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ARTICLE

Compassion in context: A contemplative neuroscience perspective on expanding compassion beyond the individual

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Abstract: A central challenge in developing an epidemiology of compassion is establishing how to determine that compassion is "present" in an individual or population. To do so requires expanding beyond individualistic conceptions of compassion to consider how compassion might manifest in relationships, in communities, and within societies. This includes agreeing upon a definition that is flexible enough to span levels of analysis, and operationalizing how to identify and quantify compassion at each level. Some of these challenges are unique to the epidemiological framework, while others have been explored by researchers in contemplative studies, psychology, and neuroscience in the process of defining our own fields of compassion science. In this paper, I consider the insights from these related fields, and reflect on how they can be applied to an epidemiological framework. I give special consideration to the challenges of measuring a latent and emergent phenomenon, spanning levels of analysis, and defining compassionate action. I also consider how the related concepts of interdependence and common humanity might help identify key indicators of compassion at a population level. Finally, I propose a set of theoretical models that illustrate the levels at which compassion may emerge, and merge the epidemiological triad model with insights from compassion science to provide a framework for the study of compassion from an epidemiological perspective.

Keywords: compassion theory, contemplative science, common humanity, social epidemiology, emergent processes

1. Introduction

The past several decades have seen an explosion of interest in scientific investigations of positive qualities of heart and mind—including compassion—as well as how these qualities may be intentionally cultivated (Goetz et al., 2010; Mascaro et al., 2020; Skwara et al., 2017). Contemplative traditions have long been concerned with the cultivation of compassion and the alleviation of suffering (Wallace, 2004), while western psychology has explored questions of empathy since the early 20th century (Titchener, 1909). In 1987, these two traditions began a formal conversation with the first Mind and Life Dialogue (Hayward & Varela, 2001). This ongoing conversation between Buddhist scholars and western scientists eventually led to the formation of a new field of study, contemplative neuroscience, in the early 2000s. This cross-cultural and multidisciplinary dialogue has generated new insights about the nature of mind, particularly as it relates to the consequences of meditation and contemplative training. However—due in part to western psychology's focus on individual mental health (e.g., van Zyl et al., 2024), and in part

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to the removal of these practices from their cultural context (Condon & Makransky, 2020)—nearly all of the research conducted has been at the level of the individual, centering on the consequences of contemplative training for individuals themselves rather than for their relationships (Kirby et al., 2026) or communities (Quaglia et al., 2021).

Now, another conversation is emerging, this time between compassion scientists and epidemiologists. Born out of the recognition that there remains much to learn about how compassion clusters throughout space and time (Goetz & Simon-Thomas, 2017; Waller, 2026) and about how it might spread between individuals or within communities (e.g., Aellah & Davey, 2026; Lomas & VanderWeele, 2026), the epidemiology of compassion (Addiss et al., 2022) aims to merge epidemiological approaches and compassion science to build a population-level understanding of how compassion presents and flows. This undertaking will require a shared definition of compassion that is flexible enough to span levels of analysis, as well as integrative models that help merge these two fields. Contemplative science, which blends ways of knowing from psychology, neuroscience, and contemplative traditions, has generated insights that may be of use in establishing an epidemiology of compassion. In this paper, I first offer a brief overview of definitions of compassion and explore key concepts and challenges drawn from contemplative science. I give special attention to issues that have direct relevance to the epidemiological investigation of compassion, including the challenge of measuring a latent and emergent variable, expanding our understanding of compassion beyond the level of the individual, and identifying compassionate actions. From this scientific and theoretical grounding, I propose a set of two models—one outlining levels at which compassion might present, and the other proposing how compassion may emerge and spread—that, together, help bridge levels of analysis and situate current scientific understandings of compassion within an epidemiological framework.

