

# Osteoarthritis and Depression Update: 2023-Can the Stress and Coping Model Help?

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## Abstract

### Background

Osteoarthritis and depression are both key barriers to healthy aging and greatly heighten the risk for many negative health issues that seriously impact life quality. When combined what are the implications?

### Aim

This mini review examines 2023 data pertaining to osteoarthritis and depression and older adults and a possible theoretical framework of stress that may direct our approaches in the future.

### Methods and Procedures

Articles published between January 1 and August 15 2023 that addressed the current topic of interest and that were extracted from **PUBMED**, **PubMed Central**, Science Direct, and **Google Scholar** were carefully read and their key points are presented in narrative form.

### Results

As in the past, very few tangible theory-based prospective analyses that employ valid measures of depression and examine any association of any form of osteoarthritis longitudinally and in a consistent manner prevail. Several reports use the same or similar large cohort to draw upon, and find various degrees of clinical implications, but this may not embrace the need for more inclusivity, sampling strategies, control and diversity issues, as well as embracing the role of cognitions positive and negative.

### Conclusion

Without efforts to develop sound research designs of diverse and carefully differentiated osteoarthritis substantive samples it is impossible to delineate the origin or implications of the osteoarthritis-depression linkage reported currently or arrive at a deep understanding of its relevance, to life quality and public health costs. What is needed to protect against or minimize either or both these clinically related disabling correlates in the aged population

warrants timely study.

### Introduction

Depression, now considered among the most disabling health challenges facing many in the older adult population can occur as a definable long standing health trait if certain clear diagnostic criteria are met or as a reactive mood state of varying magnitude and chronicity that often accompanies those diseases most prevalent in older adults, such as osteoarthritis [1].

Currently said to occur in at least one third of older adults [2], it is predicted to be among the foremost disablers in this rapidly increasing age group by 2030 in its own right [3, 4], but is possibly likely to be exacerbated in those cases having unrelenting painful disabling osteoarthritis of one or more freely moving joints such as the knee, but not always been effectively managed in clinical settings [1]. Alternately, even if depression is not deemed noteworthy in many cases with varying degrees of osteoarthritis, or not discussed as an osteoarthritis co-factor specifically [5], the disease itself which impacts the lives of many older adults significantly and severely as a standalone painful often incapacitating and unrelenting incurable condition may yet engender feelings of depression that add to their burden [6-8], no matter where subjects with osteoarthritis are studied [9].

This does not include those features that can contribute to both health challenges such as obesity, especially when combined with prolonged depression [10], multiple social, functional, and occupational challenges and restrictions, and knowledge that unrelieved osteoarthritis can foster depressive symptoms, and with this excess osteoarthritis pain and a cycle of increasing and progressive disability [6]. In an era of artificial intelligence, and its application to surgery, and drug development, the question arises as to whether this potentially interactive association is especially important to identify and intervene upon.

The pervasive idea that osteoarthritis is inevitable, and relatively untreatable with the exception of pharmacologic drugs, injections, and surgery may of course prove very stressful to contemplate in its own right among many in the aging population and its public health burden may be compounded if depressive features of the disease remain undermined. Clearly, if one takes into account results of a recent preclinical study showing the presence of chronic pain in young adult mice has the propensity to induce mood alterations and supra-spinal observable biochemical changes as well as aggravating alterations already evident in older adult animals, it appears even young adults may incur more disadvantage in later life if this topic remains understudied and thus is often ignored.

Moreover, although often deemed to be an emotional and possibly controllable emotional response or trait feature of some elderly persons, treatment with morphine known to counteract pain, while preventing the development or minimizing possible pain derived anxio-depressive disorders and nerve inflammation [11], is of course addictive and its usage is fraught with dire consequences in many cases [12].

Another intriguing novel finding is that there appears to be an observable bidirectional association between osteoarthritis and multiple psychiatric disorders, as well as findings of a shared genetic architectures between knee osteoarthritis and depression/stress-related disorders, thus providing a possible array of unconventional targets that might be pursued as far as furthering an insightful mechanistic exploration of this topic and its intervention potential [13].

