Examining affective-motivational dynamics and behavioural implications within the interpersonal context of pain

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ABSTRACT

Emotional, motivational, and interpersonal dimensions are considered integral to pain experience but have largely been examined separately. In this focus article, we argue that an integrative theoretical account that acknowledges each of these elements is a critical next step to capture the complexity and nuance of interpersonal pain dynamics and to shape future research. The aim of this focus article is to provide a foundation for such an account by drawing upon established insights from appraisal theory of emotion, influential behavioral models, empathy/interpersonal pain research, and social psychology literature to highlight conceptual relationships, potential mechanisms of action, and avenues of inquiry that have not previously been examined in the context of pain. Specifically, we highlight the interpersonal nature of pain and the conceptual relationship between emotion and motivation in pain experience. We discuss an affective-motivational tension between self- and other-oriented goals that can arise within the interpersonal pain context, and how such dynamics may impact the nature and effectiveness of caregiving behaviour. We then describe the role of emotion regulation and strategies that may facilitate optimal interpersonal pain dynamics and caregiving within a multiple goal context. Finally, we outline a foundation for an integrative theoretical model and directions for future research.

Perspective: Drawing upon insights from appraisal theory of emotion, empathy/interpersonal pain research, influential behavioural models and social psychology literature, this focus article provides a foundation for an integrative affective-motivational account of interpersonal pain dynamics as a basis for theoretical and clinical advancement.

Introduction

Recent research has highlighted dimensions of pain experience that have extended traditional conceptualizations of pain. First, although pain is often considered a personal experience, it is rarely private. Research increasingly recognizes the *social* nature of pain; observer responses to others' pain are essential both for species survival and optimal clinical care [37,94]. Recent findings also highlight the relevance of goal or *motivational* context in pain; in addition to fundamental goals of preserving physical integrity, pain experience is contextualized by proximal and distal (e.g., identity-relevant) goals [16,83]. Finally, research has increasingly addressed the role of *emotion* – e.g., fear, anger, sadness – in understanding pain experience [38,82,91]. To date, the majority of pain research (with some notable exceptions; [see e.g., 7, 8]) has addressed the *emotional*, *motivational*, and *interpersonal* dimensions of pain in relatively independent fashion. As each of these dimensions is essential to pain experience, we argue that the formulation of an integrative theoretical account that acknowledges each of these elements is a critical next step to capture the complexity and nuance of interpersonal pain dynamics and to shape directions for future research. The current paper seeks to provide a foundation for such an account by drawing upon established insights from appraisal theory of emotion, influential behavioural models, empathy/interpersonal pain research, and social psychology literature to highlight conceptual relationships, potential mechanisms of action, and avenues of inquiry that have not previously been examined in the context of pain.

Below, we first discuss the interpersonal nature of pain experience. We then briefly bring attention to the conceptual relationship between emotion and motivation, noting the centrality of appraisal processes and the multiplicity of goals and emotions. We then discuss how an interpersonal lens on pain experience involves a fundamental tension between goals we hold for

ourselves and for others, facilitating differential emotional and motivational processes that can impact the nature and effectiveness of observer behavioural responses to sufferers' pain. In this context, we describe potential mechanisms of action (i.e., quality of caregiver behaviour, feedback sensitivity) that may underlie commonly observed paradoxical effects of ostensibly prosocial behaviours or differential effects of ostensibly similar caregiver responses [12,63,68,69,70]. Subsequently, we describe the role of emotion regulation and strategies that may facilitate optimal interpersonal pain dynamics and caregiving within a multiple goal context. We suggest that the efficacy of a given emotion regulation strategy is not uniformly fixed but dependent on the goal context in which the strategy is implemented and thus, one size may not fit all. Finally, we outline a foundation for an integrative theoretical model and directions for future research.