2. Insights from contemplative science

2.1 Defining compassion

Compassion researchers have long grappled with the need for a definition that is broad enough to accommodate the varied ways that compassion may present, yet specific enough to differentiate compassion from other prosocial emotions, motivations, and actions. Compassion has been studied as an emotion, as a motivational state, as a personality trait or disposition, as a trainable skill, and in an evolutionary framework (Goetz & Simon-Thomas, 2017). Through this work, several features have emerged as central to compassion (e.g., Goetz et al., 2010; Mascaro et al., 2020; Singer & Klimecki, 2014; Strauss et al., 2016): 1) compassion involves a recognition of suffering; 2) compassion is a benevolent or caring or caring response to that perceived suffering; 3) compassion involves an other-oriented motivation to alleviate that suffering. Some definitions (Goetz & Simon-Thomas, 2017; Strauss et al., 2016) also incorporate cognitive appraisal (of the self-relevance of the observed suffering or the deservingness of the sufferer), and emotion regulation (generally regulating one's own distress), reflecting the fact that compassion implies a feeling of concern or care *in the absence* of accompanying distress or emotional contagion (B. G. King et al., 2023; Singer & Klimecki, 2014). Indeed, early psychological studies found distinct factor loadings for compassion versus distress-related words (Batson et al., 1987), and meditative adepts have described compassion as including a feeling of warm- or tender-heartedness toward the other that buffers against feelings of distress or overwhelm (Ricard, 2015). Consistent with this experiential description, neuroimaging studies have found compassion-related brain activity indicative of increased sensitivity to suffering (Lutz et al., 2008) and in regions involved with

perspective-taking, reward, caregiving, and positive emotionality (Novak et al., 2022; Singer & Klimecki, 2014).

2.1.1 The role of relationality: interdependence and common humanity

Though Buddhist contemplative traditions have informed much of modern research on compassion, the relational core of compassion has largely been overlooked (Condon & Makransky, 2020). Two relational concepts closely related to compassion within Buddhist thought that have yet to receive extensive consideration within the scientific literature are interdependence and common humanity. While compassion takes on different degrees of centrality across Buddhist traditions (Lavelle, 2017), the concept of interdependence is foundational to them all (Gethin, 1998). Put simply, interdependence holds that all objects, thoughts, and experiences occur in dependence on other factors (Bodhi, 2001). As all phenomena arise because of other causes and conditions, they are free of intrinsic existence. This is not nihilism—the claim is not one of non-existence, but rather of *relational and interdependent* existence. As such, the idea of an independent or separate self is a form of delusion, which is itself a form of suffering (Bodhi, 2000a). If all phenomena arise interdependently, then there is no "me" separate from "you," no "your suffering" separate from "my suffering"—rather all beings and phenomena are part of one interconnected flow of arising, experiencing, and dissolution (Makransky, 2012). How then, could I not see others' suffering as directly relevant to my own well-being and worthy of my attention and concern?

The universality of suffering is also central to Buddhist thought, forming the first of the four noble truths: Life, in all forms, involves suffering (Bodhi, 2000b; Gethin, 1998). From this stems an understanding of common humanity: all beings suffer, and—just like me—none of them wishes to suffer. This realization of common humanity supports an understanding of compassion arising from the shared experience of suffering (Chodron, 2023). The Buddhist conception of compassion implies inclusiveness and commonality, grounded in an understanding of our fundamental interconnectedness. This sense of connection and commonality is a central construct in research on self-compassion (Neff, 2003), and can also serve as an antidote to saviorhood or pity (Chodron, 2023) the trap of which global health workers may find themselves deeply familiar (Adiabu & Bemo, 2026).

Within a traditional practice context, the relational aspect of compassion not only grounds the understanding that all suffering is worthy of compassion, but also provides the secure relational base from which an expansive and non-exhaustible compassion may emerge (Condon & Makransky, 2020). This in turn may buffer against burnout, overwhelm, and compassion fatigue. While some scientific definitions of compassion have incorporated relational elements—for example, Strauss et al. (2016) include a recognition of the universality of suffering in their definition—compassion research has generally favored definitions, measures, and outcomes focused on the individual (Ozawa-de Silva & Mascaro, 2026). In building an epidemiology of compassion, and indeed in furthering compassion science in general, I believe that incorporating the relational elements of compassion is necessary to advance understanding of how compassion functions within relationships and communities.

2.2 Foundational approaches and conceptual challenges

A central challenge in developing an epidemiology of compassion is establishing that compassion is present in a given person, community, or society. There is no definitive diagnostic test for compassion, and the underlying tendency may manifest differently across contexts and levels. As research on compassion has gained traction, different sub-fields have adopted their

own approaches to the operationalization and measurement of compassion informed by each field's foundational assumptions and standard methodologies (Mascaro et al., 2020). Here, I offer a brief overview of some of the conceptual challenges the field of contemplative neuroscience has encountered in developing a science of compassion studies. Comprehensive reviews of the literature are available elsewhere (see, for example Addiss et al., 2022 for a review of "risk factors" for compassion; Goetz et al., 2010 for an analysis of the evolutionary basis of compassion; Mascaro et al., 2020 for an in-depth analysis of methods for measuring compassion; Skwara et al., 2017 for an overview of compassion training studies; or Strauss et al., 2016 for a review of compassion-specific measures) and such a full accounting is beyond the scope of the current paper. Instead, here I will highlight key insights, distinctions, and concepts that may be of use in establishing an epidemiology of compassion, and that provide the theoretical groundwork for the proposed models that follow.

