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Empowering caregivers of autistic children through gardening-based nutritional education: a pathway to improved family health and well-being

Abstract

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition associated with nutritional challenges, metabolic complications, and significant caregiver burden. Caregivers of autistic children frequently face knowledge gaps regarding effective dietary management, while autistic individuals often exhibit food selectivity, restricted dietary intake, and limited consumption of fresh fruits and vegetables. This opinion paper argues that gardening-based nutritional education represents a uniquely promising and underexplored intervention for empowering caregivers and improving health outcomes for autistic children and their families. Drawing on evidence from gardening therapy, nutritional education research, and physical activity interventions in ASD, we propose that cultivation-based educational programmes can simultaneously address dietary knowledge gaps, increase fruit and vegetable acceptance, promote family-based physical activity, and reduce caregiver stress and anxiety. We further highlight the dual benefit of such interventions for both the autistic child and their caregivers, and call for rigorously designed randomised controlled trials to evaluate the efficacy of this approach.

Keywords: autism spectrum disorder, nutritional education, gardening therapy, caregiver empowerment, physical activity, family well-being

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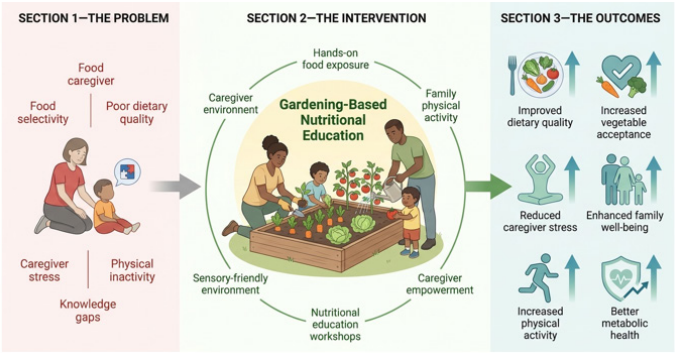
Graphical abstract



Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition primarily diagnosed in early childhood, characterised by impairments in social communication and the presence of restricted, repetitive patterns of behaviour.[1] The global prevalence of ASD has risen markedly in recent decades, substantially increasing demand for health, rehabilitation, and welfare services.[2,3] Among the many challenges associated with ASD, nutritional difficulties and physical inactivity are particularly prevalent, contributing to elevated rates of metabolic impairment, obesity, cardiovascular complications, and poor quality of life.[4–9]

Caregivers of autistic children - predominantly parents - bear a substantial proportion of the management burden. Many spend considerable time in occupational and rehabilitation settings, leaving limited capacity to address healthy lifestyle behaviours at home.[10] The demands of caregiving are further compounded by high levels of stress, anxiety, and exhaustion, with caregiver well-being frequently overlooked in intervention frameworks that focus primarily on the autistic child.[11]

Nutritional education has emerged as a critical, yet insufficiently implemented, component of ASD care. Caregivers report significant knowledge gaps regarding the dietary needs of their children, and there remains considerable uncertainty about the most effective formats for delivering nutrition-related guidance.[12] At the same time, gardening and cultivation activities have attracted growing interest as therapeutic and educational tools for individuals with developmental disabilities, offering a nature-based, experiential approach to health behaviour change.[13,14]

In this opinion paper, we argue that gardening-based nutritional education represents a promising, evidence-informed, and yet underestimated strategy for simultaneously improving dietary knowledge and behaviour in autistic children, increasing family-based physical activity, and reducing caregiver stress. We synthesize the available evidence and propose a conceptual framework for future research and practice.

