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How a Process-Based Idionomic Approach Changes our Understanding of Mindfulness as a Method and Process

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Mindfulness as a concept has a broad range of contemporary uses in psychology and behavioral science, and a rich background in human culture more generally. In behavioral science and practice it is "treated sometimes as a technique, sometimes as a more general method or collection of techniques, sometimes as a psychological process that can produce outcomes, and sometimes as an outcome in and of itself" (Hayes & Wilson, 2003, p. 161). In a cultural context it has a deep spiritual and religious history over literally thousands of years. Contemplative practice methods are arguably part of all our major wisdom and religious traditions, beginning with one of the oldest religious traditions, Hinduism (Kurien, 2006) but including especially Buddhism (Shonin, van Gordon, & Singh, 2015), and in some ways the major Abrahamic religions as well (Trammel, 2017).

In the first edition of this book, the senior author (SCH) and his students addressed the role of mindfulness in the so-called "third wave" of cognitive behavioral therapy (Szabo, Long, Villatte, & Hayes, 2015). Virtually all of "third wave" methods relied on mindfulness methods to a degree (Hayes, 2004) and as the empirical analysis of these methods has exploded, mindfulness methods have become a routine part of psychological interventions more generally. That is true of popular culture as well. An examination of the frequency of usage of the term in written English using Google N-gram shows that it has increased 15-fold over the last three decades. But that very explosion suggests that it is time to step back and consider how best to advance mindfulness work in the future.

Our major spiritual and wisdom traditions do not need to be anointed by scientific psychologists to establish their cultural legitimacy, any more than great novelists, musicians, artists, or movie producers require such validation. For "mindfulness" to serve a role as a progressive part of scientific psychology, however, it not only has to be viewed as a set of

specifiable and measurable methods and change processes, analyzed in a scientifically sound way, but it also needs to be analyzed in ways that correspond to its intended use. That is the purpose of the present chapter: to examine whether there are progressive new ways to study mindfulness as a set of methods and processes of change, and to empower the lives of individuals who are touched by the science and practice of psychological intervention.

Mindfulness research is also facing a counter-reaction, another sign that it is time to reconsider its direction. Over the last several years articles have argued that mindfulness as a scientific concept has no value above and beyond the literature on “Big 5” personality types (Altgassen, Geiger, & Wilhelm, 2023), or that the deployment of mindfulness methods in therapy raises serious ethical concerns when it is cut loose of “right action”, compassion toward others, or a variety of additional core elements commonly included in wisdom traditions (Harrington & Dunne, 2015). Capitalistic interests in mindfulness methods have received especially strong criticism (Hyland, 2015) as an era of “McMindfulness” seems to enter modern culture. One must only open a health app on their smartphones to see the issue. One is almost certain to see “mindful minutes” on the list of "health categories," along with heart function, physical activity, nutrition, and medication use. Given that degree of cultural penetration, pausing to step back and focus on how to foster further progress seems timely.

Before we begin, it seems important to state our initial biases and assumptions. The present chapter takes the view that “mindfulness” refers to a somewhat loose but broadly definable set of skills -- attentional, cognitive, and affective -- that are designed to foster the ability of individuals to live more empowered lives. While recognizing the important work done in defining and measuring “mindfulness” (e.g., Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Brown & Ryan, 2003), as researchers we view all scientific concepts as just ways of

speaking that help the scientist interact with the world in an effective way that fits their analytic purposes. For that reason, we are skeptical that there will ever be the one true analysis of mindfulness any more than there is today a single acceptable definition of emotion, cognition, consciousness, self, or any of the other many major concepts that bear on mindfulness. A more attainable and scientifically helpful goal is to generate progress in the ways that various mindfulness skills such as attentional flexibility, non-judgment, self-kindness, or emotional openness are assessed and analyzed so that scientific data can begin to narrow the range of uses of the term as assessed against the possible practical or scientific purposes of its analysis. It is our view that such a research program will foster greater progress in the long run than adopting an *a priori* definition of mindfulness phenomena based on theory. We will return to implications of this "empirical skill set" approach later in this chapter.

The empirical pathway to conceptual utility is not an easy one, however, for reasons we will soon describe. In this chapter, we argue that some of the methods we used to study mindfulness skills might have interfered with progress toward the "use case" most practitioners or applied scientists are interested in, namely, how to help individuals develop, retain, and use mindfulness skills to improve their lives.

A powerful way to focus on this issue is to start at the end – namely, the accomplishment of better outcomes due to the use of a particular process – and then work backwards and to consider the methods that move these processes. By referring to mainstream empirical methods, we can begin by documenting what has been shown to be helpful, so we can examine component processes involved, their role in successful psychological interventions, and the methodological and strategic limitations that we believe must be overcome to create further progress.

Mindfulness Skills as Sources of Change

A wealth of studies has demonstrated that mindfulness-based interventions can improve mental health (Hofmann, Sawyer, Witt, & Oh, 2010; Khoury et al., 2013). However, mindfulness is a complex construct with many different aspects that could explain its therapeutic effect (Baer, Smith, & Allen, 2004; Baer et al., 2006; Dimidjian & Linehan, 2003). For example, mindfulness skills are widely agreed to include both the extent to which one directs attention toward the present, as well as the manner in which one orients toward the present (Bishop et al., 2004; Shapiro, Carlson, Astin, & Freedman, 2006). This comprehensive and widely used way to conceptualize and measure mindfulness is with the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), which was built as a kind of superset of self-report items in this domain at the time. The facets of the FFMQ include the propensity to observe internal and external experiences (*Observe*), describe internal experiences with words (*Describe*), act with awareness of the present (*Act with Awareness*), take a nonjudgmental stance toward one's inner experiences (*Nonjudge*), and let one's thoughts and feelings go without focusing or elaborating on them (*Nonreactivity*).

A recent meta-analysis examined the relationship between mindfulness, as measured by the FFMQ, and negative affective symptoms (Carpenter et al., 2019). The study consisted of a comprehensive search yielding 148 eligible studies, comprising 157 distinct samples and 44,075 participants. The weighted mean correlation for affective symptoms and overall trait mindfulness was r = -0.53, showing a large negative relationship between affective symptoms and overall mindfulness as measured by the FFMQ. *Nonjudge* (r = -0.48) and *Act with Awareness* (r = -0.47) demonstrated the largest correlations, followed by *Nonreact* (r = -0.33) and *Describe* (r = -0.29). *Observe* was not significantly correlated with affective symptoms. No significant differences in the strength of correlations were found between these self-reported mindfulness skills and

anxiety, depression, and posttraumatic stress disorder (PTSD) symptoms, though symptoms of generalized anxiety disorder exhibited a weaker negative relationship with the *Describe* facet compared to PTSD symptoms. *Describe* also showed a stronger relationship with affective symptoms in Eastern samples compared to Western samples, whereas Western samples had a stronger relationship with *Nonjudge*. These results showed that the propensity toward mindlessness (e.g., reacting judgmentally, running on 'autopilot') was associated with higher levels of negative affective symptoms. However, these associations do not alone allow for conclusions about the processes of change. For this, we need to examine the mediation literature.