2.2.1 Measuring a latent and emergent phenomenon

Even with a clear definition of compassion, the picture of how, when, where, and for whom compassion emerges is complex. Compassion can be both latent and emergent. Latent meaning that while it has observable effects, it is not directly observable itself; and emergent meaning that compassionate responses are grounded in a specific situational context, emerging from a dynamic interaction between an individual and their environment (Varela et al., 1991) and embedded in a social, ethical, and political context (Halifax, 2012). In fact, some compassion theorists hold that compassion is composed entirely of non-compassion elements (Halifax, 2012), though there is not universal agreement on this perspective.

The latent variable problem is common in the social sciences, and researchers have developed a range of methods for indexing the unobservable. Compassion researchers, specifically, have employed a range of first, second, and third person measures spanning self-report, confederate report, behavioral observation, behavioral tasks, and neurophysiological methods to attempt to quantify compassion (for reviews, see for example Goetz et al., 2010; Mascaro et al., 2020; Novak et al., 2022; Quaglia et al., 2021; Skwara et al., 2017; Strauss et al., 2016). One challenge in translating compassion research to an epidemiological framework is that many of the more reliable and ecologically valid approaches may not be easily scalable. For example, while it may be feasible to administer self-report scales in large numbers—and indeed the ease of doing so is one reason they are used so frequently in existing research—these are among the least ecologically valid measures available (Mascaro et al., 2020). Yet conducting mixed-methods studies that incorporate multiple approaches, such as observing behavior in combination with psychophysiological measures, may not be scalable or feasible in a global health context. The question of emergence adds another layer of complexity. If compassionate responses are contextually-dependent and emerge from an interaction between a person and their environment, then it is necessary to consider not only individual-level variables but also environmental factors in any assessment of compassion. This is a problem to which epidemiological methods may be particularly well-suited (for other explorations of this topic, see Boyd et al., 2026 and Ozawa de-Silva & Mascaro, 2026, both included in this special issue).

An approach that has been fruitful in studies of meditation training is to reframe unobservable phenomena into more directly observable features. For example, the inquiry "what happens when you meditate?" can be reframed into the observable "what do you do differently because you meditated?" In our research group's attempts to understand compassion-relevant changes over the course of meditation retreats, rather than focusing only on brain activity generated during meditative states, my collaborators have examined longitudinal changes in

facial expressions to suffering (Rosenberg et al., 2015), memory for images of suffering and accompanying cardiac patterns (B. G. King et al., 2023), and the relationship between changes in attentional control and socioemotional functioning (Sahdra et al., 2011). Similarly, the question of "is this person/organization/society compassionate?" can be reframed to "what behaviors/ policies/systems does this person/organization/society engage in that reflect a compassionate response to suffering?" This reframing supports a shift from attempting to measure compassion directly to measuring compassion-relevant systems, policies, and behaviors, which can allow for the formulation of more tractable research questions and hypotheses. However, in this process of translating the ineffable to the concrete, it is essential to avoid a reductionist view that conflates the measure with the underlying phenomenon, or that values only the quantifiable (Adiabu & Bemo, 2026; Varela et al., 1991).

2.2.2 State, trait, or training

One key distinction is whether a given study frames compassion as a trait, a state, or a trainable skill (Addiss et al., 2022). A large body of research has conceptualized compassion as a trait (e.g., Keltner et al., 2014; Mikulincer & Shaver, 2017; Spinrad & Eisenberg, 2017; Stern & Cassidy, 2018). In this conception, a given individual has a relatively stable level of compassion that they carry with them as they go about their lives. Work in this domain has largely relied on individual differences in this baseline level of compassion to elucidate neurophysiological correlates (see for example, Hou et al., 2017; Novak et al., 2022 for reviews), map related social, emotional, and behavioral tendencies (e.g., Davis et al., 2019; Davis, 2017; Lim & DeSteno, 2016, 2020; Shiota et al., 2006; Stellar et al., 2012), and explore the effects of trait compassion on the mental (e.g., Neff, 2011; Sahdra et al., 2023; Zessin et al., 2015; Zhuniq et al., 2025) and physical (e.g., Cha et al., 2022; Gluschkoff et al., 2019; Lee et al., 2021; Phillips & Hine, 2021) health of the individual. Another line of work approaches compassion primarily as a state. This research often attempts to evoke or diminish compassion through experimental manipulations such as priming attachment security (e.g., Cassidy et al., 2018; Mikulincer et al., 2005) or increasing the scale of suffering (C. D. Cameron, 2017). This work has served to elucidate the situational factors that influence the degree to which someone experiences compassion.

