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社区老年人自然干预措施范围综述

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摘要：【目的】健康老龄化是世界卫生组织（World Health Organization, WHO）提倡的一项优先政策，旨在创造能够支持老年人健康积极生活的环境，提高老年人的健康水平。目前，学界对自然干预措施（nature-based interventions, NBIs）的研究方兴未艾，NBIs 日益受到科学家和学者的关注。【方法】采用范围综述的方法探讨针对社区老年人的 NBIs 类型及其理论框架。运用史蒂芬斯数据库（EBSCOhost）对 Academic Search Premier、Art & Architecture Complete、CINAHL Complete、Education Resources Information Center (ERIC)、GreenFILE、MEDLINE 6 个数据库进行检索。检索文献的语种涵盖中、英文，但仅检索到英文文献，最终共纳入 22 篇文献进行分析。【结果】关于老年人 NBIs 类型的研究成果较为多样化，但仅有 3 篇文献探讨了理论框架。尽管健康老龄化已被 WHO 列入全球国家政策议程的关键优先事项，但是检索到的文献都聚焦于个体健康，没有一篇侧重于老年群体的健康促进。【结论】老年人是一个特殊群体，随着年龄的增长，身体机能会逐渐下降，然而他们有着个性化的需求，因此在为老年人制订健康促进计划时需要特别注意。研究人员和从业人员需要把握当前形势，以宏观、系统的视角来审视健康问题。

关键词：自然干预措施；园艺疗法；社区；老年人；健康促进；范围综述

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截至 2022 年，老龄人口占世界人口比例的 10%，中国的老龄人口数量居世界首位。预计到 2040 年，中国老龄人口将达到 4.02 亿，占总人口数量的 28%^[1]。据联合国预测，到 2050 年全球每 6 人中就有 1 名老年人^[2]。为了应对这种趋势，世界卫生组织（World Health Organization, WHO）已将健康老龄化作为全球国家政策议程的关键优先事项^[3]。

在过去 10 年中，学界对自然干预措施（nature-based interventions, NBIs）^[4]的研究兴趣日益浓厚。有研究发现，与绿色环境进行互动可以带来一系列积极的健康效益^[4]。NBIs 有助于提高人们的体育活动参与度、消除抑郁情绪、减轻压力、提升身体机能水平、增强认知能力并促进社会交往^[5]。因此，医疗保健部门了解 NBIs 对老年群体的健康益处至关重要。

目前，关于 NBIs 影响人们健康效益的证据的研究较多^[6]，已有一些研究深入探讨了 NBIs 在特定患者群体（如心理或生理存在健

康问题的人）中的应用情况，然而对 NBIs 在社区老年群体中的应用情况探讨较少。相关研究成果主要针对普通和弱势成年人群体^[7]或发育障碍儿童（如患有自闭症的儿童）^[8]。关于园艺疗法（horticultural therapy, HT）对老年人健康影响的研究主要集中在死亡率，以及心血管疾病、呼吸系统疾病、癌症等疾病的发病率方面^[9]。Hartig 等^[10]指出关于老年群体的现有研究并不全面，学界对社区老年人健康促进方面缺乏重视，因此相关科研人员应加强对该领域研究进展的关注。

运用系统性思维和概念性思维指导 NBIs 的发展并评估其影响非常重要。理论或概念框架对于 NBIs 的发展十分关键，可以据此构建研究路线图来帮助研究人员进行系统性研究，并分析健康行为的动态情况。理论或概念框架不仅可以帮助目标人群筛选合适的干预措施，还有助于评估干预情况^[11]。将研究问题概念化可以帮助研究人员规避盲点，最大