Mindfulness as a Mediator of Change

We recently summarized the entire world's literature on successful mediators of psychological interventions (Hayes, Ciarrochi, Hofmann, Chin, & Sahdra, 2022). Using PsychInfo, Web of Science, Medline, and ProQuest databases, our team examined every existing randomized controlled trial of a psychosocial intervention targeting a mental health related outcome, that compared intervention to a no-treatment or treatment-as-usual condition and identified a statistically significant mediator of outcomes. We used the following search terms: "process of change", "mechanism", "mediat*", and "change mechanism"; at least one word from the title of every known therapy, based on the Wikipedia "list of psychotherapies"; and the terms "RCT", "clinical trial", "randomi?ed control trial", "interven*", "treatment condition", "control group", "treatment group", "random", and "random assignment." That yielded 54,633 studies for examination. Each abstract was scored by two trained raters to ensure that studies met the inclusion criteria. Two trained raters then conducted full text screening of the 1,353 studies that appeared to be eligible and a total of 1,050 mediational findings were identified across 624 studies, while 729 studies were excluded based on the entire article (e.g., because the mediational

analysis itself was flawed; or only medications were examined, not psychosocial methods, and so on). Because there was evidence that mediators were often an afterthought and unusual combinations of items or measures were used to obtain successful mediational results (that is, there was some evidence of "p hacking") only the 71 mediational measures that had been successfully replicated at least once were cataloged in the final report. Together they constituted 281 findings – representing the core of the entire world's literature on processes of change.

Of these 281 findings, a large number (56% or 157 of the findings) focused on processes that have routinely been identified as part of mindfulness writ large. These included emotion focused processes such as acceptance, self-kindness, low levels of anxiety sensitivity, the ability to describe emotion, or self-compassion; cognitive processes such as non-judgment, defusion, decentering, or observation of thought; flexible, fluid, and voluntary attentional processes such as focusing on the now, present moment awareness, or attentional control; self-oriented processes such as self-as-context, perspective taking, or non-duality; and more integrative processes that include these elements along with values and right action, such as psychological flexibility. Some emotion regulation, coping, or self-regulation measures also included such concepts.

Thus, in summary, we know that self-reported mindfulness skills are key to clinical outcomes across the entire intervention science literature focused on processes of change as assessed through traditional mediational analysis. This is *before* we note that many other known mediators are ameliorated by mindfulness methods and processes, such as rumination or worry, entanglement with dysfunctional thoughts, the facilitation of healthy cognitive reappraisal, fostering parental functioning, or establishment of healthy coping skills, just to name a few (see

Hayes et al., 2022 for more details). In almost all known processes of change, mindfulness and psychological flexibility are likely to play a significant role.

Advancing the Study of Mindfulness as a Process of Change

The success story that has just been told comes with a warning label. Processes of change cannot be fully understood and applied to particular people who may need them using only our mainstream statistical approaches because the underlying mathematical assumptions needed to do that simply cannot be met. We will explain this unsettling claim in the present chapter.

Processes of change unfold within the lifetime of individuals (or of larger specified units such as couples, families, or communities). To this point, processes of change are very largely studied as normative analytic abstractions, in which measures are developed based on between person consistencies relative to between person variability (that is, via traditional psychometric criteria) and are tested in models that treat the central tendencies of a collective as the "true score" and individuals as a source of error in the measurement of latent constructs. For example, a common traditional mediational analysis considers the cross product of the coefficients of the differential intervention impact on a mediator (the "a" path), and the mediator's relation to outcome controlling for treatment assignment (the "b" path). These comparisons and their components are viewed as "significant" relevant to the degree of variability between participants.

When the findings are applied to a person, however, researchers and practitioners alike expect (at least probabilistically) that if the effective treatment is applied to a particular person, the mediator is likely to change, and the outcome in turn is likely to change. That extension is not scientifically valid (Hofmann, Curtiss, & Hayes, 2020) and for a reason that extends to a much wider set of data analytic circumstances (Hayes et al., 2019; Molenaar, 2013). Normative concepts developed and measured at the level of a collective apply to the prediction of individual

trajectories measured over time if and only if the phenomena are *ergodic* (Molenaar, 2013). Ergodicity is not a new concept – it is nearly 150 years old in the physical sciences (Boltzman, 1884; see Ashley, 2015) and has been accepted science there ever since it was mathematically proven in the early 1930's (Birkhoff, 1931; von Neumann, 1932). In essence, ergodicity is a far more restrictive form of the "homogeneity assumption" that everyone learns about in their early statistical training. It turns out that normative biostatistical methods need to assume ergodicity and homogeneity in order to apply results to individuals, but unlike homogeneity, the ergodicity assumption is rarely if ever met in psychology (Molenaar, 2004). Distilled to a single sentence, ergodicity requires that 1) processes be stationary and that 2) the same dynamical model apply to all. Concretely, this would mean that, at any given time point, the phenomenon being modeled would have the same mean and standard deviation, and assessed across time each individual would display that same mean and standard deviation of the measured process as well.

Experience suggests that these requirements are novel enough for behavioral science students and professionals that it is better to start with a commonsense metaphor than to jump immediately into how to avoid the need to assume ergodicity. Suppose an applied scientist wanted to learn more about how people can navigate a large open field with trees, rocks of all sizes, coves, and muddy bogs. The scientists decides that a mediational analysis will best reveal the functionally important pathways of change. A group of 100 people are broken into two groups. One group is told to start anywhere on one side of the field try to get anywhere on the other side. A second group is told to attend to their own body and to be very efficient while traversing the field. That instruction leads to better outcomes (they traverse the field more quickly) so the issues turn to "why did this happen?".

Each person has a video camera on their head taking pictures every step and, data from the video camera shows that at step 500 (the mid-point) of their approximately 1,000 step journey. The "attend and be efficient" group is not yet significantly faster than the control condition. They are making fewer big jumps, however, and this fact mediates the ultimate differences in ultimate outcomes.

Should the analyst now suggest to other individuals to avoid big jumps in order to traverse the field more quickly? The answer is "yes" if and only if there were no trends in jumping or related processes over time, and all people showed the same mean and standard deviation of these processes (in other words, jumping and related variables were ergodic). Otherwise, the answer is "no."