A third approach treats compassion as a trainable attribute or skill that can be enhanced through intentional practice, often meditation training (for a review, see Skwara et al., 2017). Some of these studies compare meditative adepts (often Buddhist monastics) to novices (e.g., Lutz et al., 2008, 2009). Others take a longitudinal approach, following the same participants as they go through a (usually secularized) meditation intervention (e.g., Goldin & Jazaieri, 2017; Mascaro et al., 2017). Supporting the idea of compassion emerging from non-compassion elements, not all of these interventions specifically train compassion, and some work has found no difference between compassion-relevant outcomes between mindfulness-based and compassion-based meditation trainings (e.g., Condon et al., 2013). These studies address questions of whether volitional practice can enhance compassion, the effects of intentionally cultivating compassion, and what may be different about individuals who have "expertise" in compassion. These three approaches are not mutually exclusive. For example, a training program may conceptualize compassion primarily as a trait that can be enhanced, or an experimental study may aim to index both a person's baseline (trait) level of compassion as well as the degree to which it is evoked across different contexts (e.g., Guan et al., 2025). An integrative approach allowing for both state-like and trait-like manifestations of compassion may be of particular utility in understanding the spread of compassion in a public health context as it can account for latent potential and environmentally-responsive emergence, which may both be necessary to

explain observed compassion clusters. I discuss this further and propose such an integrative model in the "Toward an Epidemiological Framework" section that follows.

2.2.3 Compassion as a predictor or compassion as an outcome

Another key distinction is whether a study frames compassion as a predictor (e.g., "do people higher in trait compassion display better vagal tone?") or as an outcome (e.g., "do people with secure attachments styles express higher levels of compassion?"). The first foundational paper working to establish an epidemiology of compassion (Addiss et al., 2022) focuses on identifying "risk factors" for compassion, and therefore exclusively reviews studies where compassion was measured as an outcome variable. Other theoretical work has framed the closely related concept of kindness as a public health action (Nguyen & Lee, 2025), aligning more closely with casting prosocial actions as predictors or causative agents. Both framings may be of use in building an epidemiology of compassion depending on the specific question at hand and the level of analysis.

2.2.4 The problem of levels: Compassion beyond the individual

Compassion can manifest at multiple levels: a community, organization, or society could all in theory display compassionate behavior. As a population science, an epidemiology of compassion will need to confront the challenge of expanding our understanding of compassion beyond the individual and bridging levels of analysis. The vast majority of research on compassion within the psychological and contemplative sciences has been at the level of the individual, with researchers only beginning to investigate relational and systems-level perspectives in depth (see, for example, Condon & Makransky, 2020; Donald et al., 2019; Engert et al., 2023; Quaglia et al., 2021). Further, this individual-level research has primarily centered on self-oriented outcomes (e.g., benefits to mental and physical health) rather than compassion for others or related social and relational outcomes (Quaglia et al., 2021). Therefore, while contemplative neuroscience has developed a decent mapping of the consequences compassion and compassion training for the self, we know far less about how compassion might manifest interpersonally, within communities, or in a society.

A largely separate body of research has explored compassion within organizations (for recent overviews, see Bui et al., 2025; K. S. Cameron, 2017; McAllum et al., 2023; Wapaño, 2026; Worline & Dutton, 2017). While empirical studies are limited and have primarily focused on compassion in the workplace (K. S. Cameron, 2017), this literature provides the beginnings of a theoretical framework for studying how compassion may present and flow beyond the level of the individual. Several key concepts drawn from this work may be relevant to an epidemiological framework. The first is the distinction between compassion in organizations and compassion through organizations (K. S. Cameron, 2017; McAllum et al., 2023). Compassion *in* organizations may be expressed by an individual or individuals, but compassion *through* organizations requires *collective or coordinated action* in response to suffering that goes beyond what could be achieved by an individual alone (K. S. Cameron, 2017)—this expands the definition of organizational compassion beyond the level of individual experience or behavior to collectively expressed action. Aligned with cognitive science theories of participatory sense-making (De Jaegher & Di Paolo, 2007), Worline and Dutton (2017) cite the role of collective meaning making of suffering in shaping organizational response. This meaning making process is informed by the context and organizational norms, values, and culture which are often largely implicit and may only become manifest when a situation creates the opportunity for coordinated action (K. S. Cameron, 2017). This concept of implicit organizational culture manifesting in collective action when the opportunity arises closely parallels the idea of trait-like compassion translating to state-like

