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HEALTH, FUNCTIONAL AND QUALITY OF LIFE OUTCOMES OF CREATINE SUPPLEMENTATION BEYOND ATHLETIC PERFORMANCE: A NARRATIVE REVIEW

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ABSTRACT

Background: Creatine supplementation is one of the most effective nutritional strategies for improving athletic performance and increasing skeletal muscle mass. Recently, interest has expanded toward its potential benefits in health promotion, aging, rehabilitation, metabolic health, and quality of life.
Aim: This narrative review summarizes current evidence on the effects of creatine supplementation beyond sports performance, with emphasis on physical function, muscle health, metabolic and cognitive outcomes, and quality of life.
Methods: A literature search was conducted in April–May 2026 using PubMed, Scopus, Web of Science, Google Scholar, and other relevant databases. Keywords included "creatine supplementation," "aging," "sarcopenia," "cognition," "metabolic health," and "quality of life." Priority was given to systematic reviews, meta-analyses, randomized controlled trials, and position stands in English.
Results: Evidence suggests that creatine supplementation improves muscle strength, lean body mass, exercise capacity, and functional performance, especially when combined with resistance training. Benefits are also observed in older adults with sarcopenia. Emerging data indicate possible positive effects on cognitive performance, mental fatigue, metabolic health, and neurological function. Creatine appears safe in healthy individuals at recommended doses.
Conclusions: Creatine supplementation may provide benefits beyond sports performance, particularly for muscle health, physical function, and quality of life. However, further long-term randomized controlled trials are needed to confirm clinical effects in non-athletic populations.

KEYWORDS

Creatine Supplementation; Dietary Supplements; Skeletal Muscle; Physical Function; Muscle Strength; Sarcopenia; Aging; Resistance Training; Cognitive Function; Quality of Life

CITATION

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1. Introduction

Creatine is a naturally occurring nitrogen-containing compound synthesized endogenously from the amino acids arginine, glycine, and methionine, primarily in the liver, kidneys, and pancreas. It is also obtained through dietary sources, particularly meat and fish, and stored predominantly in skeletal muscle in the form of free creatine and phosphocreatine. The phosphocreatine system plays a crucial role in rapid adenosine triphosphate (ATP) resynthesis during short-duration, high-intensity physical activity, making creatine a key substrate in cellular energy metabolism [1,2].

Over the past three decades, creatine monohydrate has become one of the most extensively studied and widely used dietary supplements in sports nutrition. A substantial body of evidence confirms its effectiveness in improving strength, power output, and lean body mass, particularly when combined with resistance training. These ergogenic benefits have led to its widespread adoption among athletes across various sports disciplines [1,3].

However, contemporary research has progressively expanded the scope of creatine supplementation beyond athletic performance. Increasing attention has been directed toward its potential therapeutic and health-related applications in non-athletic populations. Emerging evidence suggests that creatine may play a role in supporting skeletal muscle function, attenuating age-related muscle loss, and improving functional capacity in older adults. This is particularly relevant in the context of sarcopenia, a progressive and generalized skeletal muscle disorder associated with increased risk of falls, frailty, and reduced quality of life [2,4].

In addition to its musculoskeletal effects, creatine has been investigated for its potential neuroprotective and cognitive benefits. The brain, similar to skeletal muscle, relies heavily on ATP availability, and creatine supplementation may enhance cerebral energy metabolism, particularly under conditions of metabolic stress, sleep deprivation, or neurological impairment. Furthermore, preliminary evidence indicates possible benefits in mood, cognitive performance, and mental fatigue [5].

Beyond musculoskeletal and neurological outcomes, creatine supplementation has also been explored in relation to metabolic health, rehabilitation, and clinical populations, including individuals with chronic diseases or reduced physical capacity. Importantly, creatine is generally considered safe when used at recommended dosages, with a well-established safety profile supported by numerous clinical studies [1,6].

Despite the growing body of evidence, findings across studies remain heterogeneous, particularly regarding non-sport-related outcomes such as cognitive function, quality of life, and clinical applicability in aging and disease populations. Therefore, a comprehensive synthesis of current literature is warranted to better understand the broader implications of creatine supplementation beyond sports performance.

