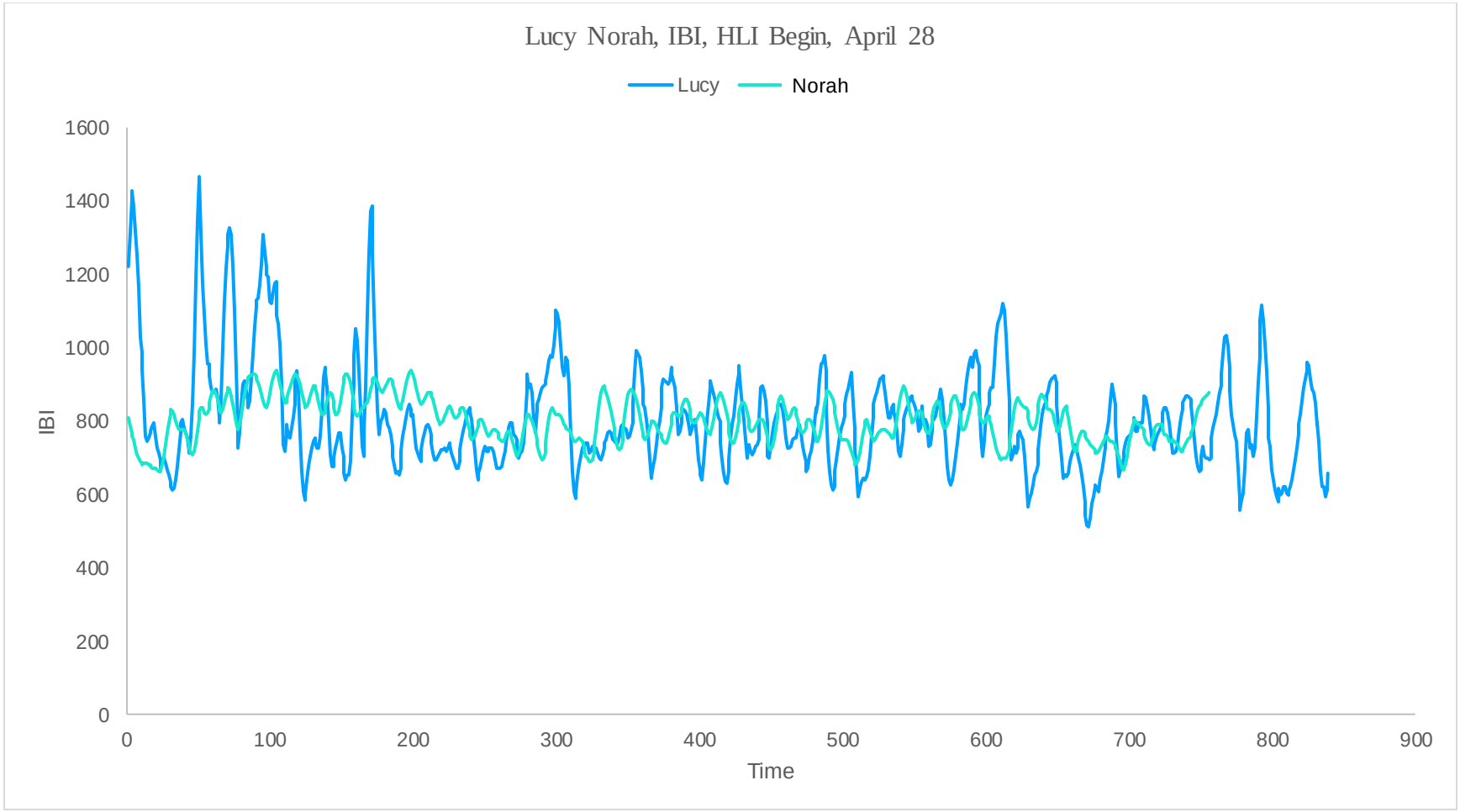

Lucy Norah, HRVC, HLI End, June 7
Lucy
Norah
Coherence
6
5
4
3
2
1
0
6/7/22 19:57:22
6/7/22 19:58:05
6/7/22 19:58:48
6/7/22 19:59:31
6/7/22 20:00:14
6/7/22 20:00:58
6/7/22 20:01:41
6/7/22 20:02:24
Date Time