compassionate responses when confronted with suffering at the level of the individual. Other work on organizational compassion has developed theories of bidirectional flow and multilevel emergence, examining how the behavior of individuals—particularly leaders (e.g., Worline & Dutton, 2017)—shapes a culture of compassion within organizations (Bui et al., 2025), but also how being embedded in a compassionate organizational culture can affect the behavior of individuals (K. S. Cameron, 2017). While this work in is its early stages, by integrating perspectives from these different bodies of research we can begin to build a framework for understanding the flow of compassion at a population level.

2.2.5 Defining compassionate action

While I have suggested that framing compassion in terms of compassionate actions and behaviors may assist in formulating more tractable research questions, this approach introduces its own set of practical and theoretical challenges. One obvious issue is inferring intent from behavior. From a Buddhist perspective, an action cannot be compassionate without an underlying compassionate motivation (Chodron, 2023). Consistent with this, the consensus scientific definition of compassion includes experiential and motivational components (Goetz & Simon-Thomas, 2017; Mascaro et al., 2020; Strauss et al., 2016). Can, then, the presence of compassion be inferred from behavior alone? Another challenge arises from the contextually grounded nature of compassion: compassion may present differently depending on the context. Contextual factors can include the specific situation, the type of suffering, ones' relationship to the suffering other, culture, and timing (Chodron, 2023), among others. For example, in most contexts speaking gently to children would be a compassionate approach to parenting. Yet in the instance of a child repeatedly running into the street, speaking sternly to emphasize the danger may constitute the more compassionate response. This illustrates how compassionate action is not always soft, gentle, or accommodating, but can take "fierce" forms (e.g., Makransky, 2016). These instantiations may not always feel good to the receiver and can even trigger tension or conflict (Chodron, 2023; Quaglia, 2023). This may be particularly true in instances of standing up to social or societal injustices (S. B. King, 2023; Makransky, 2016). But if compassion can be behaviorally present in such varied forms, what consistent criteria can researchers use to identify its many manifestations?

From a Buddhist philosophical perspective, these inquiries lead to an exploration of the relationship between compassion, wisdom, and skillful means, all of which are necessary components of compassionate action. In a recent paper, Quaglia (2023) defined compassionate behavior as "goal-directed behavior that…stems from noticing suffering, feeling for the one who is suffering, and desiring to alleviate that suffering" (p. 2431). Skillful means, on the other hand, are tactics, behaviors, and tools that can be flexibly deployed based on the needs of a given person, context, and situation—in the case of compassion, to alleviate suffering (Chodron, 2023; Quaglia, 2023). Discerning what constitutes skillful means in a given situation requires wisdom, which in Buddhist thought takes years and lifetimes of dedicated bodhisattva practice to cultivate (Chodron, 2023). Collectively, these concepts speak to the diverse behavioral forms compassion may take, and to the challenge of identifying the contextually appropriate course of action.

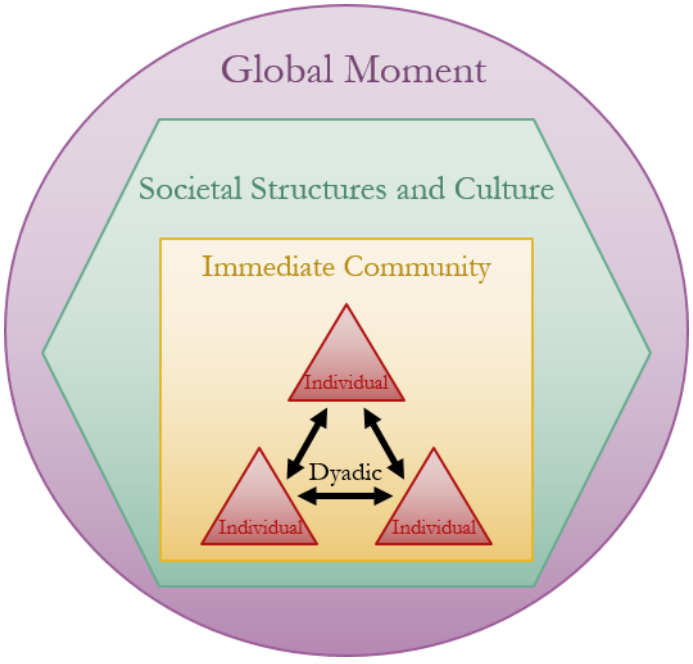
From a research perspective, the diverse and contextually-emergent nature of compassionate actions and the centrality of underlying motivation argue for multi-method approaches that incorporate information from multiple perspectives (Quaglia, 2023) and levels of analysis. No measure will capture compassion itself, but indexing potential indicators of compassion may provide convergent evidence that compassion is present and being enacted. While complicated, I do not believe that the challenges inherent in identifying and measuring compassionate action

