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Critical Reviews

# Pain and Aging: The Emergence of a New Subfield of Pain Research

Lucia Gagliese

*School of Kinesiology and Health Science, York University, Toronto, Canada; Department of Anesthesia and Pain Management, Behavioural Sciences and Health Research Division, Psychosocial Oncology and Palliative Care Research Division, University Health Network, Toronto, Canada; and Departments of Anesthesia and Psychiatry, University of Toronto, Toronto, Canada.*

**Abstract: The pain and aging subfield has grown dramatically, including a 6-fold increase in publications over the last 2 decades. This subfield is based on the assumption that pain in older and younger adults differs in clinically and theoretically significant ways. If this were not the case, data from younger groups could be generalized to older persons, and the subfield would not be needed. This article considers the evidence for this assumption. Possible interpretations of the discrepant findings of age-related increases, decreases and stability in pain, including methodological limitations, challenges of gerontological research, and the possibility of nonuniform age-related variation, are discussed. Evidence is presented for several unique characteristics of geriatric pain: difficulty using Visual Analog Scales, increased vulnerability to neuropathic pain, decreased vulnerability to acute pain related to visceral pathology, prolonged recovery from tissue and nerve injury, including prolonged hyperalgesia, and differences in the relationships among psychosocial factors important in adjustment to chronic pain. However, without a theoretical framework, it is difficult to integrate these results in a heuristic manner. Further research is needed to elucidate the characteristics of geriatric pain, to examine the mechanisms for age-related patterns, and to develop and test the efficacy of age-tailored interventions.**

***Perspective:** This article reviews the emerging subfield of pain and aging, discusses the interpretation of age-related patterns in pain, and presents several avenues for future research and subfield development. This could contribute to the continued growth of this subfield.*



***Key words:** Geriatric pain, age difference, older people, assessment.*

*Editor's Note: This article is 1 in a series of invited Critical Review articles designed to celebrate* The Journal of Pain*'s 10th year anniversary of publications.*

Is there such a thing as geriatric pain?" asked Dr Pamela Melding in a pioneering editorial published in 1991.[90] This provocative question was posed to draw empirical and clinical attention to pain and aging, an area that until then had been largely neglected. In the years since the editorial appeared, this area has grown at a steady pace. This is evident in the increased publication of empirical papers, the development of clinical guidelines[1] and expert consensus statements,[63] the formation of Special Interest Groups in professional societies, including the International Association for the Study of Pain (IASP) and the American Pain Society, and most notably, the designation of an International Year Against Pain in Older Persons (2006 to 2007). As a result, a new subfield of pain research can be said to have emerged. As *The Journal of Pain* celebrates its 10th anniversary, it is timely to revisit Melding's question and to consider this subfield's domain, fundamental questions, and theoretical framework.

One of the primary catalysts for the growth of the subfield has been the aging of our population and the expected increase in demand for pain management that will result.[41] Pain is highly prevalent among older people. Up to 40% of elders living independently[118] and 27% to 83% of those in institutional settings[44] report

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Address reprint requests to Dr Lucia Gagliese, University Health Network, EN9-236A, 200 Elizabeth Street, Toronto Ontario, Canada M5G 2C4. E-mail: lucia.gagliese@uhn.on.ca

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pain that interferes with daily function. Similar to younger individuals, pain in older people is associated with significant psychological distress and impaired physical function.[100] Despite this, older patients are at risk for inadequate treatment.[15,87] Approximately 40% to 80% of community-dwelling[99,126] and 16% to 27% of institutionalized older people do not receive any treatment for their pain.[84,106] Shockingly, a quarter of older cancer patients who report daily pain do not receive analgesics.[7]

## The Domain of the Pain and Aging Subfield

The pain and aging subfield does not easily fit into well-defined domain boundaries. Instead, it stands at the intersection of 2 interdisciplinary fields: gerontology[26] and pain.[92] As a result, a variety of disciplinary, theoretical, and methodological approaches to research have been used. This is well suited to the subfield because both pain and aging are multidetermined with contributions across the biopsychosocial spectrum. Given the multitude of intra-individual factors that influence pain,[92] it seems likely that age may also be important. This applies across the lifespan, although few studies include such a broad age range (but see Reference 8 for an exception).[8] For the most part, research has focused on how advancing age impacts on pain.