In the interim therefore it seems reasonable to assert that unrelieved states of suffering, including feelings of hopelessness, and low self-worth, may in turn, increase or produce unwanted stress and frustration levels, while adversely impacting coping ability, sleep, energy levels, and appetite, as well as

serving as a risk factor for pain, bone loss, osteoporotic fractures [14], cardiovascular disease [15] obesity or frailty, social isolation [16], social strain [8], or poor life quality [17, 18]. The available evidence further identifies depressive symptoms, intolerable pain perceptions and pain self-efficacy along with possible negative self-perceptions, fears of disfigurement and dependence as mechanisms partially explaining the cross-sectional association between insomnia symptoms and pain in people with osteoarthritis that might foster symptoms of depression in their own right [19].

In light of the severe impact of osteoarthritis of any joint, plus excessive symptomatic as well as excess actual biological depression as mentioned above, and its possible unique and combined detrimental impact on motivation, as well as health seeking and promoting behaviors, as well as intervention efficacy, this mini review elected to selectively focus on whether initiatives to minimize osteoarthritis and depression have yet emerged to any degree, given the fairly well established observations that predates this current 2023 time period and a failure to advance osteoarthritis or depressive symptom care to any meaningful degree via non pharmacologic means.

It investigated whether:

- a. We have solid evidence for or against recommendations to address emotional factors in osteoarthritis, including stress and coping
- b. Whether the data indicate if the *Transactional Model of Stress and Coping* [20] can offer-an explanatory tool and intervention approach to advance osteoarthritis understandings and care, and if so in what regard.

While other frameworks exist, this aforementioned health behavior explanatory and guiding framework developed by Lazarus and Folkman [20] argues that stress or stressors –such as a physical or cognitive disease- are often complex and may be influenced by personal as well as environmental factors that impact health and the individual’s vulnerability to further stress and disease resolution or exacerbation. This is because it helps to explain and predict how people adapt or do not adapt to chronic illness and how to influence some moderators or at least mitigate some harmful stress impacts [20, 21].

## Materials and Methods

To attain the aims of this review, we attempted to locate salient data housed on **PUBMED** and **GOOGLE SCHOLAR, Science Direct, and PubMedCentral** using the key terms, *depression/older adult/osteoarthritis*. All forms of publication were deemed acceptable if they addressed the topics of interest noted above and there were no yearly or methodological restrictions. The most salient articles related to the topic were duly examined and those that were noteworthy are presented in narrative form. All modes of application employed in the various research studies were accepted as valid, as were all definitions of depression. Moreover, since the article was designed to serve as a general one to introduce the topic, rather than a systematic review, it did not consider any of the currently reported research endeavors in depth, but rather the goals was to present a snapshot of the prevailing trends in this realm and the potential of this modality for clinical purposes.

Key concepts of the *Transactional Stress Model* such primary and secondary cognitive appraisals of threat, perceptions of desired solutions, and coping ability, were of specific interest and have not been well studied to date or applied as an osteoarthritis intervention guide that appears to address:

- \* Exposures to one or more actual or perceived chronic stressors such as an intractable personal or existential health threats.

- \* A possible limited ability to reduce or conceive reducing this threat.
- \* A series of negative beliefs about the self-and the situation.
- \* A limited ability to access ongoing social support.
- \* Ineffective or suboptimal coping strategies/style.

Likely moderators in this regard that were sought are age, resources, dispositions, culture, degree/duration of any impairment, degree of potential resilience and socioeconomics [20, 22].

## Search Results

### *General Observations*

Depressive symptoms and on occasion deprivation disorders have been shown to be associated with premature or advanced biological aging and consequently to adversely impact life quality adversely, as well as somatic health [23]. Osteoarthritis similarly is not only widespread, but is a chronic disease disabler of older adults in all realms of the globe that is largely said to induce physical challenges. Yet most studies presently posted that implicate some role for osteoarthritis and depression in health outcomes are cross-sectional not longitudinal. Many too, fail to specifically focus on depression or its symptoms, and most at present are reviews of former publications, rather than emergent clinically oriented current findings.

At the same time, no definite decision as to whether any observed osteoarthritis-depression linkage is clinically relevant persists largely because very few controlled longitudinal studies in any year prevail. At the same time, despite a call for evidence based medicine, many ideas for intervening in general in osteoarthritis and possibly depression continue to be cited or expounded upon, and most offer a limited theoretical or sound evidence base or basis for their proposed methodologies. Even fewer focus on stress and its implications in this realm, and why one remedy versus another may be preferred, indicated or effective in light of the actual sources of both conditions of osteoarthritis when coupled with depressive emotions is very poorly articulated to date.