make the endeavor of systematically investigating compassionate actions, behaviors, systems, and policies fruitless or intractable. Rather, they should condition researchers with humility and encourage investigations that span levels of inquiry and incorporate context. This approach may in and of itself be a reflection of wisdom and skillful means.

3. Toward an epidemiological framework

So how to translate existing research on compassion into a framework that can guide epidemiological investigations? Compassion can manifest at multiple levels, but the expression may vary across levels and between contexts. Compassion displays trait-like qualities, but it also emerges in a state-like manner in response to environmental factors. It is latent and can exist without being expressed, but when expressed appears to be transmissible, though the mechanisms of transmission have received limited research attention. As the first comprehensive attempt to investigate compassion from a descriptive epidemiological perspective demonstrated, many factors are associated with the development and expression of compassion, and these can be both individual and environmental (Addiss et al., 2022). Here I present a set of two theoretical models to hold these complexities and provide a framework for the investigation of compassion from an epidemiological perspective. The first explores the levels at which compassion might emerge (Figure 1). The second integrates current scientific understandings of compassion with the epidemiological triad model (Figure 2). Together, these models provide an initial scaffolding to support systematic investigations into how compassion may manifest and spread within individuals, communities, and societies.

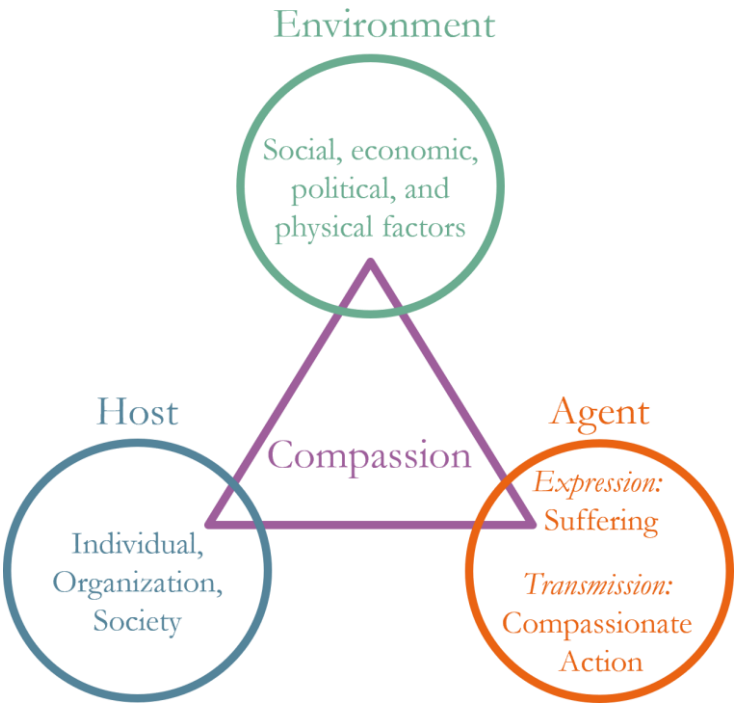
Figure 1. *Levels of emergence*



The Levels of Emergence model considers multiple levels of analysis simultaneously and makes explicit the embeddedness of each level in the others (Figure 1). The levels I consider here are: individuals, dyads, immediate communities (communities where members have frequent, direct interactions), larger societal structures and cultures (that do not require direct interaction between members but nevertheless affect the perspectives and well-being of the people within them), and the larger global moment in time.