Nutritional challenges in autism spectrum disorder

Children with ASD are at considerably greater nutritional risk than their neuro-typically developed peers. Restrictive and selective eating patterns are among the most consistently reported challenges, with approximately 90% of autistic individuals exhibiting some form of problematic eating behaviour, including food refusal, repetitive consumption of a narrow range of foods, and swallowing difficulties.[15] Consequently, the dietary profiles of autistic children tend to be characterised by lower intakes of fresh fruits, vegetables, and micronutrient-rich foods, alongside higher consumption of calorie-dense, ultra-processed foods.[16–18]

These dietary imbalances have significant downstream health consequences. Autistic children are at substantially elevated risk of overweight and obesity compared to neurotypically-developed peers,[16] and are disproportionately affected by metabolic disorders,

gastrointestinal complications, immune dysregulation, and oxidative stress.[6–9,11] It has been demonstrated that functional training combined with online nutritional education can produce clinically meaningful improvements in metabolic and inflammatory markers in autistic children, underscoring the therapeutic potential of integrated lifestyle interventions.[6,7,9]

Despite the clear clinical importance of nutrition in ASD, the evidence base for nutritional interventions in this population remains limited and heterogeneous. Karhu et al. (2020) observed that the proliferation of diverse and sometimes contradictory nutritional guidance has created confusion among caregivers, further undermining dietary management capacity.[19] Structured, accessible, and engaging nutritional education programmes are therefore urgently needed.

The role of caregiver knowledge and empowerment

Caregivers serve as the primary mediators of dietary behaviour in autistic children. Their nutritional knowledge, attitudes, and confidence directly shape meal planning, food purchasing decisions, and the management of food selectivity.[12] Coleman et al.[20] identified substantial gaps in nutritional knowledge among families of autistic individuals, highlighting the critical need for targeted educational support.[20]

Educational interventions have demonstrated meaningful effects on caregiver competence and child dietary outcomes. Kral et al.[21] found that a non-technology-based nutritional education programme led to reductions in caloric intake and improvements in dietary quality in autistic children.[21] Similarly, face-to-face nutritional education has been associated with more effective weight management outcomes compared to passive information provision.[22] These findings suggest that the format and experiential quality of nutritional education may be as important as its content.

Beyond dietary knowledge, caregiver well-being is an independent determinant of intervention success. High levels of parental stress, anxiety, and burnout are associated with reduced capacity to implement health behaviour changes and poorer outcomes for autistic children.[10] Effective caregiver empowerment programmes must therefore address not only knowledge deficits but also the emotional and psychological needs of families. Physical activity, in particular, has been consistently shown to reduce stress and anxiety in caregivers of autistic children,[2] creating an important synergy between nutritional and physical activity interventions.

Gardening-based nutritional education: a dual-purpose intervention

Gardening and cultivation activities offer a uniquely powerful platform for delivering nutritional education in a context that is experiential, sensory-rich, and inherently motivating for many autistic individuals. Rather than relying solely on didactic instruction, gardening-based approaches allow participants to engage directly with the food system - planting, tending, harvesting, and ultimately consuming the foods they have grown - a process that has been shown to increase vegetable acceptance and dietary variety in paediatric populations.[23]

Shiji and Beela[23] demonstrated that garden-based nutrition education in preschoolers significantly improved healthy eating habits and cognitive outcomes, supporting the value of hands-on, nature-integrated approaches to dietary change.[23] For autistic children specifically, physical contact with plants and vegetables during gardening activities may gradually reduce sensory aversions and increase willingness to try novel foods, addressing one of the core barriers to dietary improvement in this population.

The therapeutic benefits of gardening for autistic individuals extend well beyond nutrition. Chang and Chang[14] reported that outdoor and cultivation activities reduced negative affect, improved behavioural symptoms such as agitation, and enhanced attentional capacity in children with developmental challenges.[14] Van der Valk[24] proposed that gardens can serve as a therapeutic milieu for autistic youth, promoting communication, emotional regulation, and a sense of mastery and agency.[24] Nam and Yun[25] evaluated a 30-week gardening programme for children with developmental disabilities and found significant reductions in problem behaviours, including aggressive and disruptive behaviours.[25]

Critically, gardening is an inherently family-based activity. When caregivers participate alongside their children, cultivation programmes provide a structured and enjoyable form of shared physical activity, fostering bonding and mutual support while simultaneously addressing physical inactivity — a major risk factor for metabolic complications in ASD.[4] The physical engagement involved in gardening contributes to increased daily activity levels, improved motor coordination in the child, and reduced caregiver stress — outcomes that parallel those reported in structured physical activity programmes.[2,3]