Further confounding any meaningful synthesis of the current literature is the persistent lack of focus on the origins of either osteoarthritis or depression or their sub groupings. Social factors that are now known to influence health outcomes are also not commonly mentioned in the realm of either the disease presentations, or any intervention solutions. For example, racial disparities in health care services, as well as depression may partially explain Black adults' relative lower physical activity participation rate. However, other factors may well have had some additional significance here, such as pervasive stress and living conditions, and income [20, 24].

Other poorly explored osteoarthritis outcome determinants involving depression are the role of intractable bouts of neuropathic pain [25], improper pain management [26], type of pain measure [27], unmeasured confounders [28], and pre surgical depression presence [28]. Stress as a standalone factor, while an immense health negating determinant is surprisingly quite rarely mentioned in its own right, if at all, even though these may embrace multiple pathological, biological, mechanical stresses, physical, and emotional as well as economic and social stresses.

### *What the research further shows*

Additional currently posted data reveal that whereas depression may not be a major osteoarthritis determinant, and may thus indicate a limited causative role for this attribute even in cases with end stage

painful disease, it may yet be a potent cognitive attribute as well as a reactive one that emerges in the face of aging processes, other health issues, and especially unrelenting pain [17, 29, 30] in a dose dependent manner or relative to the prevailing pain mechanism [17]. Based on a report by Yalew et al. [31] the magnitude of depression deemed to be quite impairing was relatively high among musculoskeletal disorder patients treated in physiotherapy out-patient department and was moderated by the status of social support from families and friends. Since those with depression appear to have longer hospital stays in general than those with no depressive symptoms, it appears multidisciplinary strategies for diagnosing and treating depression in patients with musculoskeletal disorders are strongly indicated. Moreover, these should proceed in a timely way regardless of any definable condition origin to avert higher than desirable levels of dysfunction and mood impairments [31].

This line of reasoning is indeed borne out by some recent observations of wrist joint osteoarthritis that can result in severe pain, disability, disturbed emotional well-being, limited life quality and reduced productivity. However, it is possible that those depressive symptoms that arise in parallel with increasing functional disability experiences are yet modifiable and might be viewed as one of the clinicians' priorities [30].

While Yao et al. [32] fail to explicitly mention depression as a possible osteoarthritis determinant or therapeutic target, Yan et al. [33] concur that it is important to note that there is considerable heterogeneity in depressive symptoms and their trajectories among cases with knee osteoarthritis. Even though this does not include other forms of osteoarthritis, it is possible that pain intensity in this regard predicts the nature of these potentially differing depressive symptoms, regardless of disease site, and may be more successfully addressed than not by efforts to carefully incorporate strategies to address and reduce any modifiable degree of prevailing joint pain, and this topic should be carefully studied in its own right in the future.

In the interim, as noted by Pua et al. [34] while depression may not be a key mediating factor as far as explaining associated the oftentimes observed discordance between self-reported measures and performance-based measures of physical function, it can possibly predict worse life quality after knee joint replacement surgery, among other factors [35]. Moreover, a recent systematic review by Prado et al. [36] affirms knee osteoarthritis has a significant negative impact on patients' lives and is correlated with pain, functional limitation, dependence, anxiety and depression, compromising interpersonal relationships, physical and mental status and causing disability due to chronic pain, and leading to high financial, physical and emotional costs for the patient. Depressive symptoms may also be overlooked or confused with those of pain, and may thus be overlooked or undertreated [37].

Mulrooney et al. [38] argue that those cases diagnosed as having hand joint osteoarthritis who also have a greater comorbidity burden, co-existing back pain or depression do report greater pain severity than their counterparts at baseline as well as after three years. Hence it is possible this sub group of adults might be effectively targeted by early efforts to avert excess depressive consequences such as negative affect, sleep, and pain found to accurately predict 6-week opioid use [39]. Depression is also associated with early knee osteoarthritis mild to moderate pain complaints [40], plus poorer outcomes after surgery to replace the osteoarthritis hip joint even when the expected pain relief is forthcoming. Diamond et al. [41] further show that patients with depressive disorders undergoing primary reverse surgical shoulder replacement for the treatment of shoulder osteoarthritis have longer in-hospital stays, higher complication rates, and increased care costs.