Compassion may present differently across levels. Drawing on existing research, we may begin to flesh out a picture of what compassion might "look like" at each level. For example, we might expect compassion at the individual level to manifest as high scores on self-report scales (Strauss et al., 2016), physiological responsiveness to cues of suffering (e.g., B. G. King et al., 2023; Lutz et al., 2008), or a tendency to engage in prosocial behaviors (e.g., Weng et al., 2015). Within dyads, we may look for verbal expressions of and behaviors reflecting mutual support and responsiveness (Jiang et al., 2023; Reis et al., 2017). At the level of an immediate community, we might look availability of social support, community cohesion, or equitable allocation of burdens and resources (McAllum et al., 2023), as well as specific interpersonal interactions as vehicles for transmission. Less empirical grounding exists when we reach the levels of Societal Structures and Culture and the Global Moment. However, here we might apply our working definition of compassion and look for evidence that suffering within the system is being recognized and that structured, collective attempts are being made to alleviate it from a core of benevolence and care. We might also search for policies, rhetoric, and social structures that reflect a recognition of common humanity and shared interdependence.

Figure 2. *An epidemiological triad model of compassion*



Importantly, no level exists in isolation—they are fundamentally interdependent. Compassion may flow bi-directionally across all levels, with the higher levels providing the environmental context for the lower levels, and the lower levels in turn shaping their environment(s) (Varela et al., 1991). For instance, the larger social structures, values, and culture in which an individual exists are likely to influence their worldview, their stance on the relevance of others' suffering to their own life and well-being, as well as the resources to which the individual has access to alleviate suffering. At the same time, an individual engaging in compassionate actions within their community may have ripple effects throughout that community, changing the culture and making the community at large more likely to respond to suffering with compassion and care.

Having considered the levels at which compassion might emerge, I now turn to the question of how compassion may be transmitted within and between levels. The epidemiological triad model is a foundational framework of epidemiology describing the interactions between agent, host, and environment (MacMahon & Pugh, 1970). Though originally developed as a model for understanding the causation of infectious disease, it has been adapted to study non-infectious diseases like chronic conditions such as asthma (Larkin et al., 2015). Building on these chronic disease models, I propose an adaptation of the epidemiological triad model that hypothesizes mechanisms for the development and transmission of compassion. In this model, compassion is both chronic (the trait-like latent manifestation) and transmissible (through state-like expressions and behaviors). The chronic aspect of compassion (represented by the purple triangle) may lay latent until triggered by an encounter with suffering, at which point it is expressed and becomes transmissible. As such, there are two types of Agent included in this model. The first type is the agent that triggers expression of the underlying chronic state of compassion: suffering. The second is the agent by which compassion is transmitted between hosts: compassionate action.

When an encounter with suffering triggers expression of compassion (compassionate action) within a host, that compassionate action may serve both to alleviate the suffering (original trigger) and to transmit compassion to other susceptible hosts. Repeated exposures to compassionate action may serve to increase the severity of the underlying chronic compassion state, making future expressions more likely and easily triggered. Building on the existing descriptive epidemiology of compassion (Addiss et al., 2022) and other models of chronic disease (Larkin et al., 2015), risk factors can occur at the level of the host (e.g., personality, family history, past experiences), and at the level of the environment (e.g., social or organizational support).

Importantly, this model can also accommodate different levels of hosts—an individual, an organization, or a society can all carry latent/chronic compassion. Integrating this model with the levels of emergence model, we can see that each of these levels may express compassion via compassionate action through the means available to it (forms of individual, collective, or systemic action). For example, an individual might express compassion through volunteering at a food bank, an organization might express compassion through hosting a food donation event, a society might express compassion through public food assistance programs. In general, social systems that reflect a recognition of and commitment to common humanity and shared interdependence may be indicative of a society high in compassion (though this does not rule out the possibility of societies that are high in compassion but whose governmental or political systems for myriad reasons may fail to reflect this value).

For each type of host in the triad model, the higher levels of the emergence model serve as the environment. For example, the global moment is the environment for a host society, while both the global moment and societal systems and culture form the environment for a host community. Building on organizational compassion principles, existing in a compassionate environmental context is a risk factor for the development of compassion at every level of host (K. S. Cameron, 2017). As hosts do not just respond to, but actively shape, their environment (Varela et al., 1991; Worline & Dutton, 2017) being home to highly compassionate hosts may also increase the level of environmental compassion.