Within the subfield, there has not been careful delineation of key terms, such as "geriatric", "older person," "elderly," or "aging." For this article, the terms will be used in accordance with the larger academic literature. Older or elderly people are usually individuals in the latter part of life, with a cutoff at 60 or 65 years old common.[79] Geriatric refers to phenomena relating to old age.[113] Finally, aging is the process of maturation and change over time within physical, social and psychological contexts.[40,66] These definitions are neither straightforward nor precise, and to date, consensus has not been reached.[2] It is important to distinguish between normal aging and disease[38,66,95]; however, our study designs rarely allow this.

Despite the lack of consensus on definitions, the literature has demonstrated that aging affects every aspect of health and illness, including risk, molecular mechanisms, symptom experience, psychosocial adaptation, treatment efficacy, and survival.[9] In general, older people are more susceptible than younger people to poor outcomes, including increased disability, symptom burden, and mortality. This may be due in part to reduced physiological reserve, homeostenosis, and multisystem functional decline associated with normal aging.[9] Advancing age is marked by a high prevalence of core geriatric syndromes, including frailty, pressure ulcers, incontinence, falls, functional decline, and delirium.[74] These syndromes share multiple risk factors that interact in a synergistic fashion to increase the risk of poor outcomes[74]; however, the role of pain as a risk factor or outcome remains to be clarified.

Given the increased vulnerability associated with aging, it is reasonable to expect that pain would differ with age in important, clinically relevant ways. This is the core assumption of the subfield. Specifically, the processes of aging, in interaction with the biopsychosocial substrates of pain, result in an experience—geriatric pain—that is sufficiently different from that of younger people to require uniquely tailored assessment and management strategies. If this were not the case, there would be little reason to invest in the growth of this specialized subfield. Instead, it would be more advisable to simply generalize findings from younger adults to geriatric patients. In considering the emergence of the pain and aging subfield, it is important to evaluate the evidence supporting this core assumption. Are there unique characteristics of pain in adults of different ages? What does an age difference mean? What does age-related stability mean? What are the mechanisms underlying age differences? Does equivalence on outcome measures mean the underlying determinants of those outcomes are also not age-related? It is the answers to such questions that will enable preliminary consideration of the fundamental question, "Is there such as thing as geriatric pain?"[90]

## Emergence of the Pain and Aging Subfield

One objective index of a subfield's growth is an increase over time in the number of relevant publications.[56] To assess publication growth over the past 20 years, a series of searches of the Medline periodical database was conducted. In the first search, all publications relevant to pain were identified using the search string "pain or nocicepti* or analgesi* or hyperalgesi* or allodyni*." Limitations by language or type of publication were not used. This search was then limited by year to obtain the annual number of publications from 1987 to 2007 (the last year for which complete data were available). To identify publications relevant to aging, the following search was conducted: (pain or nocicepti* or analgesi* or hyperalgesi* or allodyni*) AND (aging or ageing or elder* or age difference or age related or geriatric or gerontolo* or senior or older) NOT (child* or adolescen* or pediatric or neonat* or fetal). This search identified 6808 publications from 1987 to 2007. Year-by-year searches were then carried out to determine the number of articles published annually. To index growth, 1987 was chosen as the comparator year, and the growth in number of articles about pain overall, and pain and aging specifically, were calculated using the following formula: No. of articles published in a given year/ No. of articles published in 1987 (Fig 1). To assess the percentage of articles published about pain and aging annually, the following formula was used: (No. of articles about pain and aging/ No. of articles about pain)*100. As the figure shows, the number of publications about pain has increased 3.5 times; from 6623 in 1987 to 22,911 in 2007. Importantly, the number of publications relevant to pain and aging has outpaced even this substantial growth: from 107 in 1987 to 641 in 2007, a 6-fold increase. Consistent with this, 1.6% of pain-related publications were relevant to aging in 1987, but this grew to 2.8% by 2007. Therefore, it is clear that this subfield has grown substantially in the past 20 years. Nonetheless, 2.8% is a very small proportion of all pain-related publications.