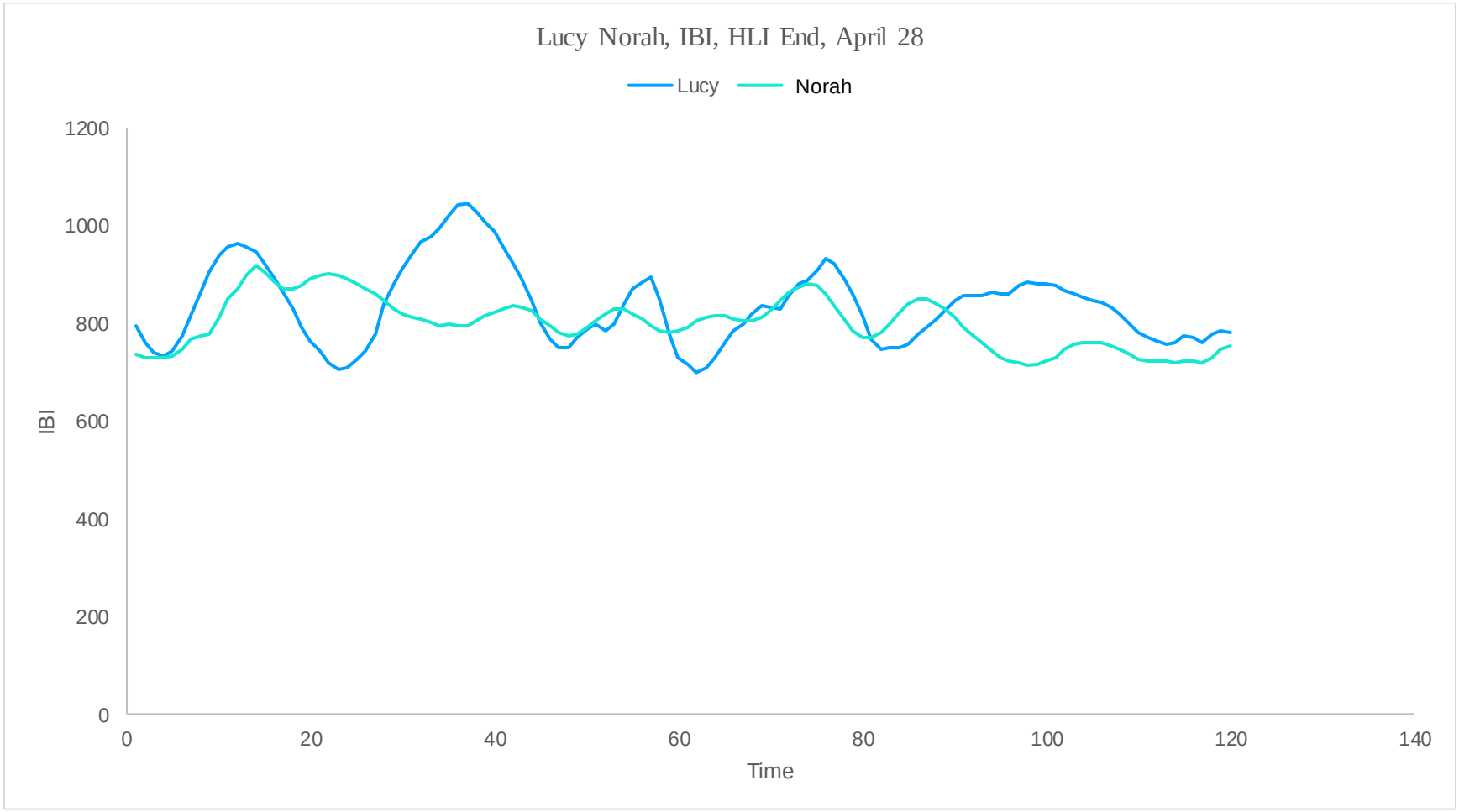

Lucy Norah, HRVC, Shift and Lift, May 5
Lucy
Norah
Coherence
8
7
6
5
4
3
2
1
0
5/6/22 0:59:46
5/6/22 1:00:29
5/6/22 1:01:12
5/6/22 1:01:55
5/6/22 1:02:38
5/6/22 1:03:22
5/6/22 1:04:05
5/6/22 1:04:48
5/6/22 1:05:31
5/6/22 1:06:14
5/6/22 1:06:58
Date Time

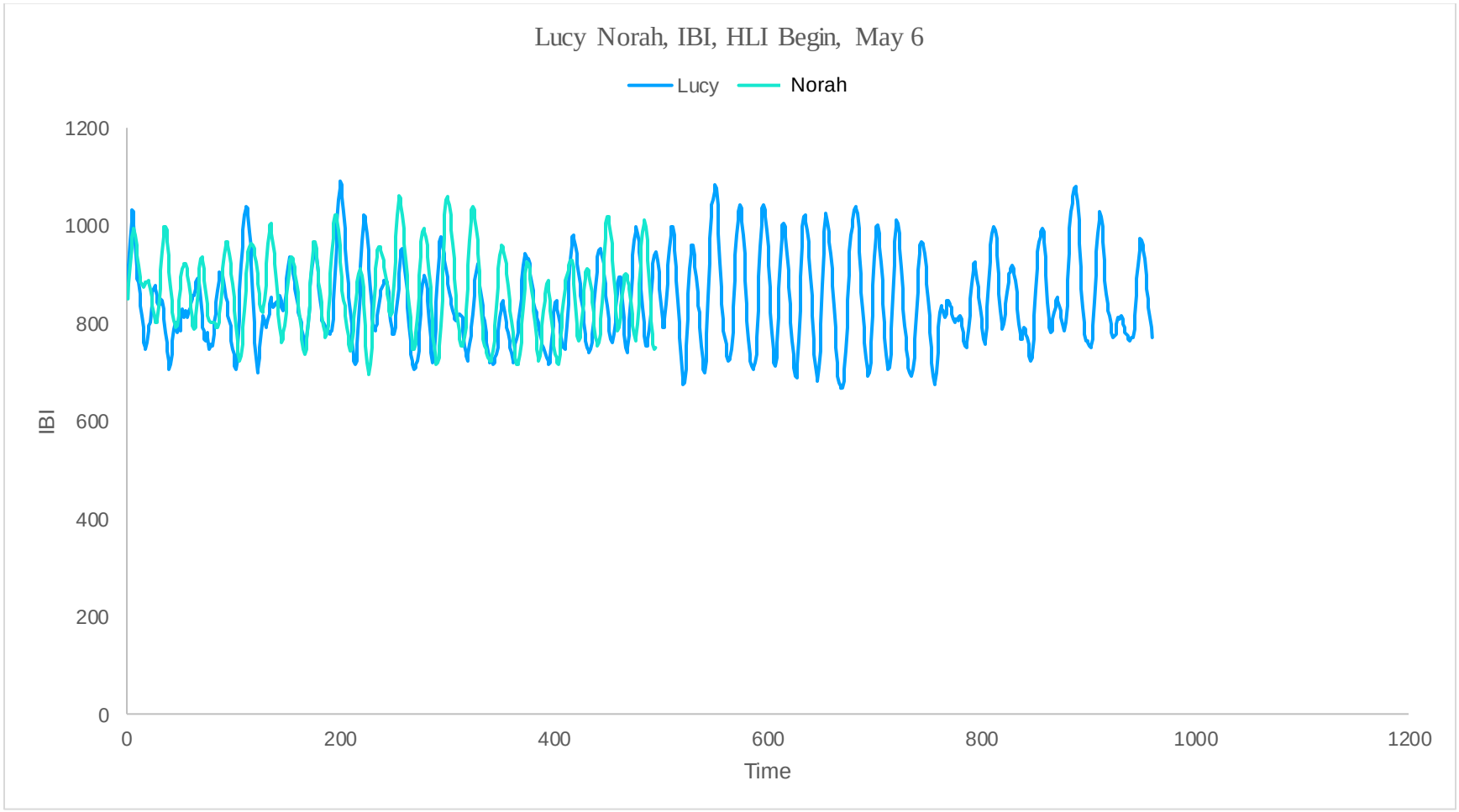

Lucy Norah, HRVC, Shift and Lift, May 17
Lucy
Norah
Coherence
9
8
7
6
5
4
3
2
1
0
5/17/22 20:00:58
5/17/22 20:02:24
5/17/22 20:03:50
5/17/22 20:05:17
5/17/22 20:06:43
5/17/22 20:08:10
5/17/22 20:09:36
Date Time