This narrative review aims to summarize and critically evaluate current evidence on the effects of creatine supplementation on health outcomes, physical function, and quality of life, with particular emphasis on its emerging role in aging populations and clinical contexts.

2. Materials and Methods

This study was designed as a narrative review of the current scientific literature concerning the effects of creatine supplementation beyond sports performance, with particular emphasis on health outcomes, physical function, and quality of life in non-athletic populations.

A comprehensive search of the literature was conducted using electronic databases, including PubMed, Scopus, and Google Scholar. In addition, relevant articles published in journals focusing on health sciences and sport sciences, specifically *Journal of Education, Health and Sport* and *Quality in Sport*, were also included. These journals were considered particularly relevant due to their focus on interdisciplinary research combining medical, rehabilitation, and physical activity-related topics, which aligns with the aim of this review to integrate evidence from both clinical and exercise science perspectives.

The search strategy was based on combinations of the following keywords: “creatine supplementation”, “creatine monohydrate”, “aging”, “sarcopenia”, “physical function”, “muscle strength”, “quality of life”, “cognitive function”, “rehabilitation”, and “metabolic health”.

The search included studies published primarily in English between 2000 and 2026 in order to capture both foundational research and the most recent evidence. Original research articles, randomized controlled trials, systematic reviews, and meta-analyses were considered eligible for inclusion. Priority was given to high-quality human studies, particularly those involving older adults, clinical populations, or individuals with reduced physical capacity.

Studies were included if they investigated at least one of the following outcomes: muscle strength, muscle mass, physical performance, functional capacity, cognitive function, metabolic health, or quality of life in relation to creatine supplementation. Studies focusing exclusively on acute exercise performance in trained athletes were included only when they provided mechanistic or clinically relevant insights applicable to broader populations.

No formal meta-analysis or statistical synthesis was performed due to the heterogeneity of study designs, populations, and outcome measures. Instead, a qualitative synthesis of the available evidence was conducted, allowing for a comprehensive overview of current knowledge and identification of key trends, consistencies, and gaps in the literature.

The review methodology followed established standards for narrative reviews in biomedical sciences, with emphasis on transparency in study selection and interpretation of findings.

3. Mechanisms of action of creatine

Creatine is a naturally occurring compound that plays a key role in cellular energy metabolism and is essential for maintaining adequate adenosine triphosphate (ATP) availability in tissues with high energy demands. In recent years, increasing scientific attention has been directed not only toward its well-established ergogenic effects in sports performance, but also toward its potential relevance in conditions characterized by impaired muscle function, aging-related decline, and reduced physical capacity [1,4].

The primary mechanism of creatine action is based on the phosphocreatine system, which enables rapid regeneration of ATP from adenosine diphosphate (ADP) during periods of increased energy demand. This energy-buffering system is particularly important in situations where cellular energetics are compromised, such as aging, sarcopenia, or chronic inactivity [2]. In these populations, reduced intramuscular creatine stores may contribute to impaired muscle function and decreased physical performance in daily activities.

Beyond skeletal muscle, creatine is also involved in energy metabolism within the central nervous system, where it supports neuronal ATP homeostasis. This mechanism has been proposed as potentially relevant for cognitive function and mental fatigue, particularly in conditions associated with metabolic stress or age-related decline in brain energy metabolism [6].

In addition, creatine may influence muscle function through secondary mechanisms such as cellular hydration and metabolic signaling pathways involved in protein turnover and muscle maintenance. These processes are of particular interest in clinical and aging populations, where preservation of muscle mass and functional capacity is a key determinant of independence and quality of life [4].

Overall, creatine supplementation may therefore be understood not only as a strategy for enhancing exercise performance, but also as a potential supportive intervention for maintaining cellular energy balance and functional capacity in populations experiencing age-related or disease-related declines in physical and cognitive function.