1. Pain occurs in an interpersonal context

Pain is a multi-dimensional aversive experience that nonetheless serves critical protective functions in response to physical threat. For instance, upon exposure to flame, sudden pain captures a child's attention, prompting behavioural withdrawal. The child's grimace and crying also capture the parent's attention and instigate fear, motivating the parent to aid and soothe the child in pain. Given its substantial personal and social consequences, pain's potential to galvanize both persons in pain and others in the environment may have an evolutionary basis [24,37,89,94]. Specifically, attention to pain can trigger observer approach and targeted helping behaviour, which increases the survival chances of offspring and group as a whole. The pain reactions of another may also serve as a warning signal of potential threat to observers themselves, motivating avoidance of personal harm when helping costs are too high [34]. Although pain can inspire a variety of responses, the current paper specifically focuses on protective or caregiving responses aimed at

the self or others (i.e., aimed towards others' and personal well-being). These are discussed through the lens of theoretical developments in the emotion and motivation literatures, established behavioural accounts, as well as existing models of empathic interaction in pain [17,28,32].

2. The relationship between emotion and motivation in pain

The central role of emotion in pain is captured by the International Association for the Study of Pain (IASP) definition of pain which recognizes that without emotion, sensory perception is insufficient to reflect pain experience as we know it [41]. Likewise, the connection between emotion and motivation is articulated by well-established appraisal theories of emotion, which suggest that emotions occur when stimuli are appraised as relevant to and/or (in)congruent with a central goal or concern [29,55,67]. Once pain is appraised as incongruent with goals of physical integrity, emotional responses -- comprising cognitive changes (e.g., increased vigilance), action tendencies (e.g., defensive preparation), somatic responses (e.g., focal brain activity), expressive behaviour (e.g., facial expression), and subjective feeling (e.g., of fear) -- engender behavioural efforts (e.g., pain control behaviour such as escape) to facilitate desired goal states (restoring/protecting physical integrity) and optimize adjustment to environmental demands [29,45,55,67]. In this way, the IASP definition of pain recognizes the lack of absolute correspondence between pain and tissue damage, noting that pain experience is necessarily *appraised* as harmful/threatening to physical integrity. In sum, *emotions arising from subjective appraisals deriving from goal (in)congruence* are at the heart of the response system by which pain is understood and dealt with; this notion has been clearly articulated within empirical pain research and existing theoretical conceptualizations of pain [58,91].

The multiplicity of goals and emotions. Given pain's salience to physical damage, pain research has primarily focused on *fear-based* emotional responses – notably, pain-related fear and pain catastrophizing – which arise from appraisals of threat to the physical self and mobilize attentional, motivational, and behavioural processes (e.g., narrowed attention, avoidance) to control pain and facilitate physical safety [56,91]. However, emerging research has increasingly attended to the broader motivational context in which pain occurs [16,83]. Specifically, pain can disrupt *goals other than physical integrity*, such as daily goals (e.g., to work, to play) and broader identity-relevant goals (e.g., being a good colleague, spouse, or parent). This is particularly true when pain is chronic. Findings support that chronic pain is replete with losses and frustrations to a variety of goals, catalysing emotional responses such as anger, sadness, frustration, and guilt [82]. Clinical and research paradigms harness *non-pain goals* (e.g., engagement in valued daily activities) to disrupt potentially fruitless efforts to control pain -- for instance, acceptance and commitment therapy is particularly explicit in its focus on valued non-pain goals [14,76].

Goal multiplicity further implies that individuals may entertain, prioritize, and flexibly shift between multiple and possibly conflicting goals [27]. Research on goal diversity in pain is still in its infancy and recognition of goal diversity within the *inter*personal sphere adds a further level of complexity. Below we discuss how both persons in pain as well as observers of others' pain experiences hold multiple goals both related and unrelated to pain. From the perspective of the pain observer, those goals can be further distinguished as those held for the self (self-oriented goals) versus those held for the pain sufferer (other-oriented goals). We suggest that optimal response to another's pain is facilitated by an observer's flexible attunement to multiple self- and other-oriented goals, with other-oriented goals ultimately prevailing. We further suggest that emotion regulation is key to this process.