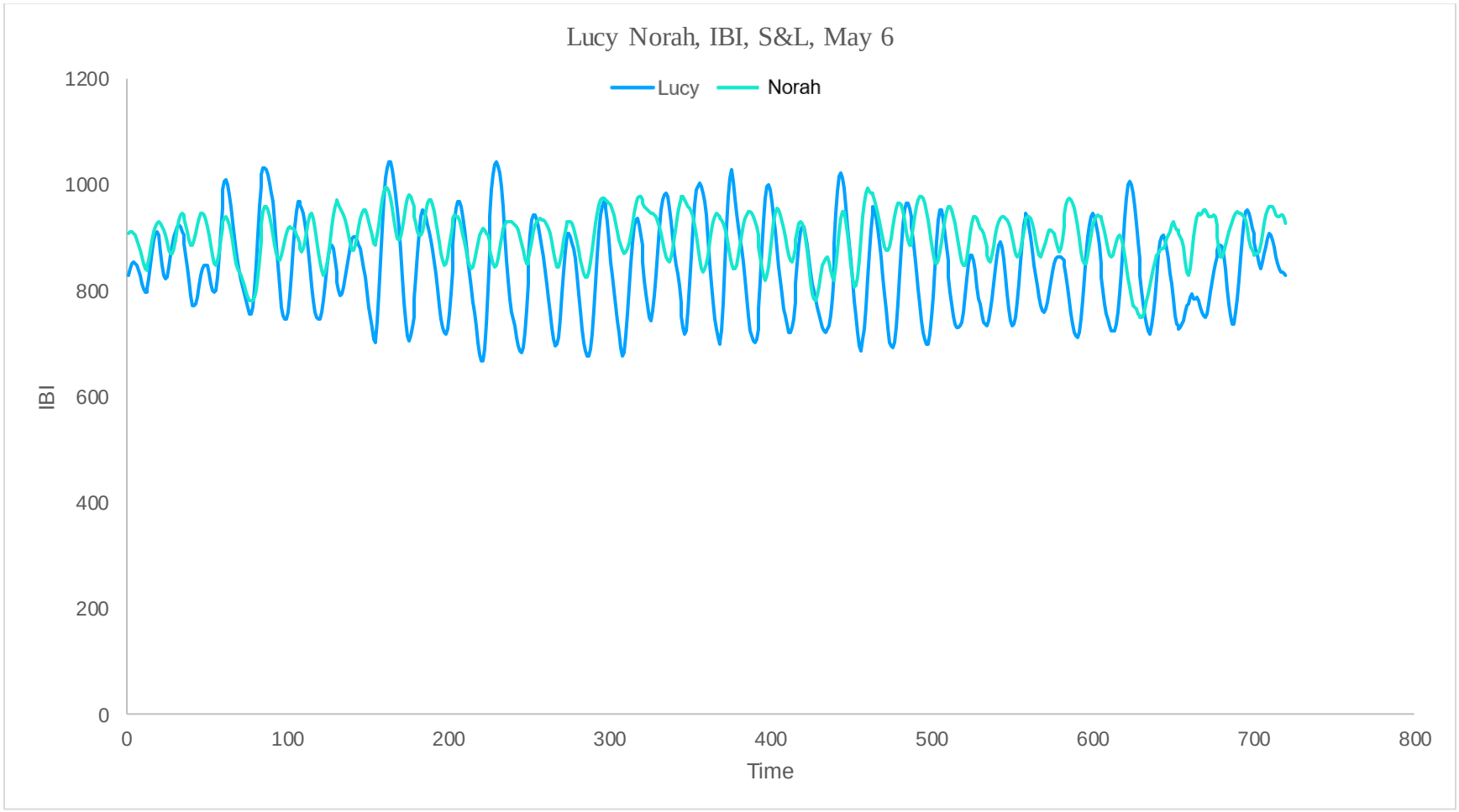

Lucy Norah, IBI, HLI Begin, April 21
Lucy
Norah
IBI
1400
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
800
Time