Suppose the lack of jumping at the mid-point of the journey mediated outcomes because people who were attending to their body and their efficiency were more likely early on to discover that they could make good progress by making big jumps a lot but some of these eventually became exhausted and slowed down, and stopped jumping by the mid-point -- but later on avoided swamps due to that exhaustion, much to their advantage. Others did not jump much early on and arrived at the midpoint fresh but at an average speed, but some in this subgroup realized that they could make much better progress by picking a route that *required* big jumps. These trends and differential features (who became exhausted quickly and who did not) could cancel each other out and still yield a statistically significant mediational variable. A bell curve of outcomes (or mid-point progress with a mediational variable) can be interpreted by probability theory (as in traditional mediational analyses) but it does so by assuming only chance is otherwise operating, and systematic trends, systematic idiosyncratic responses, or their combinations, are not "chance." Using statistical models that require such implausible

assumptions in order to apply the obtained results to individuals is especially unwise in applied psychology where applying results reliably to individuals is often part of the very purpose of scientific analysis.

There is a statistically legitimate alternative: Model each idiographic journey from the recorded camera one pathway at a time, and then combine these into nomothetic subgroups if and only if it helps model most of these idiographic journeys (what is called in Hayes et al., 2022 an "idionomic approach"). Knowing who displayed various patterns could help explain key outcomes when knowledge of how individuals traversed the field is related to the time it took to cross it, the effort spent to do so, and the impact of exhaustion or injuries that happened along the way. The scientist could then use that knowledge to help people cross the field safely, efficiently, and effectively.

As we will show in this chapter, if you model how much of the information about pathways is person-specific the resulting values are so large as to question the meaningfulness of calculating central tendencies as a means of understanding processes of change. Most human data have trends and all "processes of change" do, *by definition*. Very, very few of our statistical tools are designed to avoid making an implausible ergodic assumption.

If you are a practitioner, this is the take home message: psychology and behavioral science generally has unintentionally been feeding you false and misleading information that is inadequate for you to do your job. This could be a major reason why psychological intervention specialists have had such a hard time improving our methods based on our science: our science has been giving us empirical information that violates its own empirical assumptions.

When mindfulness and its elements are no longer assessed as normative analytic abstractions but instead are examined as dynamic unfolding processes that apply to particular

people, we find what our wisdom traditions have always known: Mindfulness is a multi-element skill that you exemplify in context over time. It is the entire set of interrelated skills that matters, and the context in which they are applied.

In the next section we will explore the rapidly developing but still very young science of idionomic analysis and how modern empirical methods are validating ancient wisdom. Most especially, we believe these methods provide a pathway forward to expand the science and practice of mindfulness methods for the good of all.

Why Idionomic Analysis Matters: The Example of Self-Compassion

Many scholars consider self-compassion to be the natural result of mindfulness skills (Germer, 2009) and vice versa (e.g., Neff & Dahm, 2015), and research confirms that these skill sets are highly interrelated (e.g., Hollis-Walker, & Colosimo, 2011; Voci, Veneziani, & Fuochi, 2019). In our research team we have begun studying self-compassion as a dynamic unfolding process. What we have found is profoundly worrisome. Despite the overwhelming reports that compassion towards oneself is conducive to psychological well-being (e.g., Marsh, Chan, & MacBeth, 2018; Phillips & Hine, 2021; Sirois, Kitner, & Hirsch, 2015; Zessin Dickhäuser, & Garbade, 2015), an idionomic analytical perspective requires that we remain open to the possibility that the experience of compassion for some individuals may substantially deviate from the nomothetic effect. The psychological impact of self-compassion may differ across person, context, and time (Ferrari, Ciarrochi, Yap, Sahdra, & Hayes, 2022). For instance, compassion towards the self can be experienced as incompatible with compassion towards others in the daily lives of some people. Such low self-other harmony in compassion may impact the wellbeing of the individuals differently than the overall nomothetic positive effects of self- and other-directed compassion on wellbeing reported in the literature.

In a recent experience sampling study of transdiagnostic patients, the researchers examined the extent to which moment-to-moment self-compassion was associated with compassion towards others, life-satisfaction, and mood (Sahdra et al., 2023). Consistent with prior research, the researchers found that the moment-to-moment experiences of self-compassion and compassion towards others were generally in harmony for most participants in the sample, though there was substantial heterogeneity in these within-person positive associations. When the two forms of compassion were in disharmony, the well-documented positive link between compassion and wellbeing disappeared. That is, compassion was conducive for wellbeing in moment-to-moment experiences of individuals, but only among those who also exhibited self-other harmony in their moment-to-moment experiences of compassion.

We suspect that violations of ergodicity will be discovered in many studies as the field becomes more comfortable at focusing more on the heterogeneity of the "fixed effects" rather than treating the normative finding as the headline of any research study (e.g., see Sahdra, Ciarrochi, Klimczak, et al., 2023, for systematic demonstration of violations of ergodicity and a review of idionomic methods). Compassion is universally considered a virtue in almost all traditions around the world, and self-compassion appears to be a common route to compassion itself (Neff & Pommier, 2013). Yet, when examined under an idionomic microscope, the dynamics of the moment-to-moment experiences of individuals tell us otherwise.

The heterogeneity of the mindfulness construct

We have already mentioned that in a spiritual context mindfulness skills are trained as part of an overall ethical program that avoids selfishness and promotes prosociality. For instance, various traditions of Buddhism have for millennia emphasized ethical conduct, including prosocial behavior, as a crucial part of practicing mindfulness (e.g., Dalai Lama & Ekman,

2008). Buddhist mindfulness practices are meant to foster harmonious social relationships while dampening the impact of "afflictive" states, such as selfishness, which are thought to be harmful for the individual experiencing them and others related to them (Goleman, 2003). The ancient practices of mindfulness were designed to minimize suppression of unwanted thoughts and anxious clinging and highlight the importance of giving and receiving love (Sahdra & Shaver, 2013).

In modern secular contexts in the West, mindfulness interventions have proliferated in diverse ways, forming an industry worth more than a billion dollars (Wieczner, 2016). Some interventions focus almost exclusively on the mindfulness skills of focused attention, curiosity, non-judgmental awareness, and acceptance of the present-moment experience, while other interventions teach these skills in conjunction with the cultivation of prosocial skills such as empathy, warmheartedness, kindness towards others, and acting with compassion to relieve the suffering of others (e.g., see Galante et al., 2014 for a review).