4. Effects of creatine on skeletal muscle and physical performance

Creatine supplementation has been extensively investigated in relation to skeletal muscle health and physical performance. Although initially associated mainly with athletic performance enhancement, current evidence suggests that creatine may also provide clinically relevant benefits in older adults and individuals with reduced physical capacity [10,12].

One of the primary effects of creatine supplementation is the improvement of muscle strength and lean body mass. Creatine increases intramuscular phosphocreatine stores, thereby enhancing ATP resynthesis and improving energy availability during muscular contractions [2]. This mechanism may contribute not only to improved exercise tolerance, but also to better performance in everyday functional activities, particularly in populations affected by age-related muscle decline.

Age-associated reductions in skeletal muscle mass and strength are strongly linked with impaired mobility, increased fall risk, frailty, and loss of independence [8]. Consequently, interventions supporting muscle preservation have become increasingly important in healthy aging strategies. Several studies demonstrated that creatine supplementation, especially when combined with resistance training, may enhance gains in muscle mass and muscular strength in older adults more effectively than exercise alone [4,11].

A meta-analysis conducted by Devries and Phillips found that creatine supplementation during resistance training significantly improved muscle mass, upper-body strength, and lower-body strength in older adults [7]. Similar findings were reported in a systematic review by Stares and Bains, which suggested that continuous low-dose creatine supplementation combined with moderate- to high-intensity exercise may positively influence functional capacity and skeletal muscle health in aging populations [13].

Recent evidence has also emphasized the potential role of creatine in maintaining functional performance rather than solely improving athletic outcomes. Improvements in chair-rise performance, walking ability, and activities of daily living have been observed in older adults receiving creatine supplementation [10]. Such findings are clinically relevant because preservation of physical function is strongly associated with improved quality of life and reduced disability risk among elderly individuals.

Furthermore, creatine may attenuate muscle wasting associated with inactivity, immobilization, or chronic disease. Gualano et al. highlighted that creatine supplementation may support rehabilitation outcomes and muscle recovery in clinical populations characterized by reduced muscle function and fatigue [6]. These observations suggest that creatine may have broader therapeutic applications beyond sports nutrition.

Nevertheless, the magnitude of benefits appears to vary across studies. Differences in participant age, baseline physical activity, dietary creatine intake, supplementation protocols, and intervention duration may influence outcomes [11,13]. Moreover, while the combination of creatine supplementation and resistance training consistently demonstrates beneficial effects, evidence regarding creatine supplementation without concurrent exercise remains less conclusive.

Overall, current literature supports the role of creatine supplementation as a potentially valuable strategy for preserving skeletal muscle health and physical performance, particularly in aging populations and individuals at risk of functional decline. These findings further support the growing perception of creatine as a supplement with potential applications extending beyond competitive sports and athletic performance.

5. Creatine supplementation in older adults and sarcopenia

Sarcopenia is a progressive age-related syndrome characterized by the loss of skeletal muscle mass, muscle strength, and physical performance. It is associated with increased risk of falls, frailty, hospitalization, disability, and reduced quality of life among older adults [14]. As the global population continues to age, increasing attention has been directed toward interventions that may help preserve muscle function and maintain independence in elderly individuals. Among nutritional strategies, creatine supplementation has emerged as a potentially beneficial supportive intervention in the prevention and management of sarcopenia [15].

Age-related declines in muscle mass are partly associated with impaired muscle protein synthesis, reduced physical activity, hormonal changes, chronic low-grade inflammation, and decreased cellular energy availability [16]. Since creatine plays an important role in ATP regeneration and cellular energy metabolism, supplementation may help improve muscle energetics and functional capacity in older populations.

Several clinical studies demonstrated that creatine supplementation combined with resistance training may enhance gains in muscle mass and muscular strength in older adults more effectively than exercise alone [17]. Brose et al. reported that older men and women receiving creatine supplementation during resistance training experienced significantly greater increases in fat-free mass and muscular performance compared with placebo groups [18]. Similar results were observed by Gotshalk et al., who demonstrated improvements in muscle strength and body composition among older adults supplemented with creatine during strength training interventions [19].