3. Goals and emotions within an interpersonal context: The Self vs. Other

As noted, pain does not occur in a vacuum but within a social environment comprising individuals – persons in pain and observers – that each have proximal and distal goals only some of which are related to pain. Findings that another's pain activates neural representations of *personal* pain as well as self-oriented aversive emotional responses suggest that observing pain automatically references the self, potentially signaling threat to one's own physical integrity and non-pain goals [7,51,60]. Indeed, the seminal work of Yamada and Decety [95] suggested that observation of pain does not automatically activate empathic concern, but rather activates a threat detection system resulting in a general aversive response in the observer. Such findings may reflect the evolutionary roots of the intrinsically interpersonal nature of pain and underscore that pain touches on multiple goals relevant to not only persons-in-pain but also observers.

A motivational tension. Drawing on research discussed thus far, we suggest that a basic tension emerges when one faces another in pain, stemming from goals one has for the self (self-oriented goals potentially subserved by shared neural representations and implications for personal threat) and those one has for another (other-oriented goals). This notion is supported by social psychological theory indicating that almost all goal pursuit occurs in a relationship context where personal and joint goals may exist in tension [28,84] as well as findings that multiple goal pursuit pulls resources away from individual goal efforts, and may thus be difficult [27]. A common example may be deciding to skip an important work appointment to meet a distressed spouse.

As goal (in)congruence is central to emotion, preferential attunement to *self-oriented goals* will likely result in *self-focused emotional states*; these will in turn prioritize *avoidance motives* (away from the person in pain and their respective needs) and – as will be described below – drive

behaviour oriented toward one's own needs. In contrast, attunement to *other-oriented goals* will promote *other-oriented emotional states* (often denoted as sympathy [see e.g., 4]), prioritizing *approach motives* (towards the person in pain and their needs) and promoting behaviours responsive/attuned to the needs of another [4,22,25,30,62]. Behavioural traditions [e.g., operant behavioural theory; 28] have long recognized the key role of interpersonal dynamics in governing pain behaviour; however, the likely tensions between observer self- and other-oriented goals, associated emotional/motivational states, differential behavioural responses, and ultimate implications for pain outcomes have yet to be fully explored within contemporary pain theory or research.

Behavioural implications and mechanisms of action. Individuals rarely opt-out of established social bonds; in response to another's pain, caregiving behaviour is more likely than not [21]. However, given the motivational tension outlined above, we hypothesize that *ostensibly similar caregiving behaviour* may be underpinned by *either* approach or avoidance motives, with the latter emerging from self-oriented goals and emotional states and the former from sympathetic emotional states and attunement to the goals of the person in pain. This notion is in line with findings that approach motivation does not necessarily manifest as behavioural approach; similarly, avoidance motivation does not always manifest as behavioural avoidance [25]. For instance, a parent soothing a screaming infant (an ostensible approach behaviour) may be underpinned by *approach motivation* (reflecting an other-oriented goal of providing comfort, and accompanied by sympathetic emotion); alternatively, the same soothing behaviour may be underpinned by *avoidance motivation* (reflecting self-oriented goals of peace and quiet and reflecting efforts to regulate self-oriented emotional distress). Given this potentially paradoxical association between motivation and behavioural output, it stands to reason that, within the

interpersonal pain context, observable approach or avoidant behavioural responses cannot be defined as such without understanding of their motivational substrates.

Further, in the context of pain, we propose that these differential motivational substrates (i.e., approach vs. avoidance) may underlie *either* traditionally-defined category of caregiving response – broadly, behaviours designed to control pain (such as offering medication) versus those not focused on pain control (such encouraging activity participation or distraction) [13,87]. As in the example above, a parent providing analgesic medication to a child in pain (*a pain control behaviour*) may be underpinned by avoidance motives and associated self-oriented goals and emotions; in-turn, these self-oriented goals may be related to pain (the parent may be uncomfortable in the presence of the child's suffering) or be non-pain related (the parent may wish to return to a personal work assignment). Alternatively, the same pain control behaviour may be underpinned by approach motives and associated other-oriented goals and emotions; these other-oriented goals may likewise be related pain (to quickly ease the child's suffering) or be non-pain related (to encourage the child to join their friends at play). A similar distinction between self-oriented avoidance motives (attuned to the goals of the self) versus other-oriented approach motives (attuned to the goals of the other) can also underpin *behaviour not-focused on pain control*, such as distracting the child with humor or play.