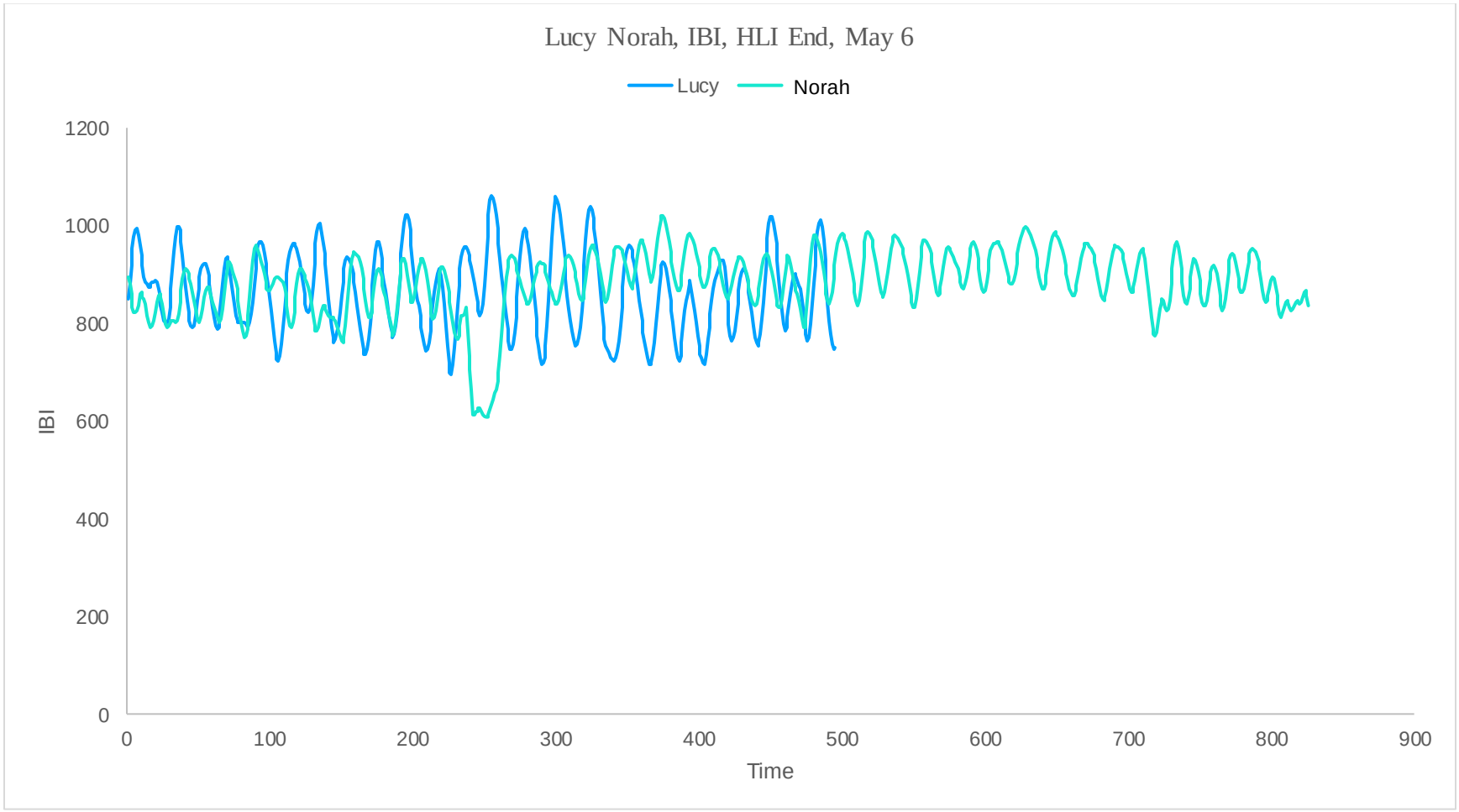

Lucy Norah, IBI, HLI End, April 21
Lucy
Norah
IBI
1400
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
800
Time

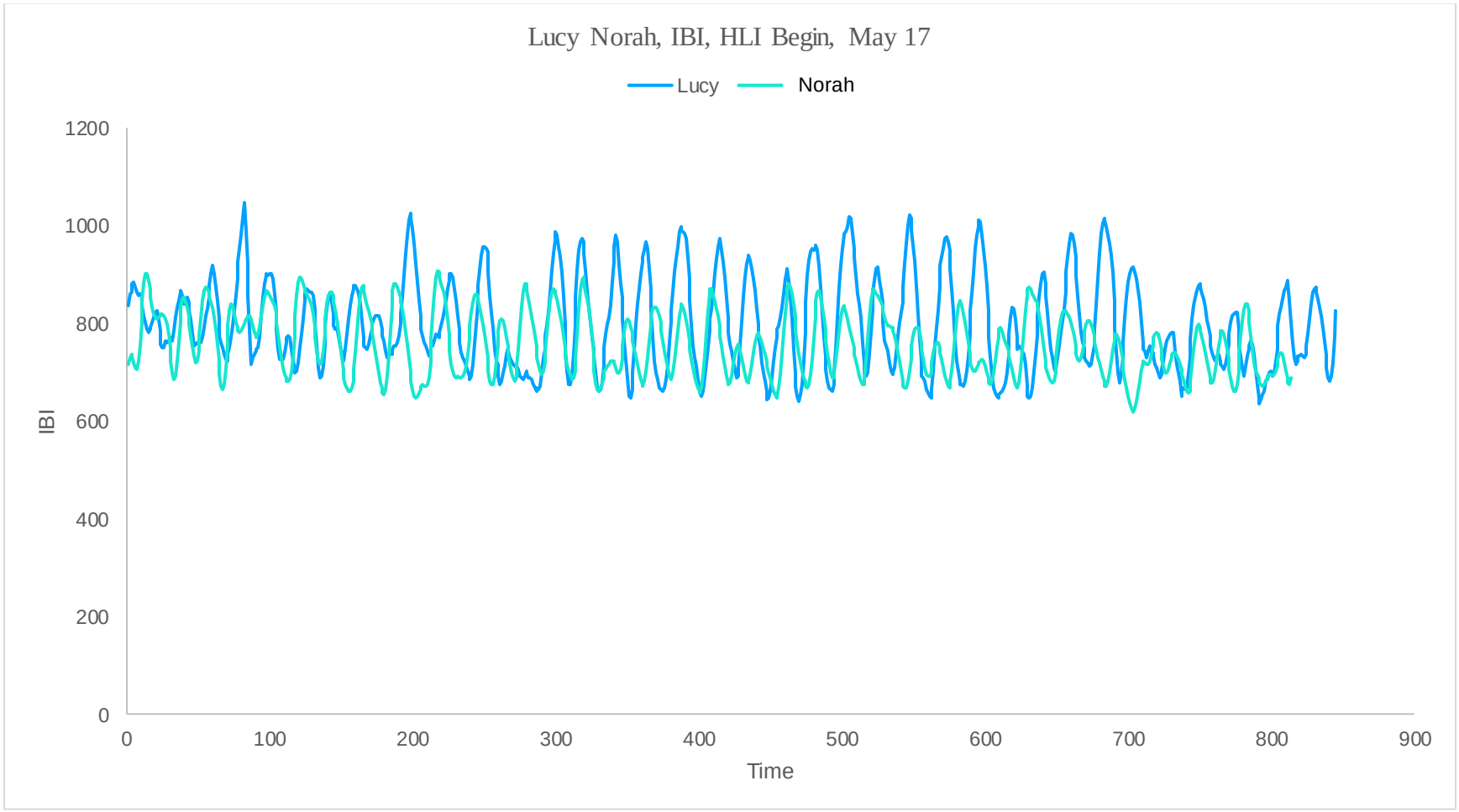

Lucy Norah, IBI, HLI Begin, April 28
Lucy
Norah
IBI
1600
1400
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
800
900
Time