As the interest in mindfulness interventions in the West has grown exponentially, especially over the past decade, there have been a plethora of theories of how mindfulness benefits the person and their social world. These theories come from a growing number of studies in behavioral, cognitive, and neuroscientific literatures, and we provide only a small sample here. The proposed mechanism by which mindfulness skills bring about wellbeing and prosociality benefits include:

- sustained focused attentional capacity (MacLean et al., 2010) and sustained capacity of response inhibition promoting adaptive personal and inter-personal functioning (Sahdra et al., 2011);
- greater response flexibility and contextual awareness (Hayes, 2019);

- greater awareness of bodily sensations (e.g., Vago & Silbersweigh, 2021), as evident by increased activity in the insula, a brain region implicated in interoceptive awareness (Farb et al., 2007) and processing others' emotional experiences (Singer, Critchley & Precuschoff, 2009);
- greater capacity to regulate one's own emotional states such that personal distress related to others' suffering has a less inhibiting effect on compassionate behavior (Berry & Brown, 2017; Condon, 2017);
- greater capacity to act in accordance with one's values and more autonomous forms of motivation (Donald et al., 2019; Hayes, 2019; Ryan, Donald & Bradshaw, 2021);
- greater capacity to experience prosocial emotions such as gratitude and lovingkindness, and fewer negative emotions such as anger that interfere with harmonious social relationships (e.g., Fredrickson, et al., 2008), an argument that is supported by studies showing that meditators, relative to non-meditators, are more likely to show the activation of brain networks linked with prosocial emotions (Lutz et al., 2008);
- greater capacity of nonattachment, letting go of unhelpful clinging to rigid fixations about the self and others (Sahdra, Ciarochi, & Parker, 2016), which is linked with observable prosocial behavior (Sahdra, Ciarrochi, Parker, Marshall, & Heaven, 2015);
- increased tendency to support deontic retribution for third-party injustice (Kay, Masters-Waage, Reb & Vlachos, 2023); and

- reduced intergroup bias and internalized bias, and increased anti-bias towards outgroups (Chang, Donald, Whitney, Miao, & Sahdra, 2023).

The diversity of potential pathways from mindfulness to prosocial behavior discussed above implies that no pathway may be universally significant for linking mindfulness to prosociality for all people in all situations. For instance, a meta-analysis shows that there is an overall positive pooled effect of mindfulness linked to prosocial behavior but there is substantial heterogeneity associated with that pooled effect (Donald, Sahdra, Van Zanden, Duineveld, Atkins, et al., 2019). Similarly, a recent meta-analysis of mindfulness linked with improved intergroup bias revealed a moderate level of between-study heterogeneity (Chang et al., 2023). But the variation of the overall effect across studies may be only a tip of the iceberg of the psychological heterogeneity of the nomothetic effect. Different potential mechanisms of mindfulness likely function differently in the dynamics of the everyday lives of different people.

Despite that awareness there is often an implicit assumption lurking that any given pathway from mindfulness to a mechanism (e.g., nonattachment) to outcomes such as wellbeing and compassionate behavior would function in the same direction for everyone, even if the strength of those connections (effect size) differs for different people. As far as we are aware, no large empirical study has explicitly tested this psychological-homogeneity assumption by examining mindfulness within persons over time in a nexus of relevant variables that are hypothesized to play a ‘causal’ role in bringing about the personal and interpersonal benefits of mindfulness. Many of these variables could be co-occurring and some could be more essential or invariant than others, but that very issue needs to be examined in a way that allows the idiosyncratic interactions to be modelled. Intensive within-person data are needed to examine the functional links between mindfulness, potential mechanisms, wellbeing, and compassionate

action in an idionomic fashion. In this chapter we will examine some early attempts to move in that direction.

People can be mindful in different ways. One way in which researchers have tried to examine such differences is by using mixture modeling/mixed modeling or latent profile analysis of the different aspects of mindfulness. Although profile analysis falls under nomothetic approaches, it is regarded as more of a person-centered method relative to other nomothetic approaches, which are variable-centered. Strictly speaking, however, the distinction between variable-centered and person-centered approaches does not make latent profile analysis an idionomic approach. Profile analysis is not a bottom-up approach of arriving at the group-level insights only if it improves the understanding of specific individuals. Rather, profile analysis aims to identify clusters of individuals whose response patterns are similar on a given set of variables (hence the method remains nomothetic). Still, mixture modeling begins to open us to the idea that an overall single nomothetic effect (e.g., scoring high on all aspects of mindfulness is linked to high wellbeing), however 'robust' in statistical models, can be a misleading representation of reality, which often consists of diversity of experiences.

Examining such diversity in people's experiences of mindfulness, one study attempted to disentangle the quantity and quality of mindfulness in latent profiles and tested their links with mental health and life effectiveness (Sahdra et al., 2017). To separate the level and shape effects in profiles, they used a combination of bifactor exploratory structural equation modeling and latent profile analysis. They also tested the impact of including nonattachment in the set of variables used to identify profiles on the nature of profiles. In a highly conservative test, they sought to see if profile membership added value in predicting mental health and life

effectiveness, above and beyond a purely variable-centered approach of using the scale scores of mindfulness and nonattachment. It did.

Consistent with prior research on profiles of mindfulness (Pearson, Lawless, Brown, & Bravo, 2015), Sahdra et al. (2017) identified a judgmentally observing profile and a non-judgmentally aware group; but inconsistent with prior research, they did not find profiles that showed high or low levels on all specific aspects of mindfulness as measured by the FMMQ. Adding nonattachment improved the clarity of profiles but did not alter their shape. When testing the unique predictive utility of profile membership, above and beyond the scale scores of the variable, the judgmentally observing profile, compared to other profiles, showed the highest levels of mental ill-health, but also the highest levels of life satisfaction and effectiveness. Those "mindful" individuals got things done and were happy with their lives, despite showing signs of mental ill-health. Mindfulness is almost synonymous with "non-judgmental awareness" in both the scientific literature and the general public's understanding of the nomothetic concept. When most people think of a mindful person, they do not automatically conjure a caricature of a judgmental person. But that is part of the experience of being mindful for some people, as measured by the FFMQ.

Idionomic Analysis: An Empirical Demonstration

We are arguing that the analysis of mindfulness processes will be more progressive and surer footed if nested within an idionomic approach. That approach is new enough and different enough to warrant an extended example so that others might explore its possible benefits. We used an experience-sampling archival data set (Sanford, Ciarrochi, Hofmann, Chin, Gates, & Hayes, 2022) to perform network analysis on the day-to-day links between indices of mindfulness and other processes and negative affective experiences. For the purposes of this

demonstration, we focused on the five processes that showed the strongest link to negative affect in previous publications (Ciarrochi et al., 2022).

Participants were recruited using Amazon's Mechanical Turk ("mTurk") service, both to maximize the potential pool of eligible participants and to secure a diverse sample in terms of age, gender, and nationality. The sample was 44 (18 female, 26 male), with a mean age of 33.8 (SD=13.03). Data were collected twice daily, across 35 days. All items were completed using a 0–100 visual analog "finger swipe" scales to discourage anchoring.