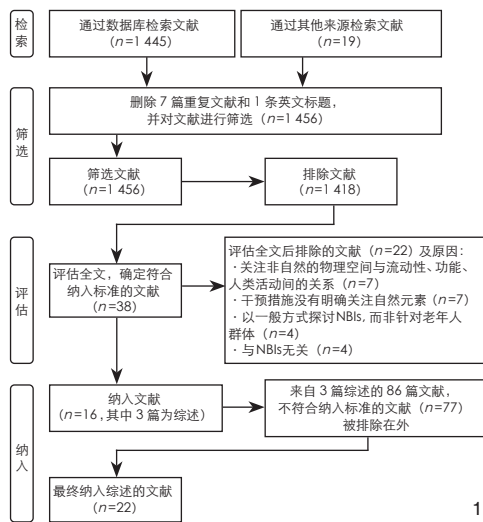
限度地弥补知识缺口。由于检索到的 NBIs 文献内容高度多样化，不宜进行叙述性综述，因此本研究设计并开展了范围综述。

1 研究目的

本研究重点探讨 NBIs 在社区老年群体中的应用情况，以及所使用的相应理论或概念框架，主要涉及 2 个问题。1) 哪些类型的 NBIs 是为社区老年群体设计的？2) 这些类型的 NBIs 应用在社区老年群体中时采用了哪些理论或概念框架？

2 研究方法

本研究的综述协议已在开放科学框架（Open Science Framework, OSF）平台进行了注册（DOI：<https://doi.org/10.17605/OSF.IO/2XGCA>）。本次范围综述遵循 Arksey 等^[12]的研究框架，旨在探究特定领域对 NBIs 研究的程度、范围和性质，并识别现有研究的空白^[13]。



1 PRISMA 文献筛选过程和结果
PRISMA flowchart showing the processes and result of literature selection

Arksey 等指出范围综述应包括 5 个阶段。1) 确定研究问题。2) 识别相关研究; 确定文献检索的时间跨度; 确定纳入的文献语种。3) 根据纳入和排除标准筛选检索到的文献, 至少需要 2 名审阅人员来确认文献是否应纳入综述。4) 根据与研究问题相对应的预设变量, 从选定的文献中提取数据; 绘制数据图表并对文献进行分类, 以便从更宏观的视角加深对相关现象的理解; 解释数据。5) 整理、总结并报告结果。

鉴于有关社区老年人 NBIs 的文献数量有限, 本研究采用了一种广泛的方法, 将可能包含 NBIs 相关研究的各学科数据库纳入检索过程。关于 NBIs 的任何类型的研究、项目、指南或论文, 即任何与自然 (自然环境或自然要素) 相关的、针对社区老年人 (定义为 65 岁及以上) 的疗法或干预措施的成果均被纳入综述。没有明确关注自然或没有讨论在老年人中使用的文献均被排除。综述类文献没有被排除, 这是因为范围综述通常基于广泛的、可能包括多种类型的证据进行, 如基础研究、非实证研究、一般性综述等^[14]。

本研究中范围综述的文献纳入标准: 1) 园艺活动 (活动开展场所为私人花园或社区花园); 2) 蓝绿空间 (河流、湖泊或海洋, 公园或森林); 3) 与自然疗愈相关的治疗、干预措施, 项目或指导方案 (即接触自然环

境或自然要素的疗愈活动); 4) 包含亲自然活动的疗愈项目; 5) 由自然场景、空间和/或要素构建的虚拟仿真环境。文献排除标准: 1) 与环境改造相关的干预、项目或讨论 (如建筑改造相关研究); 2) 关于空间 (或空间使用) 与流动性、活动或人体功能之间关系的研究或讨论, 或关于环境特征与健康特征 (如肥胖或总体死亡率) 之间关系的研究或讨论; 3) 未明确关注自然要素的干预或项目 (侧重于疾病管理, 如记忆问题、抑郁症状、体力活动或疾病隔离); 4) 以一般方式探讨 NBIs 的研究或讨论, 或者没有区分老年人相关概念的研究或讨论; 5) 关于经济评估的研究或讨论 (如 NBIs 的成本效益); 6) 史前或人类考古调查; 7) 与 NBIs 无关的研究或讨论 (如关键词可能包含自然或户外等, 但实际探讨如何提高生活质量或亲子关系等)。

本研究中的数据提取程序采用了 Levac 等^[14] 提出的高级模型, 该模型是对 Arksey 等^[13] 提出的研究框架的进一步提升。由于本研究的目的不是评估文献质量, 因此未对纳入综述的文献进行批判性评估。本研究过程遵循 PRISMA 范围综述报告规范扩展核对清单 (PRISMA-ScR)^[13] 的要求。