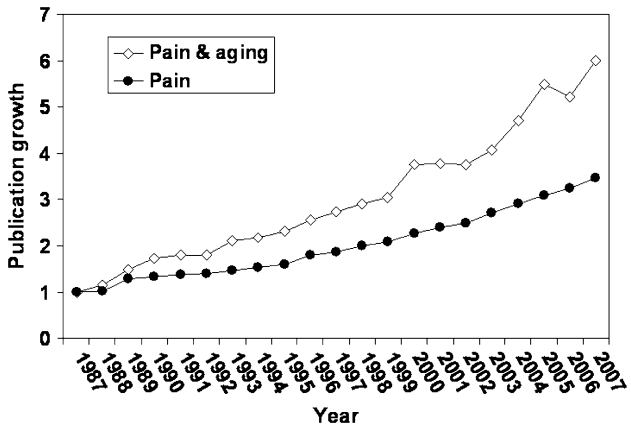


**Figure 1.** Rate of growth of journal publications about pain compared with the rate of growth of journal publications about pain and aging from 1987 to 2007.

## Obstacles to Growth of the Pain and Aging Subfield

For many years, research in this subfield has been hampered by 2 widely held but contradictory beliefs.[105] The first is that pain is so common among older people that it may be a normal, to-be-expected, part of aging. In contrast, the second belief is that older people are actually less sensitive to pain but complain about it more than younger people, leading to the misimpression that it is very common.[71,83,105] If either of these were true, we would expect that the prevalence of most types of pain would increase with age. However, age-related patterns in pain prevalence are much more complex. Some types of pain, such as neuropathic pain,[109] increase with age whereas some, such as pain related to myocardial infarction,[88] decrease. The prevalence of others, for instance musculoskeletal pain, peaks at midlife or early old age and decreases or plateaus afterward.[3,27] And finally, some, such as widespread pain, remain fairly constant across the adult lifespan.[118] (For a detailed review, see Reference 77.) This complexity challenges these beliefs because it suggests that age-related patterns in reporting may reflect actual age-related changes in pain.

It is easy to imagine how these beliefs may contribute to inadequate pain assessment and management and to the perception that this area is not a worthwhile target of research or clinical intervention.[105] They silence older people who believe that reporting pain makes them "complainers" or "bad patients"[122] or that they should tolerate their pain because it is "normal at their age." These beliefs also damage the doctor-patient relationship if an older person who does not believe his/her pain is "normal" and "to be tolerated" seeks pain management but is dismissed as exaggerating to get attention or told to expect pain as part of getting older.[65] For researchers, these beliefs may make it difficult to obtain infrastructure support and conduct studies. Specifically, reviewers, administrators, and potential research participants may not regard pain that is "normal and to-be-expected" or "attention-seeking" as a priority or good investment of research resources or time.

In the last decade, there has been an effort to dispel these myths. The evidence-based message currently being disseminated is that the high prevalence of pain among older people does not mean it is simply an unavoidable part of aging. Instead, it is likely to be associated with an underlying condition that often may be manageable.[11,89] This message is now part of the IASP core curriculum on pain,[13] information sheets distributed during the Year Against Pain in Older Persons, and some medical education curricula.[123] Nonetheless, research findings have not easily transferred to the clinical setting, and significant gaps in healthcare workers' knowledge persist.[112,127] The uptake of clinical guidelines is not universal, and many older people still do not receive adequate pain management.[86] Barriers to pain assessment and management at the patient, family, healthcare worker and system level have been identified, but discussion of these is beyond the scope of the present paper (see Reference 23 for a review). Educational strategies targeting healthcare workers[86] and older people with pain[43,81] have shown some success. Further efforts in knowledge translation are urgently needed.

Another important obstacle to the subfield's growth has been the lack of a guiding theoretical framework or model. Without this, findings across different studies often are not integrated,[2] and interdisciplinary research is limited. For this subfield to grow, it is important that investigators consider commonalities across disparate research approaches and develop a framework for the study of pain and aging. Within this interdisciplinary framework, it will be possible to identify and address the most critical research and clinical questions.[103,107] It is unlikely that a single framework will be able to explain all of the complexity in pain and aging but evidence-based, testable models will move our understanding forward. To that end, competing theories and studies testing them are to be welcomed as powerful catalysts for knowledge growth.[26,107] As a result of such studies, a sophisticated, interdisciplinary understanding of pain across the adult lifespan will become possible.