The main process assessment was the Process Based Assessment Tool (PBAT; Ciarrochi et al., 2022). The PBAT is not a scale but instead is a collection of 18 items focused on variation, selection, and retention processes across a variety of psychological dimensions, as well as sociocultural and biophysiological domains. The stem for each item in this study was "Over the past 12 hours" and the response anchors were 0 = Strongly Disagree and 100 = Strongly Agree. We used the top five items that were group-level predictors of negative affect in past research (Ciarrochi et al., 2022). These items included our proxy for a core mindfulness skill – "I was struggling to connect with the moments of my day-to-day life." In the evolutionary model, this is a form of selection focused on the yearning for orientation. The four additional items focused on "stuck and unable to change (lack of variation)", "struggling to keep doing something that was important (lack of retention)"; "having no outlet for feelings (selection: yearning to feel)", and "thinking helped my life (selection: Yearning for coherence)." For a detailed discussion of these items and their link to theory see Ciarrochi et al. (2022).

We assessed negative functioning using the Screening Tool for Psychological Distress (Stop-D; Young et al., 2007, 2015). This five-item tool asks, "how much have you been bothered by" four areas: Sadness - "Feeling sad, down, or uninterested in life?"; Anxiety - "Feeling

anxious or nervous?"; Stress - "Feeling stressed?"; Anger - "Feeling angry?"; and Perceived lack of social support - "Not having the social support you need?" (alpha = .90). because it produces similar observed correlations with a well-validated life satisfaction scale on self-reported happiness, physical health, and mental health.

Turning to analysis, our focus was twofold: 1) examine the extent that our mindfulness item linked to within-person changes in negative functioning and 2) identify the extent that this relationship varied from person to person. Idionomic analysis begins with the individual, rather than group level averages, so we sought to estimate the strength of relationship between mindfulness and negative functioning for each person using Autoregressive Integrated Moving Average (ARIMAX) analysis to deal with the time series data (see Ciarrochi, Sahdra, Hayes, & Hofmann, n. d. for details). This procedure produced an effect size estimate (Beta) and standard error for each individual which we then submitted to meta-analytic analyses. This allows us to apply well-understood standards regarding when it is appropriate to pool data from a collection of studies to the issue of when it is appropriate to pool data from a collection of people.

Meta-analytic results revealed a highly reliable pooled effect (Beta = .25, SE=.042, 95% CI[.16,.33]), indicating that low mindfulness was generally associated with higher negative functioning. However, an I^2 of .88 suggested extremely high variability and the Q test for heterogeneity was highly significant, Q = 366, $p < .0001$. Figure 1 below illustrates both the mean value (triangle on x axis) and variability of effects. Many values are significantly positive (shown when confidence interval (+-1.96SD) for positive beta values don't cross 0), but a significant number are either non-significant or significantly negative (the latter shown when error bars for negative beta values don't cross 0).

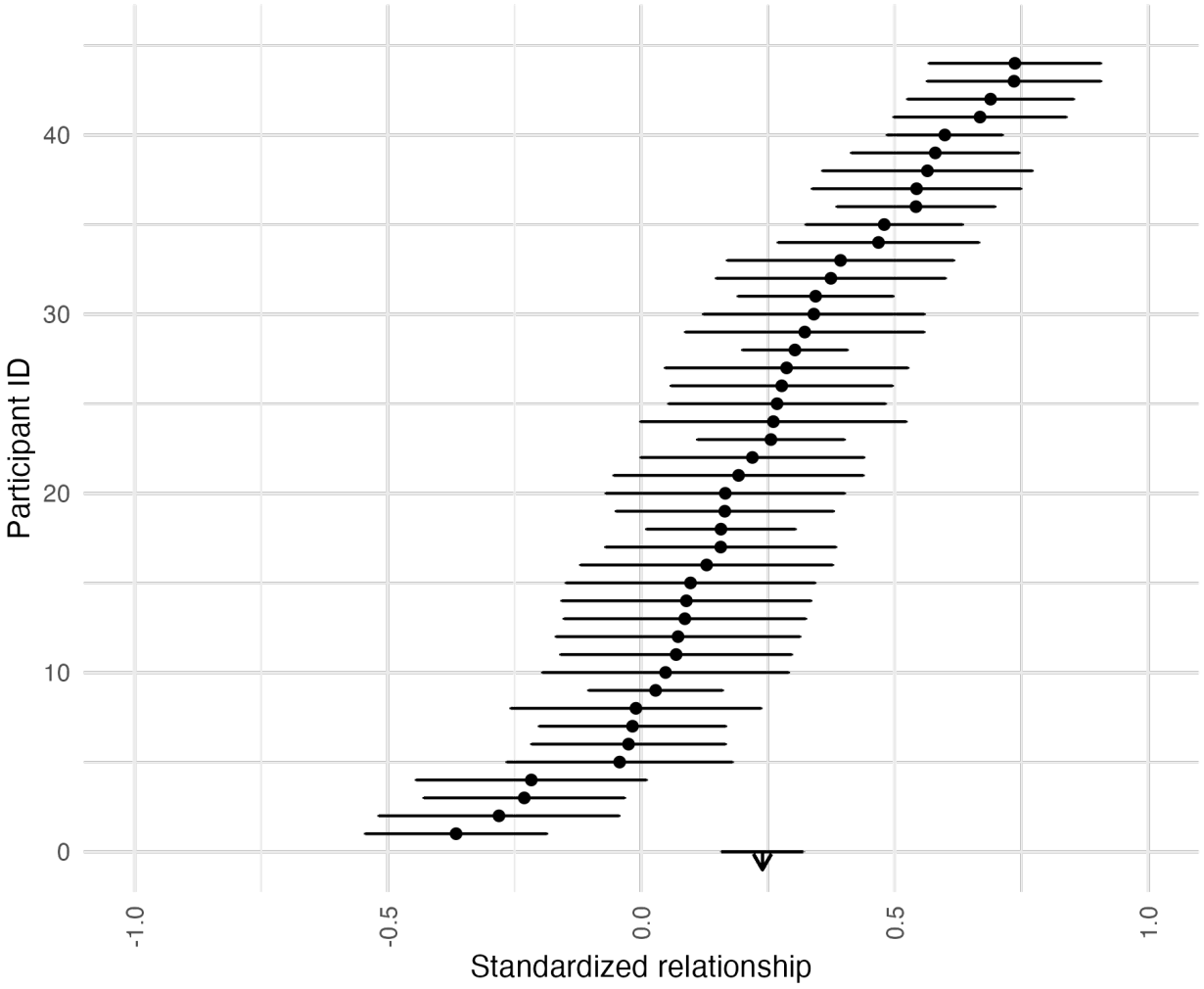

Figure 1: The strength of relationship between low mindfulness and negative affect broken down by individual

To put this variability into context, in meta-analyses I^2 represents the percentage of total variability across studies that is due to true heterogeneity rather than mere random variation or "chance." Rough guidelines for interpreting I^2 in the meta-analytic literature are that values less

than 25% reflect low inconsistency, 25% to 50% reflects moderate inconsistency, 50 to 75% reflects high inconsistency, and over 75% shows very high inconsistency. Thus, this finding represents very high inconsistency and suggests that averages should not be used.