Importantly, creatine supplementation may also influence functional performance relevant to daily living activities. Improvements in chair-stand performance, gait speed, and overall mobility have been observed in elderly individuals receiving creatine supplementation [20]. Such outcomes are clinically meaningful because preservation of functional independence is considered one of the key goals in healthy aging strategies.

In addition to physical performance, creatine may contribute to attenuation of age-related muscle loss through indirect effects on muscle protein metabolism and cellular hydration. Some studies suggest that creatine supplementation may enhance satellite cell activity and promote favorable adaptations in skeletal muscle tissue, potentially supporting muscle maintenance in aging populations [21]. However, the precise mechanisms underlying these effects remain incompletely understood.

Recent systematic reviews and meta-analyses further support the role of creatine supplementation in older adults. Antonio et al. concluded that creatine supplementation combined with resistance training may positively influence muscle strength, appendicular lean mass, and physical performance in elderly populations [22]. Similarly, Forbes et al. emphasized that creatine may represent a low-cost and accessible nutritional strategy supporting musculoskeletal health during aging [23].

Nevertheless, some inconsistencies remain across studies. Differences in supplementation protocols, duration of interventions, nutritional status, baseline physical activity, and severity of sarcopenia may influence the observed outcomes [24]. Additionally, while evidence supporting creatine supplementation combined with exercise is relatively strong, data regarding creatine supplementation without concurrent resistance training remain less conclusive.

Despite these limitations, current literature suggests that creatine supplementation may have clinically relevant benefits in older adults, particularly when combined with regular physical activity. Considering its favorable safety profile, accessibility, and potential positive effects on muscle function and quality of life, creatine may represent a promising adjunctive strategy in the prevention and management of sarcopenia and age-related functional decline.

6. Neurological and cognitive effects of creatine

In recent years, increasing attention has been directed toward the potential neurological and cognitive effects of creatine supplementation. Although creatine is primarily associated with skeletal muscle metabolism, it is also present in the brain, where it plays an important role in maintaining cellular energy homeostasis [25]. The central nervous system has high metabolic demands, and disturbances in cerebral energy metabolism have been implicated in cognitive decline, neurological disorders, and mental fatigue [26,57]. Consequently, creatine supplementation has emerged as a potential supportive strategy for improving cognitive performance and supporting brain health.

Creatine contributes to ATP regeneration in neuronal tissue through the phosphocreatine system, similarly to its role in skeletal muscle [27]. Since neurons rely heavily on continuous energy availability, enhanced phosphocreatine stores may improve resistance to metabolic stress and support cognitive processes such as memory, attention, and executive function [28].

Several studies have investigated the effects of creatine supplementation on cognitive performance in healthy individuals. Rae et al. demonstrated that creatine supplementation significantly improved working memory and intelligence test performance in vegetarian participants, suggesting that individuals with lower baseline creatine intake may particularly benefit from supplementation [29]. Similar findings were reported by Benton and Donohoe, who observed improvements in memory-related tasks following creatine supplementation, especially under conditions of increased cognitive demand [30].

Creatine has also been studied in the context of sleep deprivation and mental fatigue. McMorris et al. found that creatine supplementation may attenuate cognitive impairment associated with sleep deprivation and prolonged mental effort [31]. These findings support the hypothesis that creatine may enhance cerebral energy availability during periods of metabolic stress, thereby improving cognitive resilience.

Beyond healthy populations, creatine supplementation has attracted interest as a potential adjunctive intervention in neurological and psychiatric disorders. Preliminary studies suggest possible benefits in conditions such as depression, Parkinson’s disease, traumatic brain injury, and neurodegenerative disorders [32,33]. In depressive disorders, creatine has been hypothesized to influence brain bioenergetics and neurotransmitter regulation, potentially enhancing antidepressant treatment response [34]. However, evidence remains limited and inconsistent, and further large-scale clinical trials are required.

Age-related cognitive decline has also become an area of growing interest. Since aging is associated with reductions in mitochondrial efficiency and cerebral energy metabolism, creatine supplementation may theoretically support cognitive function in older adults [35]. Some studies have reported modest improvements in memory and mental processing, although results remain heterogeneous due to differences in study populations, supplementation protocols, and cognitive assessment methods.