## Evidence for a Biopsychosocial Model of Pain and Aging

Although an integrated framework remains premature, the one that will emerge must be consistent with biopsychosocial models of pain[91] and aging.[2] This is evident given the variability in pain reported by older people with comparable levels of pathology.[92] For example, although the majority of older cancer patients report pain, not all do. At the time of diagnosis, 34% of older patients did not report pain.[59] Among those with advanced disease, 20% were pain-free on initial referral to supportive care.[121] Similarly, almost half of older hospice patients at the end of life did not report pain.[114] Among those who did report cancer pain, its severity ranged from mild to severe.[19,114] Therefore, consistent with biopsychosocial models, not all older patients with similar disease characteristics report pain, and among those who do, there is considerable variability in pain

intensity. A number of predictors of cancer pain in older people have been identified.[7,58] These span the biopsychosocial spectrum and include factors commonly associated with pain in younger adults (eg, mood)[24] as well as factors especially relevant to the older population, such as comorbidities, widowhood, and cognitive function.[74] This suggests that there is a continuum of vulnerability to cancer pain with individuals varying in their level of risk. Although our understanding of the critical biopsychosocial and life stage factors is limited, these data can help identify the unique characteristics of geriatric pain and can contribute to the development of an evidence-based framework for pain and aging.

## Research Into Pain and Aging

### *Measurement of Pain Across the Adult Lifespan*

Two decades ago, we knew very little about the validity and reliability of pain measurement tools for older people. Early psychometric studies were integral to the emergence of this subfield. It was not possible to consider age-related patterns without first determining how to measure pain across the adult lifespan. These preliminary studies showed that cognitively intact, older people could provide valid and reliable responses on most pain scales.[5,51,67,69] The exception to this was the Visual Analog Scale (VAS). Beginning with Kremer et al,[82] evidence accumulated that older people had more difficulty than younger people completing VASs and that this scale had poorer psychometric properties than others.[51,69,76]

More recent studies have grown in methodological and statistical quality. Most include larger samples, match painful stimulus or conditions across age groups, and consider the effects of scale completion order, sensory impairment, cognitive function, and learning.[49,52,54,70,101] These studies suggest that numeric rating scales (NRS), verbal descriptor scales (VDS) and the McGill Pain Questionnaire are the best choices for pain intensity and quality measurement across the adult lifespan, which is consistent with the recommendations of IMMPACT.[33] Importantly, the limitations of the VAS have been replicated in these more carefully controlled studies. Difficulty completing the VAS has been associated with increased age, psychomotor dysfunction, and cognitive impairment.[54,70,101] Therefore, caution is required when interpreting findings based on VAS data from older people. It is essential that future studies use the recommended scales in order to increase confidence in the results and maximize our ability to identify the unique characteristics of geriatric pain. In addition, future work should focus on validating measures of pain-related functional and psychological impairment as well as examining newer, technology-based, assessment methods.[115]

The assessment of pain in older people with cognitive impairment presents special challenges for this subfield. Research has focused on 2 groups: those with mild-to-moderate dementia who are able to provide verbal self-report and those with moderate-to-severe dementia who are not able to provide verbal self-report. For the first group, early studies found that many patients were unable to complete pain scales.[39,42,62,93,124] However, more recent studies have shown that patients can provide valid and reliable VDS, NRS, and Box Score ratings if they receive careful, repeated explanation of the task.[14,18] Not surprisingly, VASs are especially problematic in this population.[18]

As dementia progresses, patients may lose the ability to verbally self-report pain. When the importance of assessing pain in these patients was first recognized, clinical experience and chart reviews led to the recommendation that standard pain behaviors as well as abrupt changes in usual behavior could signal pain.[85] While meaningful for caregivers familiar with individual patients, this recommendation was not useful for research, which requires standardization and quantification. One of the first observational measures of pain and discomfort was developed by Hurley and colleagues[72] in 1992. In the ensuing 17 years, there has been a proliferation of similar scales. In fact, there are now so many of these scales that articles reviewing them are published regularly. Five of these recent review articles describe a total of 18 different assessment tools.[61,63,68,116,130] Interestingly, while these reviewers do not always recommend the same scales, they agree that the focus should shift from the development of new scales to the validation and refinement of those already available. I echo this recommendation. Older people with advanced dementia who cannot verbally self-report their symptoms are tragically vulnerable to unnecessary suffering.[104] If we could identify the best scales for this group, we could then begin to study the mechanisms and management of their pain.[108]

### *Age-Related Patterns in Pain*

Many cross-sectional studies have examined age-related patterns in pain in humans and animals.[46] There is also a growing number of longitudinal studies of change in pain over time within groups of older people (eg, References 29 and 55). This research represents the important preliminary cataloging of age-related patterns that will map the subfield's domain and form the basis for the development of an interdisciplinary framework.[103,107] It is beyond the scope of the present paper to describe these studies in detail (see Reference 57 for a review). Nonetheless, an accurate summary is that for various types of pain, data are available to support age-related increases, decreases and stability. This is the case for studies of pain epidemiology, experimental pain sensitivity in humans and animals, and clinical pain.