Process-based approaches focus not just on individual variables but on the role of variables in a wider network of processes and aspects of context. In a network, it may be that as some processes exert weaker influence, other processes may become more impactful and thus we examined whether when mindfulness was having little impact on some people, other processes were more paramount. To explore these differences, we divided the sample into two based on the above idiographic analysis: those for whom mindfulness and negative affect did not occur at the same time (Group 1; below median relationship) and those for whom they did (Group 2; above median relationship).

We then performed the ARIMAX procedure described above on the other four process variables: “stuck unable to change”, “struggling to keep doing something that was important”; “having no outlet for feelings”, and “thinking helped my life.” The results of these analyses are summarized in Table 1. The use of both significant ($p<.05$) and marginally significant ($p<.10$) addresses the common criticism about the over-reliance on p-value cut-offs in psychology. By considering both levels, the general pattern of results is more evident, which may be less obvious with a strict $p<.05$ cutoff. Importantly, the two levels are clearly distinguished, reducing the risk of misinterpretation. Looking at the low-impact group, we see that mindfulness is modestly positive 2 times (green; linked in expected positive ways to mindfulness) and negative four times (red; linked in unexpected negative way), and neutral the other times. In contrast, “stuck” is positive (significant and in expected direction) nine times and “persist” is positive 7 times and negative once. These appear to be more reliable drivers of change for this group than

mindfulness. In contrast, the high-impact group appears to be generally influenced by all the processes, though again, there are important exceptions, and mindfulness certainly is more important for some than others. Even though many other processes are involved, we hypothesize that it would be more effective to focus on mindfulness among those in the high positive impact group compared to those in the low group. To the low-impact group, we hypothesize that it is best to focus on more behavioral processes such as feeling stuck and failing to persist at something -- processes that are likely beneficial to at least 50% of the group, whereas mindfulness is not.

Table 1: Link between daily processes and daily negative affect within person

Mindfulness had low positive impact	Mindfulness had moderate to high positive impact

ID	Mindl	Stuck	Feel	Persist	Cog
30V7	-0.01	0.04	0.01	0.24	-0.18
3ERE	0.22	0.25	0.01	0.17	**-0.28**
3Q7C	-0.04	-0.12	0.18	0.00	0.08
4R48	0.03	-0.02	-0.03	-0.01	-0.07
5V6J	0.07	0.22	0.02	0.04	0.07
66WM	0.13	0.08	0.13	-0.00	0.13
BZBD	0.17	**0.40**	**0.41**	**0.37**	**-0.32**
DVMQ	-0.02	**0.22**	0.05	0.17	0.08
E94T	0.09	0.04	0.07	**0.31**	-0.04
FLJ5	**0.16**	0.12	-0.01	0.13	0.05
GQUU	-0.03	-0.08	-0.07	0.03	-0.03
HK02	0.16	0.07	0.00	0.08	0.01
K7M72	0.05	0.09	-0.10	-0.16	-0.09
O69Y	0.19	**0.42**	**0.27**	**0.36**	0.09
P3KR	-0.22	**0.39**	**0.28**	-0.02	**-0.47**
RKPE	**-0.23**	0.12	0.04	-0.06	-0.16
RLKE	0.16	0.12	0.11	0.10	-0.09
SNJI	0.07	-0.09	0.15	0.05	0.08
UZI9	**-0.28**	**0.23**	**0.43**	0.12	-0.09
WPH1	0.09	**0.35**	**0.30**	**0.27**	0.00
WUXO	0.10	**0.47**	-0.14	**0.41**	**-0.34**
YTYB	**-0.37**	0.12	0.08	-0.16	**-0.30**

[1] $p < .05$; $p < .10$; $p < .05$; $p < .10$

ID	Mindl	Stuck	Feel	Persist	Cog
0BT5	**0.27**	**0.37**	**0.48**	0.20	**-0.37**
0GME	**0.34**	**0.26**	0.19	0.24	**-0.22**
3R5W	**0.28**	**0.27**	**0.28**	-0.05	-0.05
44L3	**0.47**	**0.49**	**0.21**	0.10	**-0.46**
6FBF	**0.56**	**0.52**	**0.45**	**0.69**	**-0.42**
7MH7	**0.74**	**0.74**	**0.81**	**0.67**	**-0.75**
807X	**0.74**	**0.39**	**0.55**	**0.41**	**-0.47**
AGV0	0.26	**0.28**	**0.31**	**0.36**	**-0.29**
ATWY	**0.60**	**0.63**	**0.57**	**0.53**	**-0.61**
D833	**0.54**	**0.66**	**0.49**	**0.54**	**-0.50**
DQ9F	**0.48**	**0.60**	**0.40**	**0.26**	-0.16
I9RS	**0.67**	**0.57**	**0.58**	**0.60**	**-0.67**
J26D	**0.69**	**0.67**	**0.83**	**0.51**	**-0.59**
LBXE	**0.26**	**0.38**	**0.32**	**0.86**	**-0.16**
MUZI	**0.58**	**0.24**	**0.29**	**0.23**	**-0.42**
MYJL	**0.54**	**0.61**	**0.47**	**0.41**	**-0.56**
PB0W	**0.39**	**0.46**	**0.42**	**0.55**	-0.05
VN9X	**0.37**	**0.28**	0.18	**0.25**	-0.07
WPLX	**0.29**	**0.41**	0.09	**0.36**	**-0.31**
X1LK	**0.30**	0.06	0.11	0.13	**-0.33**
ZIFM	**0.32**	**0.32**	**0.28**	0.15	**-0.45**
ZQ9X	**0.34**	**0.45**	**0.43**	**0.44**	**-0.31**

[1] $p < .05$; $p < .10$; $p < .05$; $p < .10$

Note: Mindl = struggled to connect with the moments of my day-to-day life; Stuck=stuck unable to change; Persist = Struggled to keep doing something that was important; Feel = no outlet for feelings; Cog—thinking helped my life

Table 1 clearly indicates that even within the two groups, there is a substantial amount of heterogeneity. We recognize this constraint but still sought to make some nomothetic generalizations about the two separate groups whilst still advising caution in overinterpreting the mean averages. A notable improvement from past research is that we have taken the step of creating groups based on idiographic and bottom-up type analyses.

We examined the interconnectedness between processes and negative affect, using multi-level vector autoregression (Moulder et al., 2022) on six time series, namely, the five processes and negative affect in daily life. We used mlVAR package in R to estimate the lagged and contemporaneous network model for both samples (Epskamp, Deserno, Bringmann, & Veenman, n.d.). MlVAR is able to simultaneously model reciprocal linkages between dynamic processes and facilitates the understanding of highly complex interactions within a unified framework (Li et al., 2022; Moulder et al., 2022). This data-driven approach can be used to explore the within-person dynamics and allows for and explores autoregressive and bidirectional associations between variables at the within-person level.

