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Effects of Horticultural Interventions on the Mental Health of Older Adults: A Systematic Review

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ADMINISTRATIVE INFORMATION

Support - No support.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 2 September 2026 and was last updated on 2 September 2026.

INTRODUCTION

Review question / Objective This systematic review aims to synthesize evidence from randomized controlled trials on the effects of horticultural interventions on the mental health of older adults. Specifically, it seeks to examine the characteristics of the included studies; compare differences in study design, intervention protocols, intervention duration, and control conditions; identify the measurement tools used to assess mental health outcomes; and evaluate the effects of horticultural interventions on mental health outcomes among older adults, including depression, anxiety, stress, mood, psychological well-being, loneliness, and other related outcomes. According to the PICOS framework, the population comprises older adults; the intervention consists of horticultural interventions; the comparison includes participants who do not receive horticultural interventions; the outcomes include any mental health-related outcomes; and the study design is restricted to randomized controlled trials.

Condition being studied The condition of interest is mental health among older adults. Older adults may experience a range of mental health problems, including depression, anxiety, psychological stress, loneliness, negative mood, and reduced psychological well-being, particularly in the context of bereavement, retirement, chronic disease, functional decline, reduced mobility, and institutionalization. This review is not restricted to older adults with a specific diagnosed mental disorder. Instead, it considers a broad range of mental health-related outcomes, including depression, anxiety, stress, mood, loneliness, psychological well-being, and other related psychological and behavioral outcomes.

METHODS

Participant or population The population of interest consists of older adults, as defined by the original studies. No restrictions will be imposed on sex, residential setting, or specific health condition. Eligible participants may include community-dwelling older adults, residents of nursing homes

or long-term care facilities, hospitalized older adults, and older adults receiving mental health services. Both generally healthy older adults and those with specific health conditions, such as dementia, frailty or pre-frailty, cancer survivorship, depressive symptoms, or other health problems, will be eligible.

Intervention The intervention of interest is horticultural intervention. In this review, horticultural intervention is defined broadly to include horticultural therapy, therapeutic horticulture, and other health-promoting activities involving real or virtual plants and participatory gardening activities. Eligible interventions may include planting, sowing, transplanting, watering, pruning, plant care, harvesting, flower-related activities, horticultural crafts, and other structured gardening activities. Interventions may be delivered individually or in groups and may involve guidance from horticultural therapists or other trained professionals. Virtual horticultural interventions, such as virtual therapeutic gardens, are also eligible when horticultural or plant-related activities constitute the primary component of the intervention.

Comparator The comparator will consist of control conditions without horticultural intervention. Eligible comparators may include wait-list controls, usual care, standard treatment, routine institutional activities, no intervention, or active control conditions such as social activities, traditional activities, educational activities, soil-related tasks without plants, and computer-based activities.

Study designs to be included Randomized controlled trials (RCTs), including parallel-group randomized controlled trials and crossover randomized controlled trials, will be included.

Eligibility criteria Only peer-reviewed journal articles will be included. Systematic reviews, review articles, study protocols, conference papers, dissertations or theses, books or book chapters, preprints, and other non-peer-reviewed publications will be excluded. No language restrictions will be applied. Studies for which insufficient information is available to determine eligibility will also be excluded.

Information sources The following electronic databases will be searched: Web of Science, Scopus, PsycINFO, and PubMed. The searches will cover studies published up to June 1, 2026. No language restrictions will be applied. Only peer-reviewed journal articles will be considered eligible; grey literature, conference papers, dissertations or theses, books, preprints, and other non-peer-reviewed publications will not be included.

Main outcome(s) The main outcomes are mental health-related outcomes among older adults, primarily including depression, anxiety, psychological stress, loneliness, and psychological well-being. Additional outcomes may include mood and affective states, comfort and relaxation, life satisfaction, social connectedness, and dementia-related psychological or behavioral symptoms such as apathy. Outcomes will be assessed using validated psychological scales and other measures reported in the included studies, such as the Geriatric Depression Scale (GDS), Self-Rating Depression Scale (SDS), Depression Anxiety Stress Scales-21 (DASS-21), State-Trait Anxiety Inventory (STAI), Zung Self-Rating Anxiety Scale (SAS), Geriatric Anxiety Scale (GAS), Hospital Anxiety and Depression Scale (HADS), Perceived Stress Scale (PSS), and measures of psychological well-being. Outcomes will be considered at post-intervention and, where available, at follow-up assessments.

Quality assessment / Risk of bias analysis The methodological quality of the included studies will be assessed using the QualSyst quality assessment tool for quantitative studies. The tool consists of 14 criteria, with each item rated as "yes" (2 points), "partial" (1 point), "no" (0 points), or "not applicable" (N/A). Overall methodological quality will be expressed as a percentage of the maximum possible score and classified as strong (>75%), moderate (55–75%), or weak (<55%). In addition, the Cochrane Risk of Bias 2 (RoB 2) tool will be used to assess the risk of bias of randomized controlled trials across five domains: bias arising from the randomization process, bias due to deviations from intended interventions, bias due to missing outcome data, bias in measurement of the outcome, and bias in selection of the reported result. Each study will be classified as low risk, some concerns, or high risk of bias. Assessments will be conducted independently by two reviewers, with disagreements resolved through discussion or, when necessary, consultation with a third reviewer.

Strategy of data synthesis This review will analyze the basic characteristics, intervention protocols, assessment tools, and main findings of the included studies. The findings will then be synthesized according to the major mental health outcome domains, including depression, anxiety, psychological stress, loneliness, psychological well-being, and behavioral and psychological symptoms. Within each outcome domain, the

direction and statistical significance of intervention effects will be compared across studies, while considering differences in intervention characteristics, duration, comparator conditions, and measurement methods.

Subgroup analysis No formal subgroup analysis will be conducted.

Sensitivity analysis No formal sensitivity analysis is planned. The robustness of the findings will be considered qualitatively by taking into account the methodological quality and risk of bias of the included studies when interpreting the results.

Country(ies) involved Malaysia；China; South Korea.

Keywords Horticultural interventions; Older adults; Mental health; Systematic review; Randomized controlled trials.

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