在经过数轮测试后, 本研究最终采用的检索式为 (nature or nature-based or garden or gardening or horticulture or horticultural therapy or green space or blue space or outdoor or parks) AND (intervention or therapy or program or guideline) AND (older adults or older people or geriatric or ageing or aged or senior) AND (theory or theoretical framework or model or theoretical model or conceptual framework or conceptual model)。运用史蒂芬斯数据库 (EBSCOhost) 检索 Academic Search Premier、Art & Architecture Complete、CINAHL Complete、Education Resources Information Center (ERIC)、GreenFILE 和 MEDLINE 6 个电子数据库的文献, 语种涵盖中、英文, 且没有发表时间 (年或月) 限制。6 个数据库的检索时间范围均设置为自数据库建立至 2023 年 10 月 15 日。检索每个数据库时都使用了统一的检索式以确保一致性。本研究只利用检索式检索了发表在学术期刊

和科学出版物中的报告和文章, 未检索发表在杂志或报纸等出版物中的文章。此外, 本研究还对美国园艺疗法协会 (American Horticultural Therapy Association, AHTA) 出版的《园艺疗法杂志》(Journal of Therapeutic Horticulture) 全部卷期进行了手动检索^②。

本研究团队中的 2 名成员根据文献纳入和排除标准分别审阅了检索到的文章的标题和摘要, 随后进行初步筛选, 并对筛选出的文献进行了全文审阅, 以决定是否将文献纳入最终的综述。如果 2 名成员对检索到的文献标题、摘要或全文的评价存在分歧, 则邀请第 3 位团队成员参与审阅和讨论。任何意见分歧都需要进行讨论, 直到达成共识。

3 数据收集、提取和分析

遵循 Levac 等^[14] 所描述的迭代过程, 本研究确定了数据收集的方法。在确定最终的检索方式之前, 本研究进行了多轮文献检索测试。数据收集工作在一所大学的图书馆进行, 为了确保收集方法的一致性, 该部分工作由 1 名团队成员负责。该团队成员在数据库中找到文献标题后, 与第 2、3 名团队成员共享。

数据提取和表格记录过程参考了 Pollock 等^[14] 的数据提取模板。记录数据的表格中包含的信息有作者、发表年份、国家、研究类型、研究目的、样本量、模型/框架、干预类型、干预频率和持续时间、主要结论。首先提取与本研究所提出的研究问题相关的数据项, 随后进行频率统计和定性分析, 并依据文献的叙述性摘要回答所预设的研究问题。

4 研究结果

本研究在 6 个数据库中初步检索到的文献数量 (n) 为 1 445 篇, 在《园艺疗法杂志》中检索到的文献数量 19 篇, 删除 7 篇重复文献 (其中 6 篇来自 6 个数据库, 1 篇来自《园艺疗法杂志》) 和 1 条英文标题后, 对 1 456 篇文献进行筛选 (图 1)。在审阅标题和摘要后排除了 1 418 篇文献, 再对剩余的 38 篇文献进行全文审阅, 以确定这些文献是否符合综述纳入标准。其中有 22 篇文献由于以下原因被排除: 关注非自然的物理空间与流动性、

功能、人类活动间的关系 ($n=7$)、干预措施未明确涉及自然元素 ($n=7$)、以一般方式探讨 NBIs, 而非针对老年群体 ($n=4$)、与 NBIs 无关 ($n=4$)。其余 16 篇文献中有 3 篇综述文献, 本研究查阅了这 3 篇综述文献提到的 86 篇文献, 发现仅有 9 篇符合本研究的文献纳入标准。在被排除的 77 篇文献中, 有 1 篇和已被纳入的 16 篇文献重复, 有 2 篇文献属于同一项研究, 其中大部分论文与 NBIs 无关, 有些论文的研究对象是成年人而非老年人。还有几篇关于老年人的研究也被排除在外, 因为其研究对象是疗养院居民。最终, 本研究将共 22 篇文献纳入综述^③。