Contemporaneous relationships involve the within-person link between processes and outcomes moment-to-moment. Figure 2 presents the contemporaneous networks for the low impact (LI) and moderate to high impact (MI) groups. The LI network contains no direct link with mindfulness but does involve a direct link between struggling to persist at something important and negative affect. This link is not present in the MI group. In the MI group there is a link between not having an outlet for feelings and negative affect, but this link does not occur in the LI group. In addition, effective thinking (reversed scored) is central to processes in the MI group but not the LI group. Note that this pattern of findings does not mean that mindfulness is

irrelevant to the LI group. Careful examination of the network suggests that mindfulness may have indirect effects through its impact on struggling to persist.

Figure 2: The estimated fixed effects of the *contemporaneous* network structures obtained in multilevel VAR for both the idiographically identified groups.

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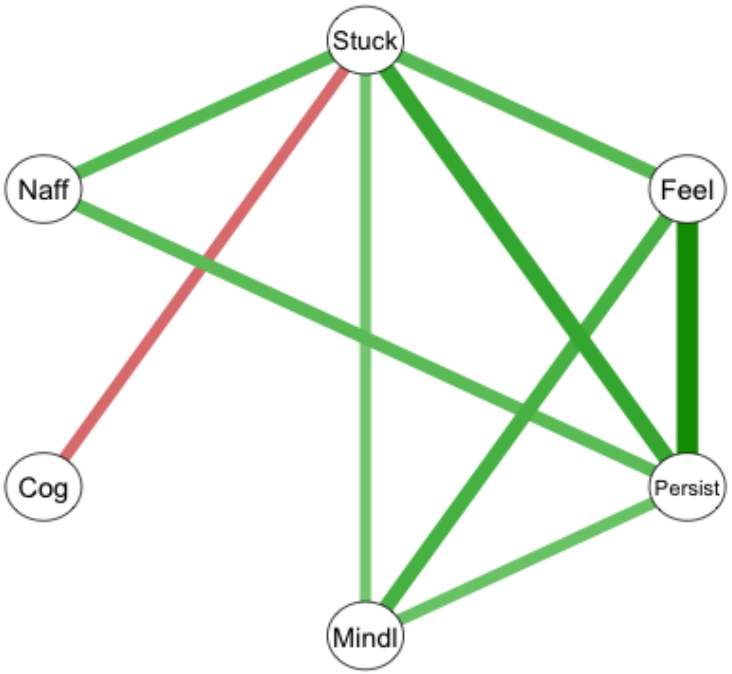
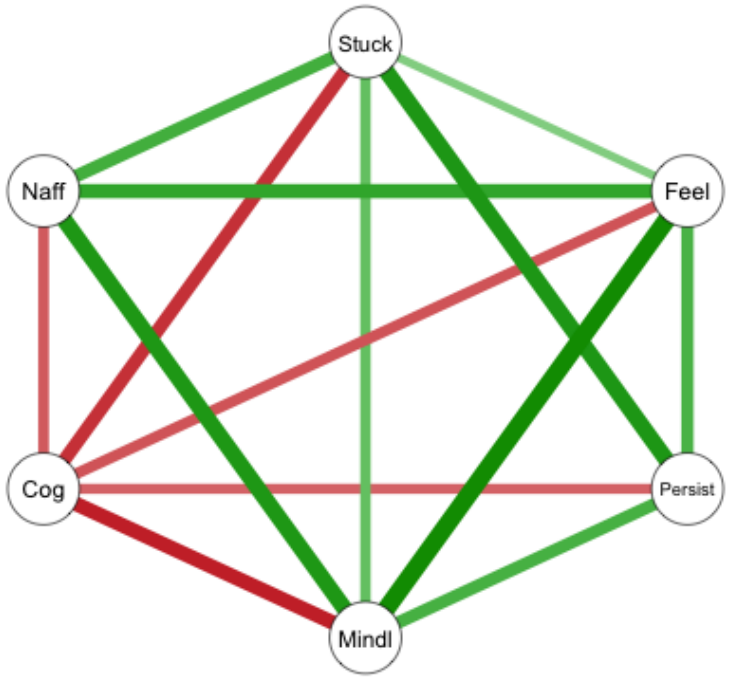
Group 1: Mindfulness had low positive impact	**Group 2: Mindfulness had moderate to high positive impact**
	

Note: Green links indicate positive relationships between negative processes and negative affect. Mindl=struggled to connect with the moments of my day to day life; Stuck=stuck unable to change; Persist = Struggled to keep doing something that was important; Feel=no outlet for feelings; Cog=thinking helped my life; Naff=negative affect