Furthermore, gardens provide a natural and low-pressure social context that may ameliorate the social isolation commonly experienced by autistic individuals and their families. Anas[13] highlighted the potential of therapeutic gardens to improve social interaction and communicative behaviours in autistic children.[13] This social dimension is particularly relevant given evidence that social isolation is a key driver of lifestyle-related health deterioration in ASD.[4]

A proposed framework for gardening-based nutritional education in ASD

Based on the evidence reviewed above, we propose a multicomponent gardening-based nutritional education framework designed to address the intersecting needs of autistic children and their caregivers. The framework incorporates three core elements:

First, structured nutritional education for caregivers, delivered through workshops focusing on ASD-specific dietary needs, food selectivity management, meal planning, and the role of nutrition in managing metabolic and behavioural health. Educational content would draw on evidence-based guidance regarding key nutritional components relevant to ASD, including omega-3 fatty acids, antioxidants, and probiotic-rich foods.[19]

Second, a family cultivation programme, incorporating regular gardening sessions in accessible community or school-based green spaces. Gardening activities would be designed to be sensory-inclusive and adapted to individual autistic children's needs, with the participation of caregivers as active co-participants rather than supervisors. Assessment of physical activity levels before and after the intervention using the Children Physical Activity Questionnaire (CPAQ) would allow quantification of activity-related outcomes.[26]

Third, caregiver well-being support, including sessions on stress management, peer support networking, and practical communication strategies for managing ASD-related family challenges. The Parenting Stress Questionnaire (PSQ) would be administered before and after the intervention to evaluate changes in caregiver anxiety, stress, and

sleep quality.[27] Dietary outcomes would be assessed using 24-hour food recall and Food Frequency Questionnaire (FFQ) instruments.[28]

This integrated framework directly addresses the evidence-identified gaps in current ASD intervention provision: the lack of experiential, family-centred nutritional education approaches that simultaneously target child dietary behaviour, caregiver knowledge and confidence, physical activity, and family mental health.

Implications and future directions

The implementation of gardening-based nutritional education programmes in ASD care settings carries significant practical and policy implications. Community gardens, school-based growing spaces, and adapted public parks represent underutilised resources that could be mobilised to support autistic families with relatively modest infrastructure investment. Collaboration between nutritionists, occupational therapists, behavioural specialists, and horticulturalists would be essential to programme design and delivery.

From a research perspective, the field requires rigorously designed randomised controlled trials to establish the efficacy of gardening-based nutritional education in ASD. Such trials should incorporate validated outcome measures spanning dietary quality, physical activity, metabolic biomarkers - including oxidative stress and inflammatory markers[6,7,9] - caregiver mental health, and family quality of life. Process evaluations examining engagement, fidelity, and acceptability would also be valuable to understand how and for whom such interventions work best.

Moiniafshari et al.[7] have previously demonstrated that health-related interventions, including functional training and dietary modification, can improve metabolic impairments and adiponectin expression in individuals with ASD,[8,29] reinforcing the broader case for integrated, multicomponent approaches. Gardening-based nutritional education represents a natural extension of this evidence base into a format that is family-centred, ecologically valid, and potentially highly scalable.[30–33]

Conclusion

Caregivers of autistic children face a complex and demanding set of challenges that intersect across nutritional management, physical health, mental well-being, and social participation. Gardening-based nutritional education offers a promising, evidence-informed strategy for addressing these challenges in an integrated, accessible, and engaging manner. By combining direct nutritional education with hands-on cultivation experience and family physical activity, this approach has the potential to improve dietary quality in autistic children, increase fresh food acceptance, promote family bonding, reduce caregiver stress, and enhance overall family well-being.

We call for the development of structured, evaluated gardening-based nutritional education programmes in ASD care settings, and for investment in high-quality research to build the evidence base for this intervention approach. Empowering families through green, experiential education may prove to be one of the most sustainable and impactful contributions to improving health outcomes in the autistic community.

Conflict of interest

The author declares that there are no conflict of interest.

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