Critically, the nature and *potential consequences* of motivational tensions in response to another's pain have received limited empirical scrutiny. For instance, it is possible that superficially similar caregiving behaviour may exert differential effects on pain-related outcomes when underpinned by approach versus avoidance motives [23,39]. Such associations are noted elsewhere within interpersonal research, for instance, individuals in romantic relationships report more favourable psychological outcomes when partner actions are perceived to arise from

approach motivation; these same partner actions are associated with detrimental psychological outcomes when perceived to arise from avoidance motives. Notably, this differential impact of identical partner behaviour is observed in response to motivation either *perceived* by their significant other or privately reported by the partner in question [42].

Although speculative, the differential effects of ostensibly similar but differentially-motivated caregiving behaviours (both within and outside the context of pain) may be mediated by *quality of caregiving response*, reflected in such non-verbal elements as tone of voice, interpersonal distance, touch/physical contact, and facial expression [31,52,62,70]. In this way, the effects of parental reassurance in response to a child's pain may engender quite different results depending on the tone in which the message was communicated [64]. Similarly, efforts to distract a pain sufferer with humour are likely to rely a great deal on what is communicated by the facial expression of the pain observer/caregiver [18,52,71]. A complementary mechanism may be an observer's *sensitivity to feedback cues* provided by the person in pain [72,73]. For instance, self-oriented emotion and avoidance motives may impede observer receptivity or attention to sufferer feedback, potentially contributing to rigid/inflexible caregiving behaviour (e.g., excessive focus on pain control at the expense of non-pain goals [2,8] or, vice versa, excessive focus on non-pain goals at the expense of pain control) and ultimately negative pain outcomes [78]. With notable exceptions [see e.g., 64, 69, 70], research on interpersonal pain dynamics has largely overlooked how subtle differences in caregiving behaviour such as non-verbal features of observer behaviour and feedback sensitivity may differentially impact outcomes.

Although proposed as speculative mechanisms for the effects of differential affective-motivational substrates, the nature and sensitivity of caregiver responses are at the core of fundamental models of pain behaviour [35,44,66,75,79]. Early and influential models underscored

the key role of environmental contingencies in activation of latent reward vs. punishment subsystems; these systems would in turn facilitate differential emotions, cognitions, and behaviours with respect to *personal* pain experience [e.g., 35,66]. Beginning with Fordyce's original conceptualizations [28], decades of research have likewise contributed to our understanding of *interpersonal* pain dynamics that may govern individuals' pain behaviour and associated pain outcomes. This research has articulated how different environmental contingencies -- in particular, caregiver behaviours -- may reinforce adaptive versus maladaptive responses to pain in the pain sufferer [e.g., 68,74]. Deepening the scope of traditional behavioural models, a growing body of research echoes the notion that a priori categorization of "reinforcing" vs. "punishing" caregiver responses may underrepresent the complexity of pain-related interaction and possibly account for findings that appear inconsistent with operant principles [e.g., 9,11,48]. These recent findings suggests that the utility of caregiving behaviour may depend in large part on the extent to which such behaviour *matches* the specific needs of the person in pain [26,45,54,65], further highlighting the significance of attunement to sufferer needs and feedback.

In summary, existing research and theory support that interpersonal pain dynamics, and in particular caregiver responses to sufferer pain, significantly inform sufferer pain outcomes [28,68,74]. While a large body of research has addressed specific affective-motivational factors (e.g., fear, catastrophizing) that may contribute to adaptive vs. maladaptive behaviours and associated positive vs. negative outcomes for individual pain sufferers, mechanisms underlying *observer behaviours* have received less attention. Given the importance of caregiver attunement and 'match' to sufferer needs [26,45,54,65], we suggest that a complete account of interpersonal pain dynamics must acknowledge that – as in the case of the pain sufferer -- observer/caregiver behaviours in response to sufferer pain are downstream from goals, emotions, and motivational

states specific to the observer/caregiver. Further, the differential affective-motivational substrates informing caregiver behaviour derive in part from tensions (e.g., differential prioritization of self vs. other-oriented goals) inherent to the interpersonal pain context. Recognition that differential affective-motivational substrates may underlie identical caregiver behaviour may not only represent key targets for possible intervention but may also offer increasing insight regarding the above-noted paradoxical impact of ostensibly prosocial action (e.g., reassurance or protective/solicitous responses) or the inconsistent impact of specific caregiving behaviours (e.g., distraction or use of humor) in the context of pain [12,63,68,69,70].