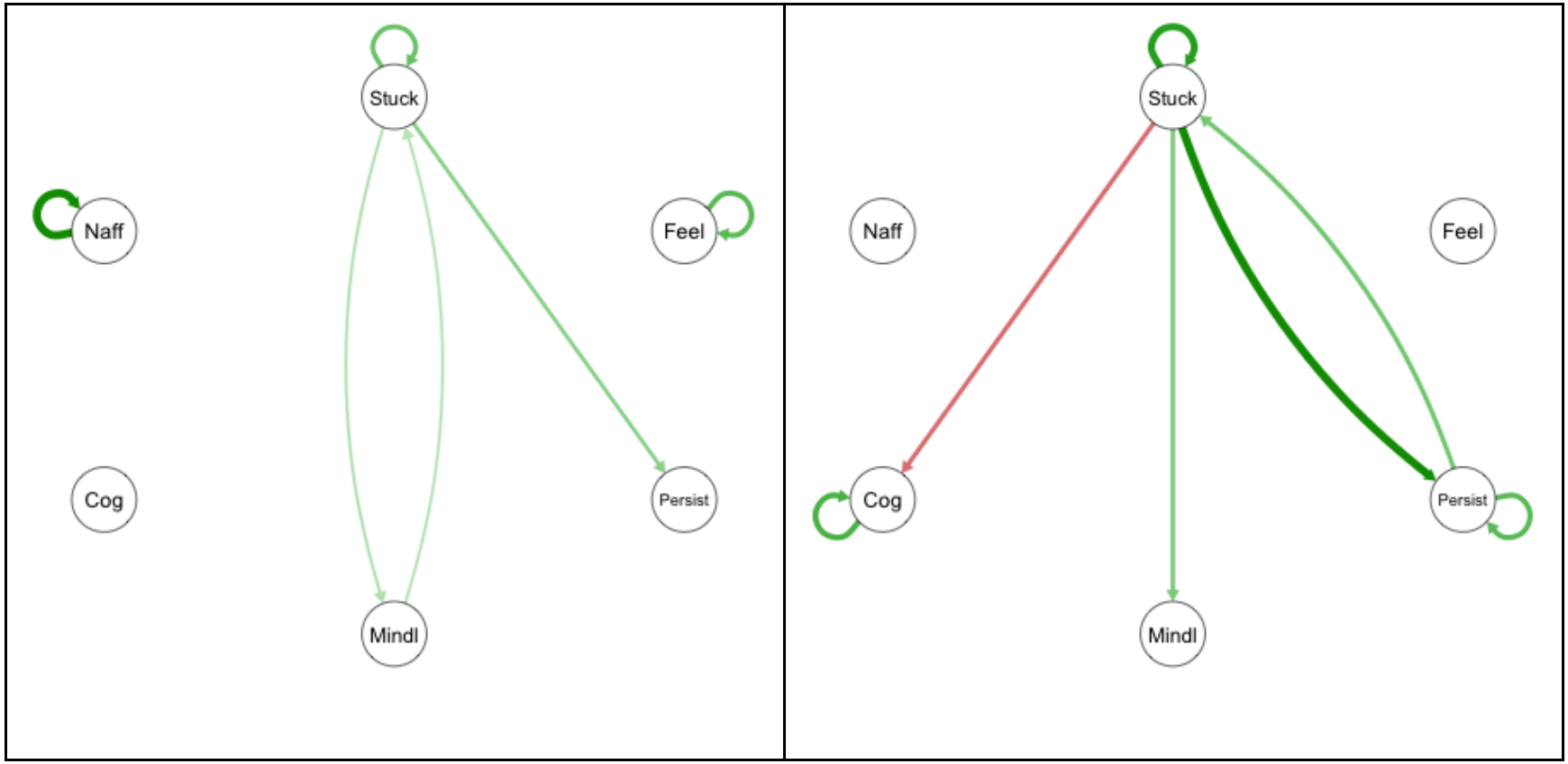
In terms of overall themes, the role of mindfulness, thinking, and outlets for feelings are dominant in MI participants: each of those variables have the maximum of five contemporaneous links to them, along with being stuck and unable to change. In the LI group, the only variable with this kind of centrality (5 relations) was *being stuck and unable to change.* As it relates to negative affect, mindfulness plays only an indirect role for LI, linking with more behavioral indices of being stuck and failing to persist, and these behavioral indices, in turn, link directly to negative affect.

The lag network relationships are presented in Figure 3. Because there are lagged relations, directionality can now be modeled. Here we see that the groups again differ. For example, feeling stuck has a larger impact on later thinking in the MI group compared to the LI group. They do share some things in common. Feeling stuck and unable to change predicted later low levels of mindfulness and persistence in both groups.

It is important to understand what can and cannot be inferred from contemporaneous and a lagged network analysis. If a variable predicts another variable at a lag over and above auto-regression, then this indicates that such a variable might be an antecedent or even have a causal relation to the later-in-time variable. However, if there is no relationship between variables in the lag network, this does *not* mean that there is no temporal or causal relationship between the variables. It is possible that the length of the lag is simply too short or too long, for instance. If mindfulness has an immediate negative effect, then a lag of three hours may miss this effect; likewise, purely contemporaneous relations might show a lagged relation if temporal units were smaller.

Figure 3: The estimated fixed effects of the *lagged* network structures obtained in multilevel VAR for both the ideographically identified co-occurring and non-co-occurring participants.

Group 1: Mindfulness had low positive impact	**Group 2: Mindfulness had moderate to high positive impact**



Note: Mindl=struggled to connect with the moments of my day to day life; Stuck=stuck unable to change; Persist=Struggled to keep doing something that was important; Feel=no outlet for feelings; Cog=thinking helped my life; Naff=negative affect

This preliminary set of findings begins to suggest that mindfulness may not have the same psychological meaning to people or the same psychological consequences depending on the context of other processes that are idiographically present or absent. Mindfulness appears to be much more central and influential for those in the LI group as compared to the MI group, where its impact on negative affect is indirect and through relatively behavioral processes.

There is a growing list of idionomic and network approaches and what has been shared here is more by way of documenting the need and possible benefits of changing our analytic strategies than it is to present a turn-key solution of the problem of ergodicity. Furthermore, however it is accomplished, we consider this kind of network identification of different process profiles and patterns to be only step one in a multistep pragmatic process (Ciarrochi et al., 2021; Hayes et al., 2019, 2022). The next step involves using those profiles to personalized therapy by targeting specific nodes or relations in the network. That research has begun (e.g., Ong, Hayes, & Hofmann, 2022) but it is in its infancy.

The field will need far more research in both areas. To support step one, we will need to gather very large samples of people reporting mindfulness and other processes in an intensive longitudinal context. This may allow us to identify characteristic profiles – considering them useful if and only if they increase idiographic fit. In step two, we evaluate whether the knowledge of these idionomic networks and the profiles and patterns they may reveal will contribute to the relevance and impact of an intervention. Stated simply, does a personalized intervention based on this statistical knowledge improve outcomes over and above a generic intervention?

Conclusion

Mindfulness research began with broad hypotheses such as “Mindfulness reduces stress” or “Mindfulness drives well-being.” As research has evolved, we as a field have begun to think more in terms of individual heterogeneity, but the hypotheses still appear to be linear and fairly general, such as “more mindfulness will lead to more well-being for some.”

As our process focus becomes more nuanced, we need to think in terms of networks of process relations. For example, a person who is focused on psychological flexibility might suppose that mindfulness skills should be deployed in service of greater emotional and cognitive flexibility, or in the service of deeply held values such as an increased ability to care for others. Other people who are focused on reducing unhelpful physiological arousal might use mindfulness interventions to increase parasympathetic activity and increase awareness of sympathetic activations.

That kind of network thinking is progressive, but it cannot be reliably done purely nomothetically. Average processes are not processes at all, and average networks do not escape the requirement of ergodicity to be applied with confidence to individuals. We will need a more bottom-up change in our measures and research methods to truly understand how mindfulness skills impact people’s lives.

This sensitivity is timely because as mindfulness methods are being widely implemented in the west, we are beginning to see such aberrations as selfish mindfulness or self-centered self-compassion. These iatrogenic effects may have been intuitively avoided in the wisdom traditions at least to some extent, but evidence-based psychological interventions will need to do so another way. Idionomic analysis suggests that poor outcomes can be avoided by considering the larger

network of processes that are needed for mindfulness skills to be deployed in a positive way given an individual's goals.

Incorporating mindfulness skills into evidence-based care is a positive thing, but how we do it differs from the spiritual and religious traditions that have developed over thousands of years. As empirical clinicians, we need to learn to be wiser and to deploy these skills in a way that makes them safe for individuals and for cultures. Every individual matters in such a journey, and so skills and aspirations of the unique individuals we work with must be measured, modeled, and understood in a way that allows their unique voices to be heard.

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