Despite promising findings, several limitations should be acknowledged. Many studies investigating cognitive effects of creatine supplementation include relatively small sample sizes and short intervention durations [28]. Additionally, the magnitude of cognitive benefits appears to vary depending on factors such as age, dietary habits, baseline creatine stores, and presence of metabolic stress [29]. Therefore, although current evidence suggests potential neurological benefits of creatine supplementation, further research is necessary to establish clear clinical recommendations.

Overall, creatine supplementation may represent a promising supportive strategy for brain health and cognitive functioning. Its role in cellular energy metabolism, combined with a favorable safety profile, makes creatine an increasingly important topic not only in sports nutrition, but also in neurology, psychiatry, and healthy aging research.

7. Creatine and metabolic health

In addition to its effects on skeletal muscle and physical performance, creatine supplementation has increasingly been investigated in the context of metabolic health. Growing evidence suggests that creatine may influence glucose metabolism, body composition, and energy regulation, making it a potential supportive intervention in conditions such as type 2 diabetes mellitus, obesity, and metabolic syndrome [36,37].

Type 2 diabetes mellitus is characterized by impaired glucose metabolism and insulin resistance, both of which are strongly associated with reduced muscle function and decreased physical capacity. Since skeletal muscle plays a central role in glucose uptake and storage, interventions that improve muscle metabolism may contribute to better glycemic control [38]. Several studies suggest that creatine supplementation combined with exercise may enhance glucose transporter type 4 (GLUT-4) activity and improve insulin sensitivity [39].

Gualano et al. demonstrated that creatine supplementation combined with exercise training improved glycemic control and glucose tolerance in patients with type 2 diabetes mellitus [40]. The authors proposed that creatine may increase GLUT-4 translocation and improve skeletal muscle glucose uptake, thereby contributing to enhanced metabolic regulation..

Obesity is another condition in which creatine supplementation may have potential clinical relevance. Although creatine itself is not considered a weight-loss supplement, several studies suggest that it may positively influence body composition by increasing lean body mass and supporting physical performance during exercise programs [41]. Preservation of skeletal muscle mass is particularly important in individuals with obesity, as reduced muscle quality and low physical activity are common contributors to metabolic dysfunction.

Additionally, creatine supplementation may support exercise adherence and functional capacity in individuals with obesity by improving muscular performance and reducing fatigue during physical activity [42]. This may indirectly contribute to improved metabolic health and long-term lifestyle modification outcomes.

Emerging evidence also suggests that creatine may influence inflammation and mitochondrial function, both of which play important roles in metabolic diseases [44]. Chronic low-grade inflammation is a hallmark of obesity and metabolic syndrome, and some experimental studies indicate that creatine may exert mild anti-inflammatory effects and support cellular energy metabolism [43]. However, these mechanisms remain incompletely understood and require further investigation.

Beyond diabetes and obesity, creatine supplementation has also been explored in other clinical conditions associated with impaired metabolism and reduced physical function, including cardiovascular disease, chronic obstructive pulmonary disease (COPD), and neuromuscular disorders [36]. In these populations, creatine may potentially improve exercise tolerance, muscle function, and overall quality of life, although available evidence remains heterogeneous.

Despite promising findings, the current literature on creatine and metabolic health remains limited compared with the extensive evidence available in sports nutrition. Many studies involve relatively small sample sizes, short intervention periods, and combined exercise protocols, making it difficult to isolate the independent effects of creatine supplementation [45]. Furthermore, differences in supplementation dosage, participant characteristics, and baseline metabolic status contribute to variability in study outcomes.

Overall, current evidence suggests that creatine supplementation may have beneficial effects on metabolic health, particularly when combined with regular physical activity. Improvements in glucose metabolism, body composition, and functional capacity indicate that creatine may represent a supportive nutritional strategy in the management of metabolic disorders. Nevertheless, additional long-term randomized controlled trials are necessary to better establish its clinical effectiveness and mechanisms of action in metabolic diseases.