There is also a possible role for perceived discrimination as an important psychosocial stressor that

contributes to worsening osteoarthritis-related mental and physical health outcomes, with greater effects on both osteoarthritis and depressive like moods among those from multiple socially disadvantaged groups that is not well explored [42] but that warrants consideration.

Marzalac et al. [43] suggest significant associations may also prevail between the construct of outcome expectations for exercise in the realm of osteoarthritis rehabilitation and self-efficacy perceptions for coping with the disease and depression that should also be examined carefully. This may indeed positively affect long-term clinical outcomes of exercise-based treatment for knee osteoarthritis, where building the client's self efficacy appears to be an emerging noteworthy correlate [44].

In addition, the role of social interactions both positive and negative should be explored in this regard [45] because desirable social interactions have the potential to influence mood in adults with knee osteoarthritis quite substantively. These interactions if carefully construed may help attenuate the relationship between pain and depression quite readily and effectively. They may also reduce the strain and limited coping ability associated with unrelenting osteoarthritis disability and its impact on depressive symptoms [8, 46]. Treating pain successfully, for example using a form of laser light termed photobiomodulation stimulation may prove highly effective as well [47].

Wang et al. [1] suggest that because psychosocial factors may well play a profound role in the context of the magnitude of osteoarthritis suffering by an older adult, early efforts to screen for depression followed by interventions where indicated are paramount. This is because it appears that standard therapy approaches for osteoarthritis in their own right might yield better outcomes if they pay more attention to depressive symptoms and make treatment adjustments accordingly.

Counseling may also help as per de France et al. [48] who noted many studies in recent years have demonstrated the issue of poor patient coping skills, such as apparent pain exaggeration and anxiety/depression as a common cause of life and treatment dissatisfaction. Ultimately this should be identified and treated because even if replacement surgery is forthcoming a high number of cases continue to feel dissatisfied. In addition to careful evaluation of depression subtypes [49], to improve six month outcomes, those with excess preoperative pain profiles, as well as opioid users [39, 50] who are depressed and those with low self efficacy scores that align with opioid use or dysfunctional cognitions should be preferentially targeted [51-53].

## Discussion

It is well established that among the many health challenges that evolve over the course of time, osteoarthritis, the most common joint disease, causes appreciable pain and functional disability in a high percentage of people over 55 years of age. Principally due to symptomatic pathological changes in the cartilage tissue lining the surfaces of one or more freely moving joints such as the hip and knee joints, osteoarthritis can be extremely debilitating, especially if accompanied by multiple chronic medical conditions, including depression.

However, although depression occurs with a high prevalence especially in the older population, many of whom may suffer from painful disabling osteoarthritis, there has been very little specific emphasis placed on the importance of evaluating and treating depression in the cycle of disability in adults with osteoarthritis. Indeed, until recently, evidence has been very sparse in examining depression in the context of osteoarthritis carefully and conclusively. The joints studied and their degree of pathology, plus the modes of assessing both osteoarthritis severity, as well as depressive symptoms is also highly non

uniform and fragmented. Thus what is reported may depend on what was measured and by the type of prevailing tool applied and sample studied. With very few prospective analyses, even when assessed empirically, whether it is important to minimize depressive symptoms in older adults with osteoarthritis and if so in what regard, has been unclear at best to date.

Based on the fact that persistent depression, a major health issue impacting older adults negatively may already exist, and may remain extremely challenging to eliminate for those who are in pain and trying to cope with osteoarthritis, this mini review strove to examine what is published in this regard in 2023. The aim was to pinpoint if ongoing health services and research are yet needed for advancing much needed efforts towards alleviating the burden currently experienced by many older adults and their families and caregivers as far as osteoarthritis is concerned, and in what regard, or whether robust inroads in these demanding health challenges have indeed been made or might benefit from certain principles put forth in the *Transactional Model of Coping* [20]. Specifically sought were facts concerning depression or feelings thereof in any form of osteoarthritis, regardless of data source, such as reviews.