4. The Role of Emotion Regulation

Drawing upon the above-outlined theoretical reasoning and empirical evidence, it is likely that for optimal response to another's pain, *other-oriented goals, emotional states, and corresponding approach motives must to some extent prevail* over self-oriented/avoidant counterparts, thus prioritizing goals/needs of the person in pain. This argument is indirectly supported by findings that pursuit of communal rather than personal goals enhances relationship function and maintenance [84]. Further, given the centrality of emotion in response to another's pain, we propose that *emotion regulation* is key in facilitating this other-oriented perspective. Emotion regulation is defined as a goal-directed process functioning to influence the type, intensity, and duration of emotional experience [36]. Emerging research on emotion regulation suggests that people may not seek to regulate emotional responses for strictly hedonistic purposes, that is, to avoid unpleasant feelings and maximize pleasant feelings. Emotion regulatory efforts may also be based on instrumental motives; people may be willing to forgo immediate pleasure to maximize attainment of valued goals [e.g., 80, 81]. Within the interpersonal pain context, these

involve both self-oriented goals as well as other-oriented goals and, as noted above, adaptive interpersonal dynamics and pain outcomes likely emerge when the latter prevail.

Emotion regulatory processes may target cognition, action tendencies, somatic responses, expressive behaviour, and/or subjective feeling states that comprise pain-related emotion [36]. For instance, in response to pain stimuli, breathing exercises most directly target somatic response [42], watching a positive television program may most directly impact feeling state [47], and suppression of facial expression addresses one behavioural component of pain-related emotion [6]. While behavioural relaxation, reappraisal, and attentional deployment are among the most commonly utilized emotion regulatory strategies [see e.g., 46,49,77], a great deal of empirical support had been provided for *reappraisal* (i.e., of specific goals or stimuli) and *attentional deployment* (e.g., engagement vs. distraction) strategies outside the pain domain [92]. This is not surprising given that contemporary appraisal theory identifies appraisal as the central process responsible for emotion generation and the driving force behind various components of emotion. Attentional deployment towards or away from an emotion-eliciting stimulus is thought to indirectly influence appraisal processes [29,36,67]. A small body of research attests to the role of reappraisal and attention with respect to *intra*personal pain experience [46,77]. To our knowledge, only one study has examined emotion regulation within the *inter*personal pain context; specifically, Vervoort et al. (described in detail below; [90]) offered initial evidence regarding observer attentional deployment as an emotion regulatory strategy with implications for caregiving.

Emotion regulatory flexibility. Given the multiplicity of goals and variability of environmental demands, it has been proposed that *emotion regulatory flexibility* is central to successful emotion regulation [1,5]. Emotion regulatory flexibility includes at least three

characteristics: (a) context-sensitive responding, (b) a broad repertoire of regulatory strategies, and (c) feedback monitoring to maintain/adjust regulatory strategy, reflecting sensitivity to feedback cues [1,5]. Further, such flexibility allows switching attention between multiple demands and strategies, as called for by the context at hand. For instance, while other-orientation is hypothesized as fundamental to effective caregiving, flexible attunement to self- vs. other-oriented goals is likewise critical (e.g., engaging in appropriate self-care while caring for a loved one with chronic illness [see 61]). The notion of emotion regulatory flexibility is echoed in broader theoretical and clinical approaches which advocate flexible behavioural response to pain – e.g., attention to both pain and non-pain goals in accordance with situational demands and one's personal values [93].