8. Safety profile and adverse effects

Creatine monohydrate is considered one of the most extensively studied dietary supplements, with a substantial body of evidence supporting its safety in both athletic and non-athletic populations [46]. Despite its widespread use and generally favorable safety profile, concerns regarding potential adverse effects—particularly related to kidney function, liver function, dehydration, and gastrointestinal disturbances—continue to appear in public discourse and among healthcare professionals [47]. However, most of these concerns are not supported by current scientific evidence.

One of the most common misconceptions regarding creatine supplementation involves its potential nephrotoxic effects. Because creatine supplementation may increase serum creatinine levels, concerns have been raised about possible kidney dysfunction. Nevertheless, serum creatinine is a metabolite of creatine and does not necessarily indicate renal impairment in individuals using creatine supplements [48,56]. Numerous clinical studies and systematic reviews have demonstrated that recommended doses of creatine do not adversely affect kidney function in healthy individuals [46,49].

Poortmans and Francaux evaluated renal function in athletes undergoing both short- and long-term creatine supplementation and found no evidence of impaired kidney function [50]. Similar conclusions were reported by Persky and Rawson, who emphasized that available data do not support claims linking creatine supplementation with renal damage in healthy populations [51]. Importantly, caution may still be warranted in individuals with pre-existing kidney disease, as evidence in these populations remains limited.

Concerns have also been raised regarding potential hepatic dysfunction associated with creatine use. However, current evidence does not indicate clinically significant harmful effects on liver function when creatine is consumed at recommended dosages [52]. Long-term studies involving healthy adults have generally demonstrated stable liver enzyme levels during supplementation protocols.

The most commonly reported adverse effects of creatine supplementation are mild and transient. These include gastrointestinal discomfort, nausea, diarrhea, abdominal cramping, and temporary water retention [53]. Water retention associated with creatine use is primarily related to increased intracellular fluid accumulation within skeletal muscle tissue and is generally considered a physiological rather than pathological effect.

Another frequently discussed issue is the potential association between creatine supplementation and dehydration or muscle cramping. Early anecdotal reports suggested that creatine might impair thermoregulation and increase the risk of heat-related illness. However, subsequent studies have not confirmed these claims. Some evidence even suggests that creatine supplementation may improve cellular hydration and thermoregulatory responses during exercise [54].

Safety data regarding long-term creatine supplementation are also reassuring. Kreider et al. emphasized that creatine monohydrate consumed at recommended doses appears safe for long-term use in healthy individuals, including older adults [46]. Additionally, the International Society of Sports Nutrition recognizes creatine monohydrate as one of the safest and most effective nutritional supplements currently available [46].

Nevertheless, it should be acknowledged that the quality and purity of commercially available supplements may vary considerably. Contamination, inaccurate labeling, or the presence of undeclared substances may contribute to adverse events unrelated to creatine itself [55]. Therefore, the use of products from reputable manufacturers remains important.

Overall, current evidence strongly supports the safety of creatine monohydrate supplementation in healthy populations when used according to recommended guidelines. Most reported adverse effects are mild, transient, and manageable. Although additional research is warranted in specific clinical populations and during very long-term use, creatine remains one of the best-studied and safest dietary supplements in contemporary nutrition and sports medicine.

9. Discussion

The present narrative review summarizes current evidence regarding the effects of creatine supplementation beyond sports performance, with particular emphasis on health outcomes, physical function, and quality of life. Although creatine has traditionally been recognized as an ergogenic aid used by athletes, accumulating evidence suggests that its benefits may extend to a variety of non-athletic populations, including older adults and individuals with chronic health conditions [1,36].

One of the most consistent findings in the literature is the positive effect of creatine supplementation on skeletal muscle mass, strength, and functional performance. These benefits are particularly important in aging populations, where sarcopenia and age-related declines in muscle function contribute to frailty, loss of independence, increased risk of falls, and reduced quality of life [8,14]. Several studies have demonstrated that creatine supplementation, especially when combined with resistance exercise, may improve muscle strength and functional capacity in older adults [7,12,18,19]. Improvements in activities of daily living and physical independence may ultimately translate into better overall well-being and quality of life.