Taken as a whole, and even if studies to the contrary are ‘in press’ or have not been published for various reasons, and are not listed in the current data bases applied, it appears that in contrast to numbers of surgical and medically oriented articles, the topic of osteoarthritis and depression remains very poorly researched. Moreover, what is published fails to address multiple methodological flaws highlighted in prior reports. As well, depression when mentioned is commonly not the primary study focus, but a secondary disease feature at best. It is hence not possible to definitively establish the pathway or pathways that are consistently implicated in osteoarthritis associated depression symptoms, nor how these can be moderated, if possible. For example, Paun [54] assert that even when taken on its own, the prevalence of late-life depression that can predictably increase osteoarthritis suffering and disability is often assumed to be part of the normal aging process. There is also a pervasive lack of distinct diagnostic criteria specific to older adults to affirm whether depression is reactive or a trait feature of osteoarthritis that too may be undiagnosed and untreated and accepted as an inevitable age associated declining condition that cannot be impacted favorably, leading to high narcotic use, mood changes, low life quality, and a high rate of premature death or suicide.

Because of its complex etiologies, especially in older adults with other health issues careful timely and ongoing assessments, with valid measures especially in older adults with disabling osteoarthritis appear indicated. As such, it also seems feasible to suggest clinicians aiming at reducing the immense osteoarthritis burden and its depression associations will find efforts to evaluate and treat this set of conditions using the *Transactional Model of Stress and Coping* as one explanatory and guiding framework highly beneficial in multiple spheres at all disease stages. Harris et al. [55] for example show that coping with life stress involves both attitudinal coping processes developed early in life such as stoicism, plus transient cognitive and support-based responses that may indeed have a bearing on how osteoarthritis is appraised and dealt with. Women in their study also described a dualistic process involving a reduction in their ability to cope with ongoing stress over time, coupled with personal growth that can conceivably impact osteoarthritis outcomes and cognitions of. non-arthritis situations. Hermson et al. [46] support the role of fostering self-efficacy in this regard.

However, failing that, it appears health outcomes may prove less than desirable as far as influencing:

- a. Adherence to treatment recommendations
- b. The degree of prevailing/future disability
- c. Fatigue
- d. Loneliness/social isolation [56]
- e. Overmedication/narcotic addiction
- f. Poor coping efficacy [56]
- g. Resilience
- h. Self esteem/efficacy declines
- i. Stigma
- j. Stress management challenges [57, 58]

As such, even if above factors are not all inclusive, it is clear many significant health determinants may emerge and converge to influence successful results of osteoarthritis management, but this may also depend on the ability to pinpoint who is at risk for cognitive declines early on, as well as by efforts to examine the attributes deemed noteworthy over time in efforts to successfully reduce stress in general, including but not limited to social, economic, and physical stress.

To this end, it appears reasonable to conclude that more careful selection criteria in future well designed studies are essential for examining osteoarthritis as well as any depression correlates among older adults, and with carefully defined subgroups of sufficient cases who are followed over time, rather than heterogeneous samples observed in retrospect [59].

As per Patten et al. [37] a strong link between pain and depression in patients awaiting specialist orthopedic consultation exists, thus indicating a need for an early integrated approach in addressing pain management and depression to optimally treat this complex health condition.

In the interim, it is not possible to derive any cumulative sense of direction on any aspect this current topic given the numerous sampling issues, and diverse measures employed-to discern depressive features as well as pain, alongside multiple problems related to study design. In addition, it can be argued that a failure to examine the possible role of stress, coping and control beliefs, self efficacy attributes, social circumstances, fatigue, sleep issues, fear, disability, and pain extent, and others such as body mass and heart health status uniformly and collectively-can lead to erroneous rather than robust conclusions. To overcome one or more of these shortcomings, objective data to support subjective findings are sorely needed, because symptoms of depression and pain in particular may be linked directly or indirectly to the subject's interpretation of their condition, their beliefs about their situation, their social circumstances or nature of any social network inputs and others, rather than changes in joint biology. They may be negatively influenced by prevailing myths, and social or cultural norms or their providers view points as well and not referred for treatment. They may also feel unconfident as a result of what they believe and perceive if they cannot take action and make sound decisions or feel their actions may prove futile. Others may feel efficacious, but are depressed because they may have limited health services access and social resources to draw on.