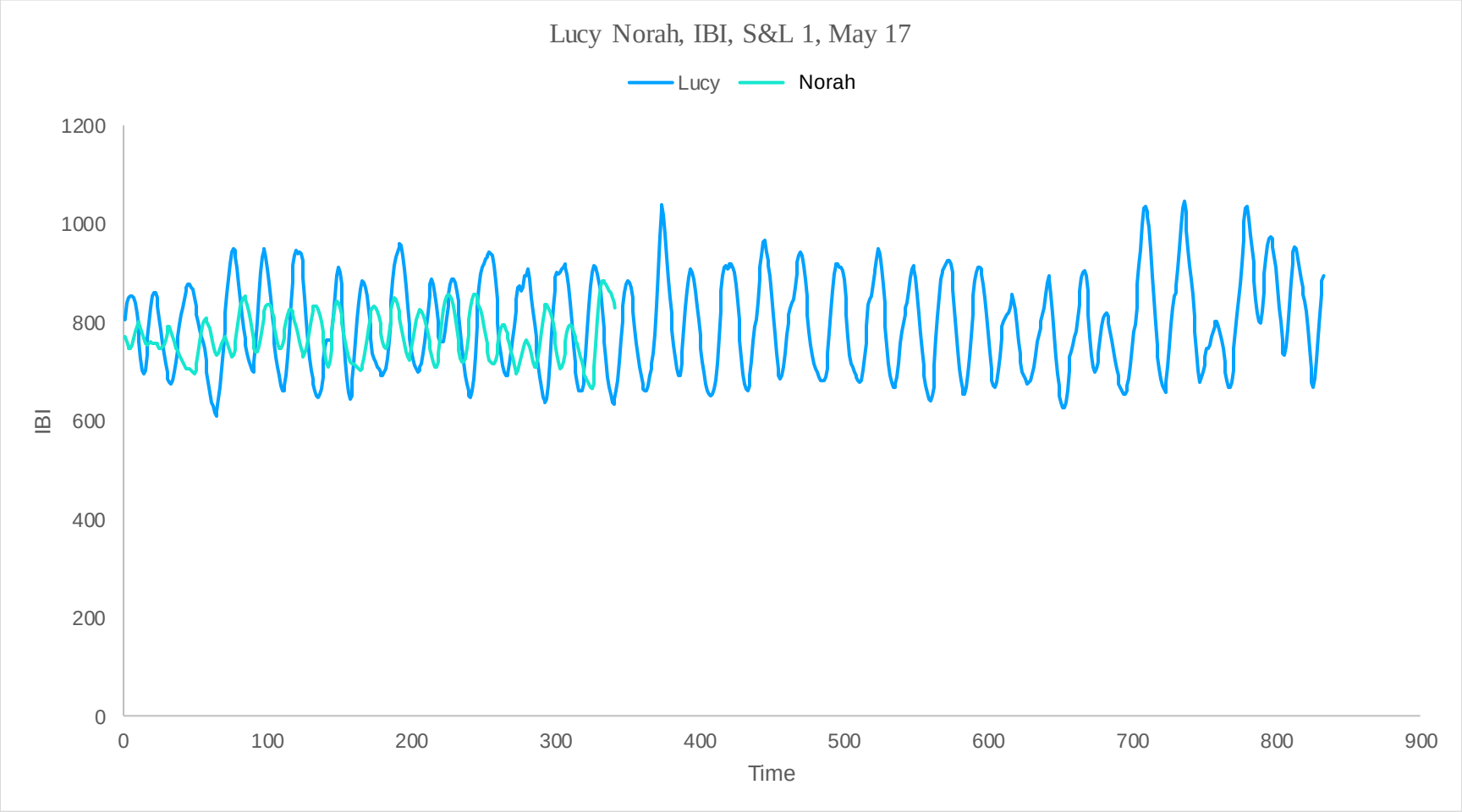

Lucy Norah, IBI, HLI End, April 28
Lucy
Norah
IBI
1200
1000
800
600
400
200
0
0
20
40
60
80
100
120
140
Time