Critically, emotion regulatory flexibility implies that the function and efficacy of a particular emotion regulatory strategy (e.g., reappraisal or attentional deployment) may not be uniformly fixed, and hence, that "one size may not fit all" or in all circumstances. Preliminary evidence suggests that regulatory function/efficacy may depend on the goal context in which an emotion regulatory strategy is implemented. Literature on catastrophizing about personal pain provides an illustrative example of such goal context-sensitivity. Specifically, high catastrophizing individuals appraise pain as signalling physical harm, leading to prioritization of pain control goals (i.e., to escape from or control pain) and associated negative emotional responses (i.e., fear). There is evidence that high catastrophizing individuals tend to show attentional hypervigilance to pain sensations (generally thought to exacerbate negative emotion and pain outcomes) and find less benefit from distraction as an emotion regulatory strategy [e.g., 10, 33] *unless* the salience of competing goals (e.g., working towards a reward in spite of pain) is enhanced [see e.g., 86]. These findings suggest that differential prioritization of goals (and associated emotional states) may

inform the utility of a given emotion regulatory strategy and – as individuals hold multiple goals simultaneously -- highlight the possible malleability of goal context.

As the first study to examine attentional deployment as an emotion regulatory strategy in response to another's pain, Vervoort et al. [90] provided evidence regarding the impact of differential emotional states (and hence, differential goals) on the utility of emotion regulatory strategy. Specifically, Vervoort et al. found that directing attention *away from* their child's pain was associated with improved emotional outcomes (distress) and caregiving responses among low-anxious but not highly-anxious parents, who benefitted more from directing attention *towards* their child. Although it is too early in this line of research to draw firm conclusion about which goals or emotional states determine which emotion regulatory strategy works for whom, these findings likewise point to the importance of exploring the effect of different goals on various pain outcomes, their potential relation to self- versus other-oriented processes (e.g., does high parental anxiety reflect a self-oriented goal?), and potential mechanisms of action.

5. Toward an Integrated Theoretical Model within the Interpersonal Context of Pain

Figure 1 presents an Affective-Motivational Model of Interpersonal Pain Dynamics, reflecting an initial integration of constructs and concepts outlined in previous sections. Given the early state of research in this area, the model aims to provide a preliminary framework to be refined though additional research. As depicted in the model, observers' attention to sufferer pain expression is hypothesized to trigger tension between appraisals of *self*- versus *other*-oriented goals. Preferential attunement to self-oriented goals is hypothesized to result in *self-focused emotional states* (with corresponding emotion components) and in turn prioritize *avoidance motives.* Conversely, attunement to other-oriented goals is hypothesized to promote *other-oriented*

emotional states and prioritize *approach motives.* Critically, these differential affective-motivational substrates are hypothesized to potentially underpin ostensibly similar *caregiving behaviour.* As discussed above, differential motives may affect caregiving behaviour through mechanisms such as altered non-verbal features (quality of caregiving response), receptivity to feedback cues, and potential (in)flexibility in caregiving strategy. Finally, *emotion regulation* (subserved by such strategies as attentional deployment and reappraisal) is suggested as key in promoting a balance of self- versus other-oriented goals and emotions to facilitate optimal caregiving and pain outcomes.

The dynamics outlined in the proposed model are likely modulated by contextual and individual difference factors. Specifically, both individual and contextual variables are likely to influence the value observers assign to self- vs. other-oriented goals, thus shaping emotional responses and associated efficacy of regulatory strategies. Although thorough discussion is outside the scope of this paper, previously examined contextual influences have included presence versus absence of organic pathology, perceived similarity/familiarity with the person in pain, perceived unfairness of the pain experience, and prejudicial/discriminatory beliefs or attitudes [3,18,19,20,40,87]. Type of relationship between pain observer and sufferer is likely important here. Various dyadic relationships (e.g., between parent and child, patient and health provider, strangers, spouses) may differentially impact the extent to which one prioritizes self vs. other-oriented goals. For instance, it is possible that observer other-oriented goals are more easily prioritized in contexts where one highly depends on the other for care. In addition, different dyadic relationships may modulate the impact of self vs. other-oriented goals, associated affective-motivational states, and behavioural responses upon sufferer outcomes. For instance, as children are more dependent upon others' care and may have a more limited coping repertoire than adults,

the impact of observer (e.g., parental) responses may be much more pronounced. Individual differences characterizing observers or persons in pain are also likely to modulate interpersonal pain dynamics; such factors may include (but are not limited to) prior (inter)personal pain experience, coping resources, dispositional empathy, and specific pain beliefs [8,57].