This diversity makes it difficult to move from listing findings to integrating them in a meaningful and heuristic way, a critical step in the development of this subfield.[26] There may be 3 broad categories of explanation for the diversity of the findings: methodological issues, challenges inherent to gerontological research, and actual age-related patterns in pain. Methodological issues include small sample sizes, use of

nonstandardized or problematic pain tools, failure to control confounding variables, and variability in definitions of "acute," "persistent," or "chronic" pain.[53] Many of the studies were not originally designed to test age-related patterns, and therefore, may not adequately represent participants across ages or consider potential age-related confounds or mediators, such as comorbidities. Of particular importance may be the wide variability in the operational definition of older persons. The research participants considered "older" range in age from mid-50s[55] to over 85 years old.[128] Finally, most of the studies do not examine the possibility of nonlinear age-related patterns.[20] Clearly, such broad-ranging methodological shortcomings could severely limit the interpretation of any individual study and make integration across studies almost impossible.

The diversity of the findings may also reflect the multiple challenges of conducting research with older people. The first challenge may arise in the recruitment of a representative sample.[102,111] Older people are less likely than younger people to consent to participate in research. As such, recruitment strategies may require modification. For instance, approaching a greater number of the oldest potential participants or allowing longer data collection timelines.[111] In the end, those who do consent may not be representative of the larger population of older people. Specifically, those with the most severe pain, impaired health, or reduced quality of life may be the least likely to participate in research, resulting in samples of older people who are healthier than average.[95] This is especially important when considering the external validity of studies that exclude older people with chronic health conditions.[45] On average, by the age of 70, most people have been diagnosed with multiple chronic conditions.[11] While studies of healthy older people are important in their own right, caution is necessary in applying these data to more typical older people, especially those seen in clinical or long-term care settings. At the other end of the spectrum, research conducted with the most frail elderly people presents its own challenges including participants' limited ability to tolerate research protocol burden, the potential necessity of proxy consent, and accommodations for sensory, motor or cognitive impairment.[111,125]

Other challenges in gerontological research arise from the study designs used. Most studies are cross-sectional, assessing participants at only 1 point in time. The results are vulnerable to cohort, generational, and survivorship effects[73]; however, these are rarely considered in the interpretation. While longitudinal studies are invaluable to assess the trajectory of pain, its correlates, and predictors over time, they are difficult and expensive to conduct.[10] To date, longitudinal studies of pain in older people have not followed participants from much younger ages. Therefore, a life course analysis, such as is becoming available among younger adults,[78] is not yet possible. In addition, the observational periods of some of the available studies are fairly short (eg, 1 or 2 years[29,128]), limiting the ability of these studies to capture changes that may only emerge over several decades. The timing of age-related effects is a critical but neglected issue.[107] Without longitudinal data, it is not possible to identify when effects or their interactions begin to emerge nor to target studies to these critical ages.[107] Despite their advantages, longitudinal studies are prone to the recruitment biases described above, as well as age-related selective attrition (participant dropout) and selective survival (mortality).[64] These types of participant loss are most likely among those who are older, more unwell, and who have lower levels of education, socioeconomic status and cognitive function.[22] A terminal drop, or a decrease in health in the period before death, may underlie significant participant loss.[64] These sources of attrition and their triggers can bias results because the remaining participants may have better health than is found in the larger population. Taken together, these research challenges may limit interpretation of inconsistent findings across studies.

A more interesting possibility is that the discrepant results may accurately reflect nonuniform age-related effects across the different phenomena studied. There is no a priori reason to expect all types of pain to change in a comparable fashion with age because different psychosocial and pathophysiological mechanisms may be involved. Given this complexity, it may be more fruitful to consider each type of pain separately to develop an integrated understanding of age-related patterns.