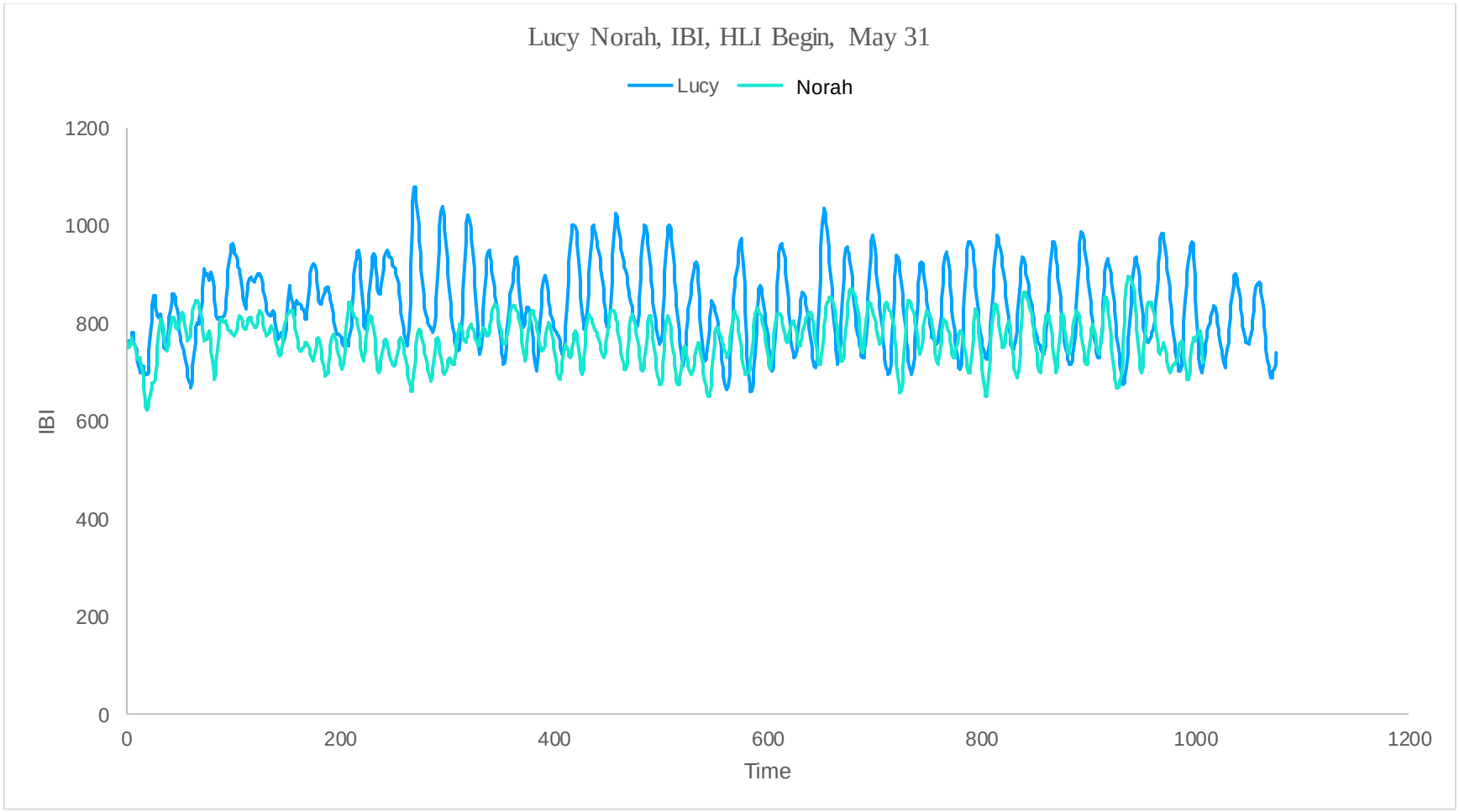

Lucy Norah, IBI, HLI Begin, May 6
Lucy
Norah
IBI
1200
1000
800
600
400
200
0
0
200
400
600
800
1000
1200
Time

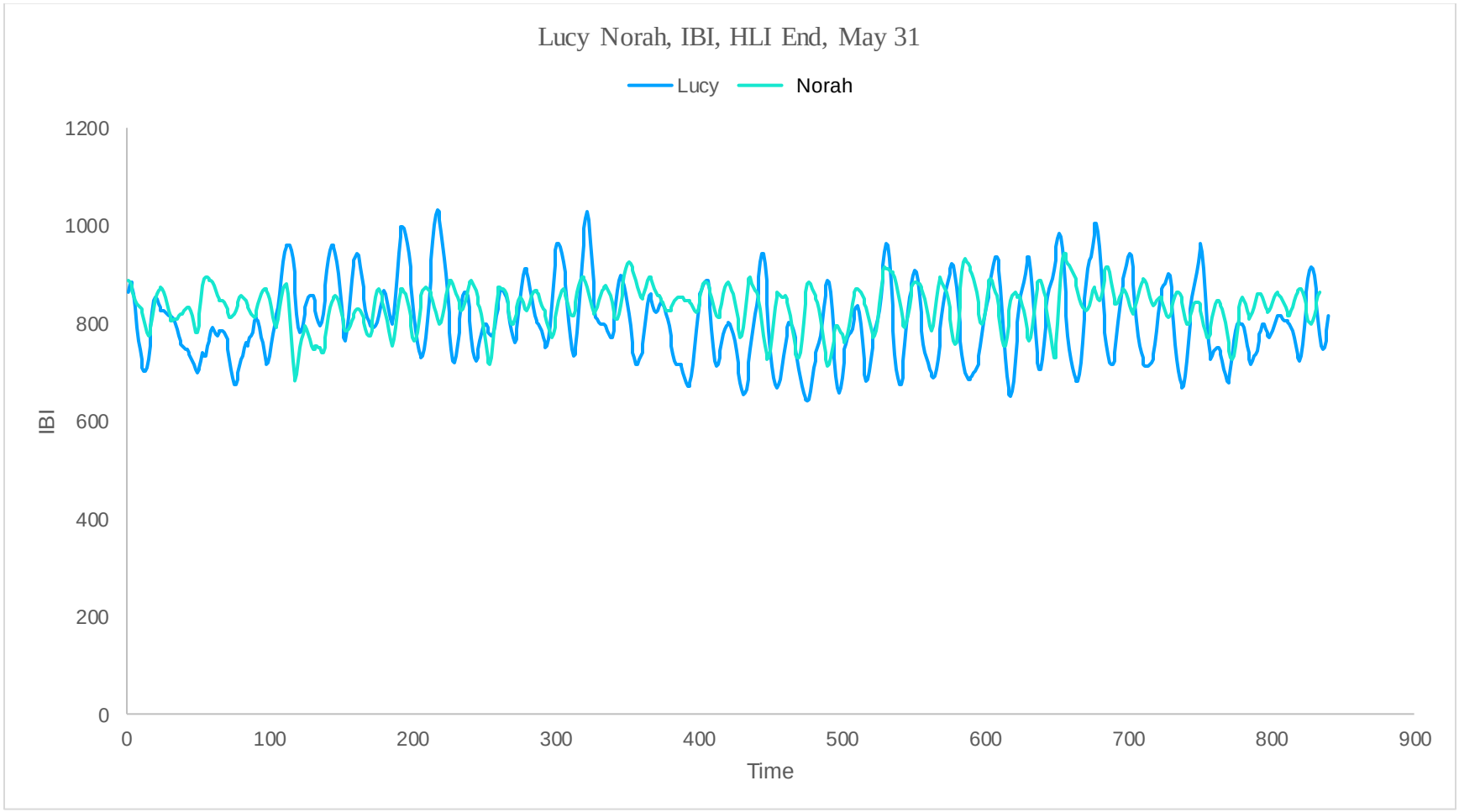

Lucy Norah, IBI, S&L, May 6
Lucy
Norah
IBI
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
800
Time