Future research is encouraged to examine the influence of contextual and individual factors on the proposed affective-motivational processes with the aim of increasing our understanding of what factors influence balance of self- versus other-oriented goals, associated emotional states, motives, and behaviours, as well as what emotion regulatory strategy works best for whom and under what circumstances. As noted above, the impact of individual difference factors is illustrated by recent findings [90], suggesting that observer characteristics (e.g., observer state anxiety) may have significant implications for the utility/effectiveness of specific emotion regulatory strategy (e.g., attending away vs. towards another's pain) in ways that can be explained by the proposed model.

6. Conclusions and Future Directions

The above discussion and proposed model aim to promote and organize inquiry regarding affective-motivational dynamics within the interpersonal context of pain. As such, the model broadens existing frameworks by (a) addressing goals both related and not related to physical integrity, (b) distinguishing affective-motivational and behavioural processes oriented toward the self vs. person in pain, (c) proposing mechanisms such as feedback sensitivity and non-verbal features that, through interaction with affective-behavioural processes, may impact the nature and effectiveness of caregiving, and (d) underscoring the role and potentially variable impact of emotion regulation strategies within a multiple goal context. Further, we hope to highlight a more

fine-grained conceptualization of emotion in the context of pain where emotions are recognized as stemming from goals and to consist of multiple components that may all constitute targets for regulation.

Future research is encouraged to refine specific hypotheses regarding associations between self- vs. other-oriented affective-motivational processes, specific observable behaviours, moderating contextual/individual differences, and pain outcomes. Ideally, research will draw on multidimensional approaches, including experimental and clinical methodology to optimize the scientific rigor and ecological validity of findings. Given the social desirability inherent in studies of prosocial and caregiving behaviour, inquiry may draw on novel/creative methodologies; for instance, implicit measures may be key to gauging observer self- vs. other- orientations [85]. Potentially useful paradigms include perspective-taking manipulations (e.g., imagining the self vs. another in pain [15,43,59]) and goal manipulation (e.g., modifying the value or salience of self- vs. other-oriented goals [14,76]). Although discussion of specific clinical implications may be premature, the current account highlights the relevance of treatment modalities addressing emotion dysregulation within intra –and interpersonal functioning. While discussed primarily outside the scope of pain research, existing treatment such as dialectical behavioural therapy [see e.g., 50] may offer insight regarding how to target emotional difficulties within the interpersonal context of pain. In discussion of future clinical and empirical targets, it is important to recall that the proposed model is not complete. As is the case for other two-factor models [e.g., 44], our distinction between observer self- vs other-oriented goals (and corresponding emotions and motives) will not explain all possible interactions between a person sufferer and observer. Accordingly, future work is needed to elaborate and refine the current conceptualization.

In summary, the above discussion highlights opportunities for theoretical and clinical advancement within the interpersonal context of pain. By identifying mechanisms of action and targets for change, future research is expected to make major strides toward the ultimate goal of enhancing adjustment for both persons in pain and observers or caregivers in their environment.