## Considerations in Interpreting Age-Related Patterns

If we provisionally accept that there may be diverse age-related patterns in pain that are dependent on the type of pain assessed, the participants studied, and a multitude of biopsychosocial factors, then we can reflect on the interpretation of these patterns. Two situations arise: an age-related pattern in pain is found, or it is not. Before considering each of these, it is important to be clear that age-related patterns do not mean that "age" causes any outcome.[40] Age should be conceptualized as a proxy for any number of potentially causal biopsychosocial and life stage factors.[107] Therefore, identifying age-related patterns is the critical first step toward elucidating underlying mechanisms.[20,50,107]

An age-related pattern, regardless of its direction, is support for the existence and uniqueness of geriatric pain. For example, advancing age has been consistently associated with increased risk for neuropathic pain, including postherpetic neuralgia (PHN) after acute herpes zoster.[17,32] Having documented the pattern, research can shift to identifying the reasons for it by considering which age- and pain-related substrates might play a role. There are several methodological approaches to this question. Prospective studies can be used to identify risk factors that differentiate older people with herpes zoster who subsequently develop PHN from those who do not.[32] We have very little data directly comparing these groups. Two studies have found that older people with more severe pain during the acute infection are more likely to develop PHN.[98,110] The evidence regarding virological, rash and psychosocial factors is less

consistent.[98,110] Severity of acute pain is a well-established risk for chronicity and is not unique to older people.[31] Therefore, it remains an open question whether there are unique risk factors for the development of PHN among older people. Identification of modifiable risk factors and their interactions may be key to the development of age-tailored prevention and management strategies.[74]

Experimental models can identify mechanisms for the age-related increase in neuropathic pain because they allow manipulation of variables. PHN may reflect central sensitization triggered by inflammation and nerve damage associated with the acute infection.[6] The emerging consensus is that the neurophysiological responses to tissue injury and nerve damage change with age. In animal models, aging is associated with prolonged inflammation and impaired recovery after tissue and nerve damage.[4,16,25,97,117,120] Similarly, in the experimental setting, older people may be more vulnerable than younger people to temporal summation[36] and prolonged hyperalgesia.[129] Several potential mechanisms have been identified, including age differences in neuropathophysiology,[12,28] the neuroimmunological response to tissue injury,[4,80] and the integrity of endogenous pain inhibitory systems.[37]

Although preliminary, this example illustrates how finding an age difference allows a deeper examination of mechanisms. In this case, "age" may be a proxy for changes in the complex cascade of immune, inflammatory and neural responses[30,75] triggered by acute herpes zoster infection.[6] Future research should continue to refine our understanding of age-related changes in the response to tissue and nerve injury. More to the point, these studies identify a fundamental characteristic of geriatric pain—increased vulnerability to prolonged sensitization after injury—which has implications for acute recovery and the development of chronic neuropathic pain.[30] Identifying the mechanisms for this vulnerability may be pivotal to research designed to prevent or minimize sensitization in older people, which would have tremendous clinical relevance. Conversely, examination of the mechanisms underlying reduced risk for pain with age (eg, the lower prevalence of pain during myocardial infarction[88,94]) also would elucidate the uniqueness of geriatric pain and have important clinical implications.

Not finding an age-related pattern also may be informative and does not necessarily warrant the conclusion of no age-related change.[20] Consideration of these results must be tempered by the usual caveats involved in the interpretation of nonsignificant differences.[60,96] For instance, because of small sample sizes, some studies simply may not have the power to detect subtle differences that may exist. As well, comparisons across only 2 age groups or time points cannot detect nonlinear change.[20] Nonetheless, the uniqueness of geriatric pain may be challenged when multiple studies consistently report a lack of differences between age groups. For instance, a systematic review recently found that the prevalence and intensity of depression do not differ between younger and older people with cancer pain.[48] Perhaps for some outcomes, older people are not different than younger people, and it may be possible to generalize data from younger groups. Larger, longitudinal studies with greater methodological and statistical rigor than are available currently are required before we can draw this conclusion with confidence. Documenting age-related stability is an important part of the mapping of this research subfield. Importantly, age-related stability in some factors does not preclude the unique experience of geriatric pain or the importance of this subfield. Instead, it is the larger context of the interaction of a multitude of factors, both those that vary with age and those that do not, which will be essential to a rich understanding of how pain changes across the adult lifespan.