While this model—like all models—should not be reified, it provides a framework to explore a number of complexities in compassion science. Namely, it accounts for the observation that compassion displays latent and trait-like features, as well as state-like expressions; it allows for both environmental and individual risk factors; it captures the emergence of compassion through host/environment interactions; and it proposes a mechanism of transmission. When integrated with the levels of emergence model, it accommodates different levels of host, each embedded in

their respective context. Finally, it translates compassion studies into a well-established epidemiological framework. Ideally, this model will provide a structure for shared thinking and help researchers identify different targets for investigation and intervention.

4. Implications and future directions

There is still much work to do to build a comprehensive understanding of how compassion operates beyond the level of the individual. Some of this basic research will need to happen within the psychological and contemplative sciences. While still in their nascence, conversations within these fields are turning toward these issues and the theoretical groundwork to expand understanding of compassion beyond the individual is underway (e.g., Condon & Makransky, 2020; Donald et al., 2019; Engert et al., 2023; Quaglia et al., 2021). Other basic research needed is at the systems level, and will likely benefit from the application of epidemiological perspectives and methods.

There is also immediate generative work to do in integrating and synthesizing the existing bodies of work on compassion bridging organizational, theoretical, and biopsychosocial studies. The first projects of this effort have begun, such as the mapping of compassion risk factors from across these literatures (Addiss et al., 2022), and this special issue itself. Further comprehensive and systematic efforts to index what is currently known about how compassion may present at different levels of analysis will be key to grounding the field and identifying gaps to guide future research efforts.

While I have attempted to provide a theoretical framework that integrates core concepts and insights from compassion science with epidemiological approaches, many existing gaps will require ongoing efforts to fill. One area that could be immediately fruitful is to begin to clarify and operationalize which indicators of compassion are most appropriate for each level of analysis. Developing these indicators will require careful attention, with input from across disciplines and cultures. While the theoretical definition of a compassionate action is relatively straightforward, the contextual nature of these actions can make them quite difficult to identify in practice. Differing worldviews and values systems can lead to compassion being expressed in culturally specific ways (e.g., Nakamura et al., 2026), and sometimes conflicting stances can both claim they root from compassion, depending on your perspective. Indeed, in some of the most contentious and seemingly intractable social conflicts—the debate about abortion rights, for example—both sides believe themselves to be enacting compassion to alleviate harm and suffering. In our efforts to build an epidemiology of compassion, we will need to maintain cultural humility to ensure that our approaches to indexing compassion do not inadvertently impose a specific worldview. Global health researchers are deeply familiar with these challenges, and the lessons learned in previous development work will be essential to inform this new field.

Finally, I want to touch briefly on the issues of boundary conditions and intergroup conflict. Decades of work in social psychology demonstrate the power of group membership in driving prosocial behavior (Imada, 2024; Tajfel et al., 1971). Compassion and care may come naturally for those close to us, but can collapse as we move further away from our immediate circle or those we identify as members of our own group (Cikara et al., 2014). In instances of resource scarcity or conflict, we may see increases in compassion-relevant behavior such as resource sharing within in-groups, accompanied by greater dehumanization of or discrimination against out-groups. This seems to be engrained at a deep biological level—for example, high levels of oxytocin, a hormone that facilitates parental bonding with offspring, can also increase discrimination against out-group members (De Dreu et al., 2011).

As we aim to expand compassion research into the realm of population sciences, we will need to deeply consider this question of boundaries. When we attempt to identify a compassionate action or policy, does it matter who is included? For example, if a society has a strong social safety net, but only members of a certain ethnic group are entitled to access it, is that compassion? Buddhist traditions, as well as the contemplative sciences informed by them, take the broadest view of who can and should be included in the circle of care: all beings. As we seek to learn about clusters of compassion in the world, we will need to balance the vision of boundless compassion with an acceptance of reality as it currently is. By walking this middle path, I hope we can create a pragmatic, empirically-based approach that is of collective benefit to humanity and does not lose sight of its heart of compassion.

5. Conclusion

In this paper, I have argued that an epidemiology of compassion requires moving beyond individualistic conceptions to consider how compassion manifests in relationships, communities, organizations, societies, and even global contexts. By integrating insights from contemplative neuroscience with the epidemiological triad model, I have proposed a framework that recognizes compassion as both latent and enactive, chronic and transmissible, individual and systemic. Future work should focus on clarifying indicators of compassion at each level of analysis, developing culturally appropriate and informed indices, and addressing the issue of boundary conditions that shape who is included within the circle of care. Ultimately, situating compassion within an epidemiological framework holds the promise not only of advancing science, but also of informing public health and policy approaches that foster more compassionate societies.

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