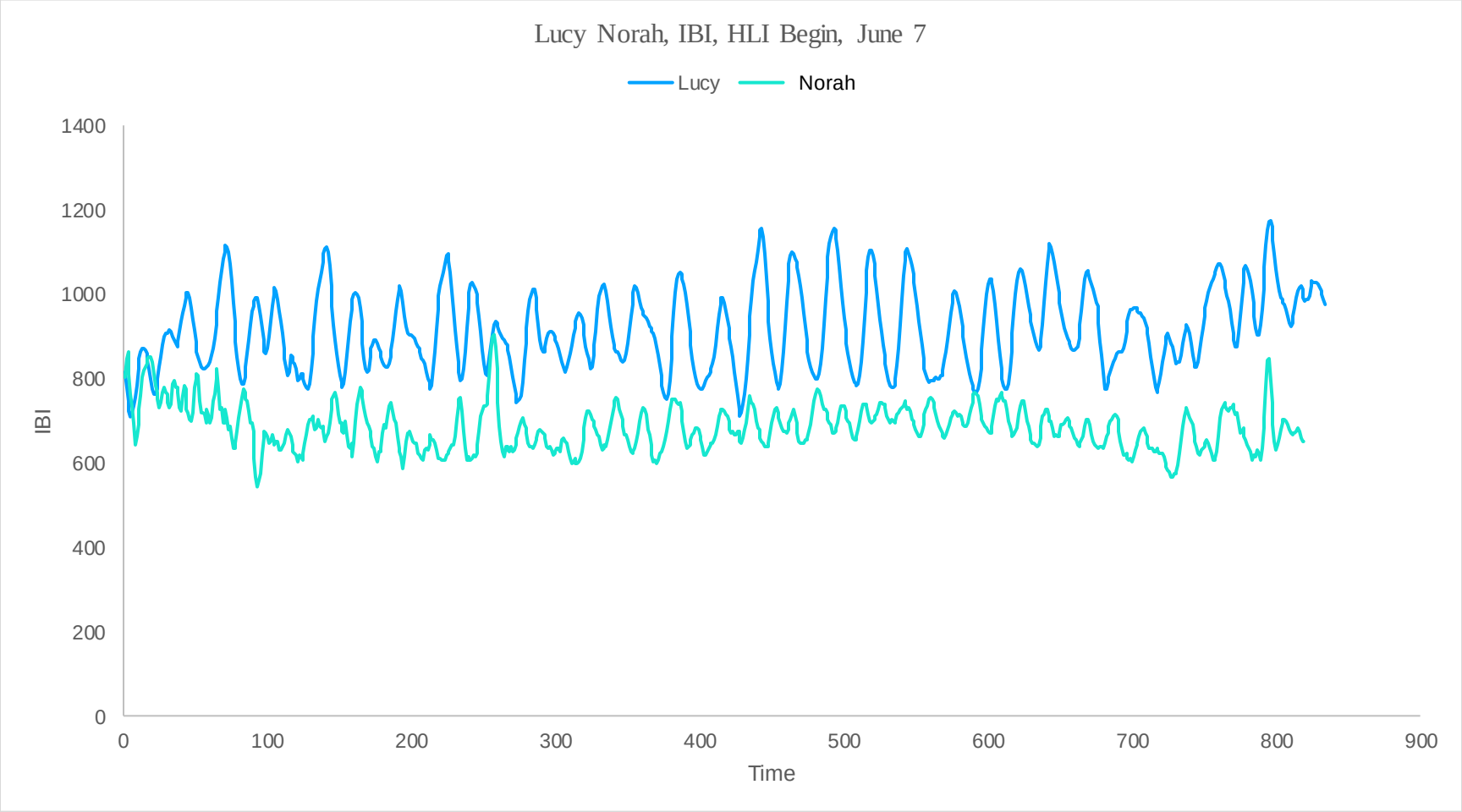

Lucy Norah, IBI, HLI End, May 6
Lucy
Norah
IBI
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
800
900
Time