### **Implications**

It is possible that subject to further study, it may be possible to develop a sense of the various sequential and signaling pathways that underpin osteoarthritis and depression and that embrace issues related to



primary appraisal of the patient's condition[s], such as the perceived disease and disability threat, how controllable this stressor is, and the magnitude of their perceived coping ability. It may then be possible to foster adaptive versus negative or maladaptive coping approaches, as well as spirituality or positive outlook based coping strategies [62].

*Approaches to advance this might include-*

1. Offering the patient a broad array of relevant resources and helping them manage uncertainty and control stress.
2. Sharing with them the need to prevent excess joint stress, as well as mental stress.
3. Helping them to manage any prevailing comorbid condition.
4. Fostering family and other social support perceptions [63].
5. Strengthening the patient's ability to improve their lives and control stress.
6. Applying positive psychology approaches [gratitude, self-compassion, and self-forgiveness, cognitive restructuring] alongside efforts to foster empowerment [61, 64].
7. Providing for personalized ongoing management approaches.
8. Preventing addictions and medical interventions associated with depression and educating about osteoarthritis and benefits of natural anti depressives [65] as well as risks of surgery, injections, opioids is advocated as well

In short, helping older clients in distress or at risk for this negative health correlate to feel understood and cared for through careful pain assessments, efforts to listen attentively alongside those designed to boost their general as well as action specific self-efficacy beliefs are likely to prove beneficial [63, 66]. Stressing the value of exercise as indicated [67], alongside integrated evaluations and interventions [68], and providing for socially supportive resources, and screening opportunities is also strongly indicated [2, 31].

### **Future research**

It appears that several realms of inquiry will be insightful in advancing our understandings, In this regard, how osteoarthritis biological features are impacted by cognitive appraisals warrants attention. Efforts to examine whether coping ability or its analog of poor coping skills impact physical function, as well as inflammation and age associated muscle mass losses as observed in osteoarthritis and if so- in what way can be equally advantageous. Moreover, can osteoarthritis be seen and viewed as a chronic stressor that may perpetuate its progression if cognition of fear, self efficacy, and beliefs based on misinformation or aging myths and others prevail?

Indeed, even if it hoped that a machine learning algorithm can be duly developed to identify potential surgical candidates for joint replacement surgery in end-stage osteoarthritis cases without an in-person evaluation or physical examination, can this system be internally or externally validated if patients personal needs, voices and holistic rather than standard radiographic evaluations are obviated and exclude the weight of depressive factors is the course of predicting need and health recovery potential [69]. This in our view is clearly an immense albeit artificial barrier to the future of many osteoarthritis cases who might be helped conservatively. In particular, because osteoarthritis pain, the problem of most concern to patients, is deemed a subjective and personal experience that cannot be accurately understood by any aggregated mathematical set of equations with any degree of accuracy the true nature of the

individual's disease experience and manifestations and potential for recovery cannot be readily assumed. In addition, there is no global standard for the assessment of any osteoarthritis cognitive factor at present and how to mitigate or avert these [70]. Surgery alone, while largely beneficial, may fail to achieve the desired result as well [71, 72].

Key possible explanatory factors to examine are: Perceptions and Relevance of Osteoarthritis to the individual's wellbeing along with their Resources.

### Conclusions

While limited, the present overview leads us to conclude:

- High quality research into the nature of any potential or actual depressive responses and why these occur in some osteoarthritis cases and not others is limited at best but could be beneficial and lead to better outcomes and cost savings.
- To address the diverse and often times purely subjective data collection processes in this realm, efforts to standardize and supplement tentative diagnoses via clinical verification and controls are sorely needed to avert erroneous diagnoses.
- For therapeutic purposes caution is advised because who will benefit, what is best for them, and why and in what respect or dosage is unclear.
- An accepted explanatory and predictive framework such as the *Transactional Model of Stress and Coping* may well advance this realm of research and practice in multiple ways.
- Alternately, a failure to collect a wide array of validated and longitudinally captured data across diverse samples and that examine those variables that impact stress specifically will likely fail to enhance understandings and provide direction into methods to counter this growing burdensome mental and physical health epidemic among older adults wherever they reside.

Until more data are forthcoming an effective stress management program may be helpful in light of the interactive determinants of osteoarthritis management such as its socioeconomic factors, such as racism, and being stigmatized that are chronic stressors in their own right.

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