An interesting possibility is that the multidimensional nature of pain and aging means that the same factors may operate in a somewhat different manner across age groups. As such, comparable outcomes may arise from different underlying pathways or mechanisms. If this is true, in addition to asking whether older people have "more" or "less" pain or adjust "better" or "worse" than younger people, it may be meaningful to ask how the correlates, predictors and mediators of pain and adjustment differ with age. There is evidence that some of the unique characteristics of geriatric pain lie in such interactions. For instance, higher blood pressure has been associated with decreased pain sensitivity in younger but not older people.[35] Female gender has been associated with more intense postoperative pain in younger but not older patients.[47] Among patients with chronic pain, disability has been associated with pain severity in older patients but affective distress in younger patients.[34] Studies comparing models of chronic pain adjustment in younger and older people are exemplars of this approach.

In a pioneering study, Turk et al[119] examined the relationship between pain and depression in younger and older people attending a multidisciplinary pain center. Younger people reported greater pain severity and interference than older people, but depression, disability, life control, and general activity level did not differ with age. To test the cognitive-mediation model of pain and depression, correlations among these factors were compared between the age groups. In younger patients, interference and life control mediated the relationship between pain and depression, which is consistent with the model. However, findings from the older group were less consistent with the model. In this group, the relationship between increased pain severity and decreased life control was stronger than that found in the younger group. Most importantly, the direct relationship between depression and pain remained significant even after considering the role of interference and life control. These findings suggest that the pathway between chronic pain and depression may differ with age and that other variables not included in this study may have been critical to the relationship for older, but not younger, patients.

More recently, Cook et al[21] tested the fear-avoidance model in patients of different ages evaluated at a multidisciplinary pain centre. Consistent with the growth of the subfield, this study had a large sample size, considered measurement tool validity across age groups, and

used sophisticated statistical analyses. There were no age differences in the intensity of pain, but older patients had less fear of movement and reinjury than younger patients. Importantly, the pathways from catastrophizing to pain severity were different for middle-aged and older patients. Specifically, fear of reinjury played a stronger mediating role between catastrophizing and depression and disability among older than younger patients. In the middle-aged group, catastrophizing was a direct predictor of depression, but this relationship was mediated by fear of reinjury in the older group. In addition, depression and disability had less predictive strength for pain severity among older than middle-aged patients. Although not directly comparable, these 2 studies suggest that the pathways to some of the most salient and clinically relevant outcomes for chronic pain patients, including depression, disability and pain severity, may differ across age groups even when levels of the outcomes do not. It is possible, therefore, that interventions may need to be tailored based on age. For instance, these 2 studies suggest that for younger patients reducing catastrophizing may be critical to impacting on depression, while for older patients, addressing fear of reinjury and diminished life control may be more important. Clinical trials are needed to examine these possibilities. As these studies demonstrate, simply documenting age differences cannot elucidate potential underlying age-related pathways which impact on outcomes. These pathways and interactions support the uniqueness of geriatric pain. Identifying them will move this subfield toward the development of a comprehensive conceptual framework.

## Is There Such a Thing as Geriatric Pain?

The last 2 decades has seen the emergence and early development of the pain and aging subfield. Although we remain far from a definitive answer to its core question, the available data enable a preliminary, tentative response: yes, there may be such a thing as geriatric pain. That is, there is sufficient evidence of unique characteristics of pain in older people to warrant continued examination. These unique characteristics include difficulty completing 1 of the most widely used pain measures, decreased pain related to acute pathologies, prolonged and impaired recovery from tissue and nerve injury, and age-specific inter-relationships of psychosocial factors important in adjustment to chronic pain. Most compelling is the complexity of the age-related patterns, which suggests that pain does not simply increase or decrease or stay the same with age. Rather, it is evident that the impact of aging is not uniform across the various types of pain and that the critical substrates encompass the full biopsychosocial spectrum. As well, the unique characteristics of older people, such as comorbidities and geriatric syndromes,[74] are important. However, geriatric pain is not universally different from that experienced by younger adults. There is evidence for age-related stability in some aspects of pain and its impact. As our understanding of these complex patterns grows, a framework of pain and aging that is complementary to current biopsychosocial models will emerge. Directions for future research and improved clinical care also will be evident. Moving the pain and aging subfield forward will require increased research rigor, greater interdisciplinarity, and ongoing consideration of the implications of new findings for the subfield's core questions. In conclusion, there does appear to be such a thing as geriatric pain. The challenge is to refine our understanding of its unique characteristics and to translate this knowledge into age-tailored prevention, assessment and intervention protocols which will reduce unnecessary suffering and maximize quality of life for people of all ages.

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