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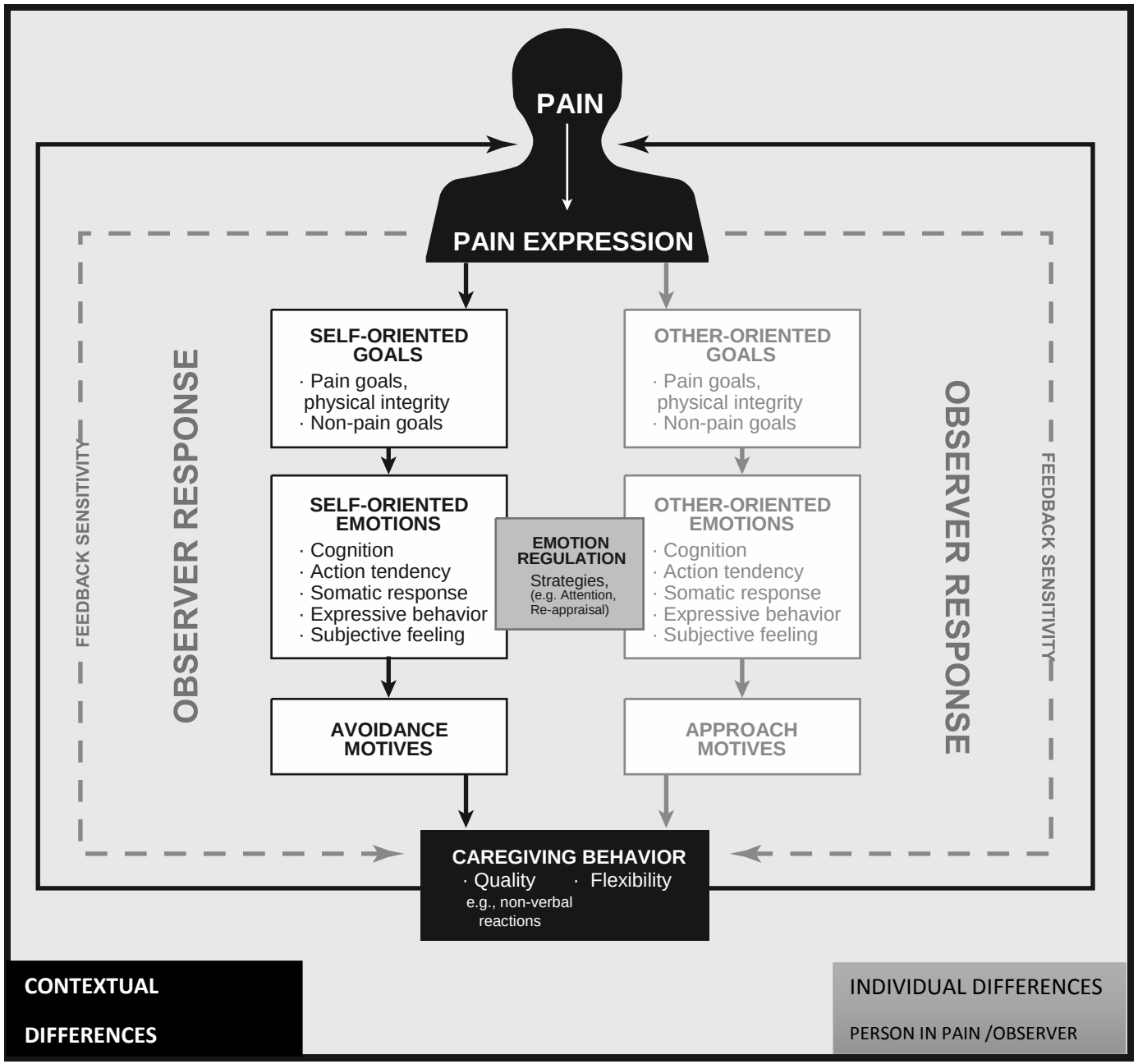
PAIN
PAIN EXPRESSION
SELF-ORIENTED GOALS
· Pain goals, physical integrity
· Non-pain goals
OTHER-ORIENTED GOALS
· Pain goals, physical integrity
· Non-pain goals
SELF-ORIENTED EMOTIONS
· Cognition
· Action tendency
· Somatic response
· Expressive behavior
· Subjective feeling
EMOTION REGULATION
Strategies, (e.g. Attention, Re-appraisal)
OTHER-ORIENTED EMOTIONS
· Cognition
· Action tendency
· Somatic response
· Expressive behavior
· Subjective feeling
AVOIDANCE MOTIVES
APPROACH MOTIVES
CAREGIVING BEHAVIOR
· Quality · Flexibility
e.g., non-verbal reactions
OBSERVER RESPONSE
FEEDBACK SENSITIVITY
OBSERVER RESPONSE
FEEDBACK SENSITIVITY
CONTEXTUAL DIFFERENCES
INDIVIDUAL DIFFERENCES
PERSON IN PAIN /OBSERVER