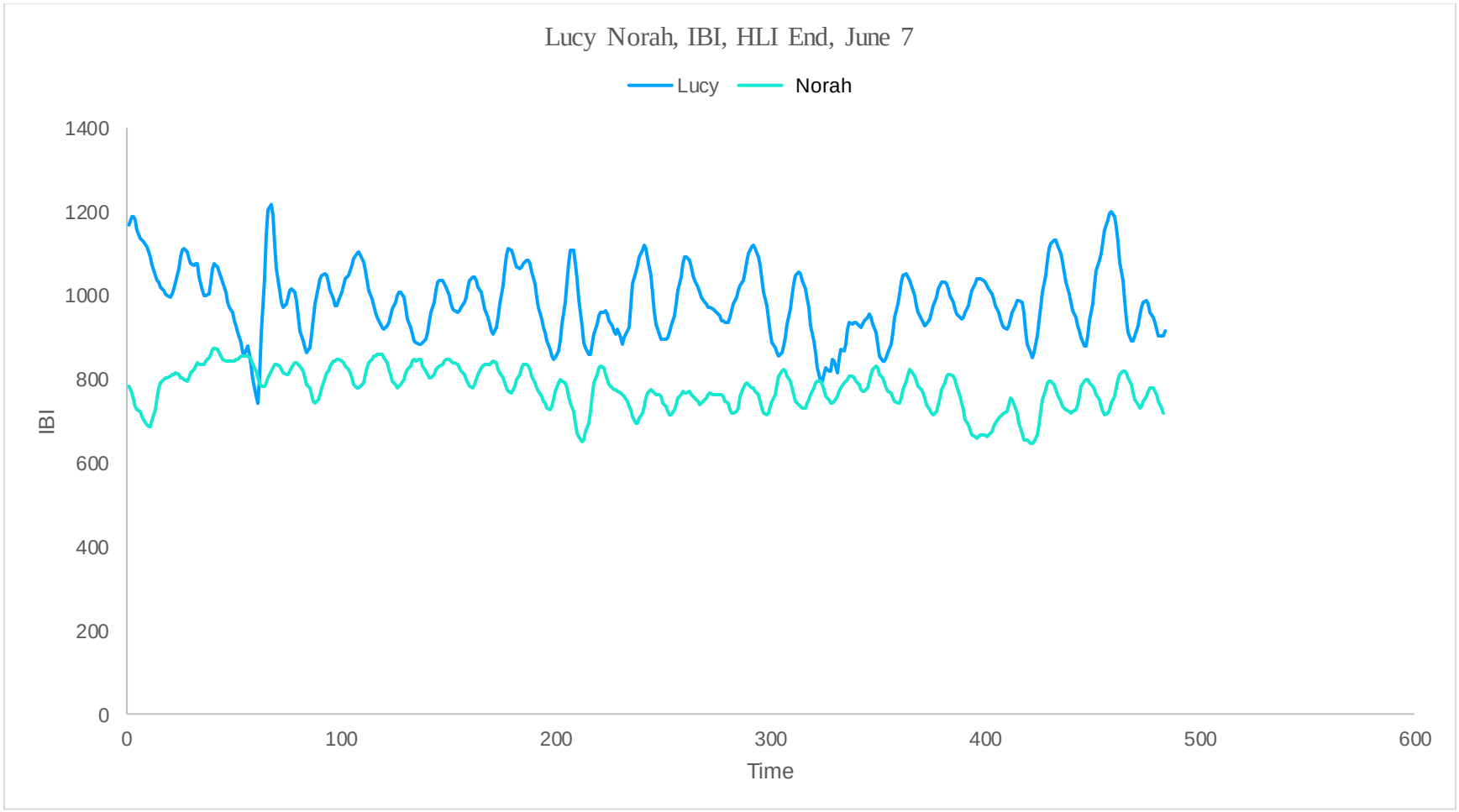

Lucy Norah, IBI, HLI Begin, May 17
Lucy
Norah
IBI
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
800
900
Time


Lucy Norah, IBI, S&L 1, May 17
Lucy
Norah
IBI
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
800
900
Time


Lucy Norah, IBI, HLI Begin, May 31
Lucy
Norah
IBI
1200
1000
800
600
400
200
0
0
200
400
600
800
1000
1200
Time


Lucy Norah, IBI, HLI End, May 31
Lucy
Norah
IBI
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
800
900
Time

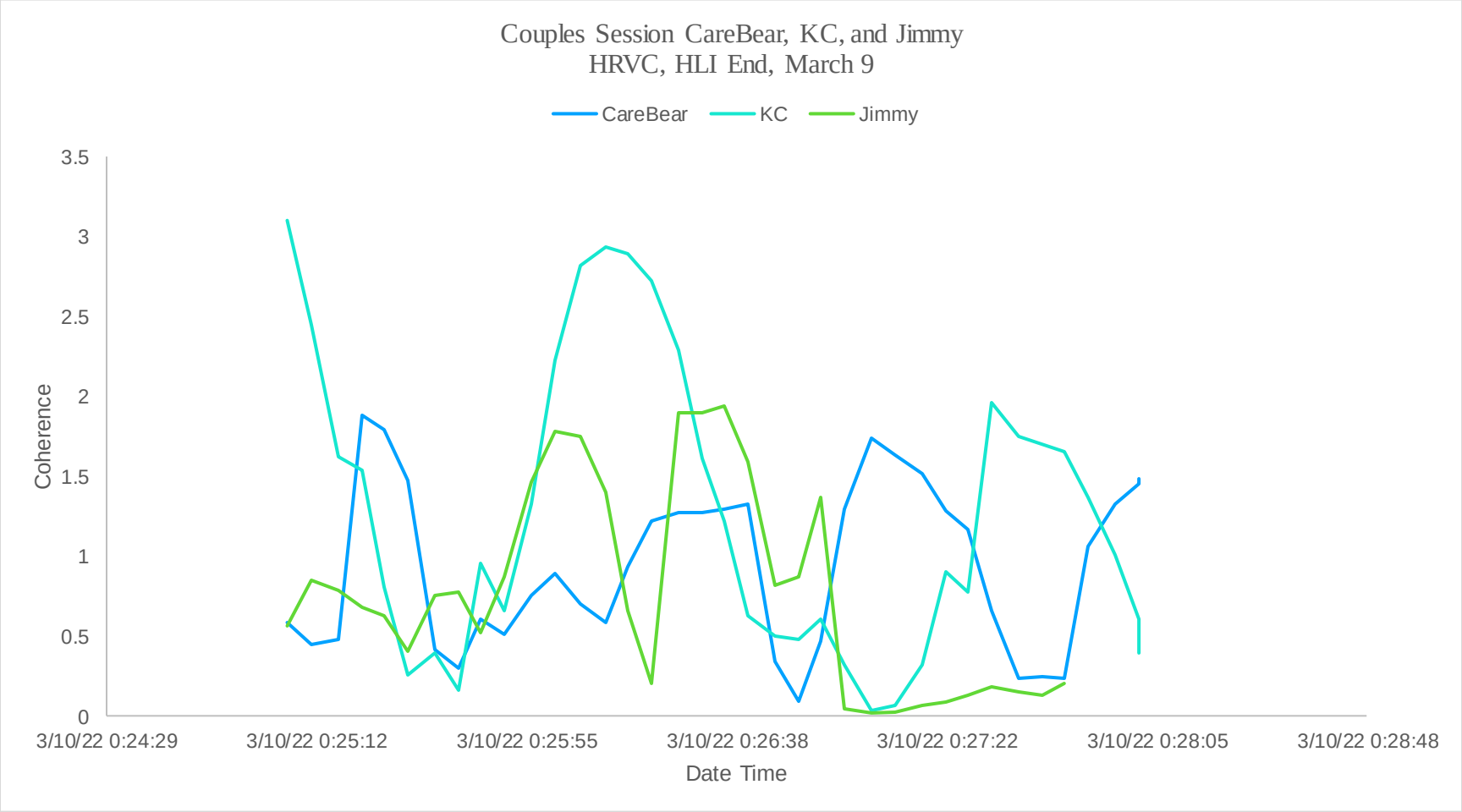

Lucy Norah, IBI, HLI Begin, June 7
Lucy
Norah
IBI
1400
1200
1000
800
600
400
200
0
0
100
200
300
400
500
600
700
800
900
Time


Lucy Norah, IBI, HLI End, June 7
Lucy
Norah
1400
1200
1000
800
600
400
200
0
IBI
0
100
200
300
400
500
600
Time

Appendix R

HRVC Line Chart, HLI during Intervention Session—Triad/Couple's Session

This appendix contains one chart for the triad/couple's session—CareBear, KC, and Jimmy.


Couples Session CareBear, KC, and Jimmy
HRVC, HLI End, March 9
CareBear
KC
Jimmy
Coherence
3.5
3
2.5
2
1.5
1
0.5
0
3/10/22 0:24:29
3/10/22 0:25:12
3/10/22 0:25:55
3/10/22 0:26:38
3/10/22 0:27:22
3/10/22 0:28:05
3/10/22 0:28:48
Date Time