Beyond its effects on the musculoskeletal system, creatine has demonstrated potential benefits for brain health and cognitive function. Maintaining cognitive performance is a key determinant of quality of life, particularly in older adults. Evidence suggests that creatine supplementation may support memory, cognitive processing, and resistance to mental fatigue, especially under conditions of increased metabolic demand [5,28–31]. Although findings remain heterogeneous, these observations indicate that creatine may contribute to preserving cognitive function and maintaining independence during aging.

Another important aspect highlighted in this review is the potential role of creatine in metabolic health. Improvements in glucose metabolism and insulin sensitivity reported in individuals with type 2 diabetes mellitus suggest that creatine may have clinical applications beyond sports nutrition [40]. Since metabolic disorders are frequently associated with reduced physical functioning and diminished quality of life, interventions supporting metabolic control may provide meaningful health benefits.

Importantly, creatine monohydrate remains one of the best-studied dietary supplements, with a strong body of evidence supporting its safety [1,51]. Concerns regarding adverse effects on kidney or liver function have not been confirmed in healthy individuals using recommended doses [45–53]. This favorable safety profile increases the potential applicability of creatine supplementation in broader clinical and aging populations.

Taken together, the available evidence suggests that the benefits of creatine supplementation may extend beyond improvements in athletic performance. By supporting muscle function, physical independence, cognitive health, and metabolic regulation, creatine may positively influence multiple factors that contribute to quality of life. This multidimensional impact is particularly relevant in the context of healthy aging, where maintaining functional capacity and independence represents a major public health goal.

Nevertheless, several limitations should be acknowledged. Much of the available evidence originates from relatively small studies with heterogeneous methodologies, supplementation protocols, and participant characteristics. Furthermore, many studies have focused on physically active individuals, limiting the generalizability of findings to broader clinical populations. Additional large-scale randomized controlled trials are needed to better define the long-term effects of creatine supplementation on quality of life and health-related outcomes.

Overall, current evidence supports the view that creatine should no longer be considered solely a sports supplement. Its potential role in promoting healthy aging, preserving physical and cognitive function, and improving quality of life warrants further investigation and may represent an important area for future clinical research.

10. Limitanions

This review has several limitations. As a narrative review, it is subject to potential selection bias and does not follow the methodological rigor of a systematic review. Additionally, heterogeneity among included studies regarding supplementation protocols, participant characteristics, and outcome measures limits direct comparisons. Future systematic reviews and meta-analyses are warranted to further clarify the non-sport-related effects of creatine supplementation.

11. Conclusions

Creatine supplementation is no longer viewed solely as an ergogenic aid for athletes. Current evidence suggests that its benefits may extend to a variety of health-related outcomes, including the preservation of skeletal muscle mass and strength, support of physical function in older adults, improvements in selected aspects of cognitive performance, and potential positive effects on metabolic health.

The strongest evidence exists for the role of creatine in maintaining musculoskeletal health, particularly when combined with resistance exercise. Emerging findings also indicate potential applications in healthy aging, sarcopenia prevention, neurological health, and metabolic disorders such as type 2 diabetes mellitus. Importantly, creatine monohydrate demonstrates a favorable safety profile and remains one of the most extensively studied dietary supplements.

Despite these promising results, evidence regarding several non-sport-related outcomes remains heterogeneous, and further high-quality randomized controlled trials are required to establish optimal supplementation protocols and clarify the long-term clinical relevance of creatine use in diverse populations.

Overall, creatine supplementation represents a promising, accessible, and generally safe nutritional strategy that may contribute to improved health, physical function, and quality of life beyond its traditional role in sports performance enhancement.

Outcome	**Main findings**	**Key references**
Muscle mass	Increase	7, 12, 23
Strength	Increase	18, 19
Cognition	Possible benefit	5, 29, 30
Metabolic health	Potential benefit	37, 40
Safety	Safe at recommended doses	45–53

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