本研究筛选出的 22 篇文献发表于 2004—2022 年, 其中英国 6 篇, 美国 5 篇, 新加坡 3 篇, 韩国 3 篇, 加拿大、中国、丹麦、芬兰、日本各 1 篇 (按第一作者国籍分类)。

在纳入综述的文献中, 样本 (被试者) 量 (N) 共 3 136 个。单篇文献的样本量范围为 5~1 516。少数文献 ($n=4$) 的样本为 55 岁及以上的老年人, 1 篇文献的样本年龄 20~80 岁不等。

4.1 针对社区老年人设计的 NBIs 类型

对于本研究提出的第 1 个研究问题, 在纳入综述的 22 篇文献中, 研究类文献采用的干预措施包括 HT^[17-23]、园艺活动^[24-29]、在自然中漫步^[30-31]、多模态活动 (如社交互动)^[32-34]、森林漫步^[35-36]、户外活动 (如公园健身项目)^[37] 和图片欣赏^[38]。其余文献为调查和访谈, 并非干预研究。

在随机对照试验 (randomized controlled trial, RCT) 和准实验研究的文献中, 采用的干预措施、干预频率和持续时间不同。如干预频率从只进行 1 次 (如欣赏自然图片或散步) 到每周进行 1、2 或 3 次, 持续时间 6~24 周不等。最常见的情况是每周进行 1 次干预活动, 持续 12~15 周。

4.2 社区老年人 NBIs 研究的相关理论、概念框架

对于本研究提出的第 2 个研究问题——是否采用理论、概念框架来指导 NBIs 研究设计? 目前来看成果很少。Gamble 等^[38] 采用了注意力恢复理论 (attention restoration theory,

ART); Ng 等^[17] 采用了“生物-心理-社会”三维归因模型 (biopsychosocial model); Duedahl 等^[22] 采用了海德格尔 (Heidegger)^[39] 的“此在” (德语: dasein) 概念。其余文献均未采用任何模型或框架, 但有 2 篇文献在讨论健康问题结合了生物医学的视角。

5 单篇文献介绍

本研究纳入的 22 篇文献采用的研究方法包括: RCT ($n=7$)、准实验研究 ($n=5$)、定性研究 ($n=6$)、问卷调查研究 ($n=3$)、混合方法研究 ($n=1$)。

5.1 随机对照试验 (RCT)

Sia 等^[18] 的研究是在新加坡进行的一项 RCT, 评估了 HT 项目 (每周 15 h 的干预) 对老年被试者心理健康的效益, 发现 HT 有助于促进被试者与他人交流互动, 显著改善了他们的心理健康状况。

Ng 等^[17] 的研究是针对在新加坡进行的一项 RCT ($N=59$) 的二次数据分析, 该研究通过比较 HT 组与等待对照组 (wait-listed control group) 的结果, 分析了 HT 的生物-心理-社会效益。被试者在 3 个月内每周进行 1 次干预, 然后在接下来的 3 个月内每月进行 1 次干预, 共进行 15 次干预。结果显示, 被试者的社会交往情况与炎症标志物 IL-6 水平显著相关, 并在第 6 个月时呈现出显著的效果。Ng 等认为社会交往对于发挥 HT 在减少炎症方面的生物效应非常重要。

尽管 2 组作者没有明确提及, 但 Sia 等和 Ng 等的 2 篇文献很可能属于同一项研究。2 篇文献具有相同的样本量和样本描述 (HT 组 $N=29$ 、对照组 $N=30$), 以及相似的筛查方案和相同的干预次数。

Lee 等^[35] 研究了森林漫步 (仅 1 次) 对被试者 ($N=70$) 动脉硬化和肺功能的健康效益。在配对样本分析中, 1 h 的森林漫步显著改善了被试者动脉硬化和肺功能的情况, 但在城市漫步组的被试者中未观察到显著变化。通过比较发现不同组的结果差异显著。

Wu 等^[36] 研究了一种由单一树种 (樟树, *Cinnamomum camphora*) 组成的森林对患有高血压的老年人 ($N=31$) 的影响, 测量了被试

者的血压、脉搏、血氧饱和度、心率、心率变异性、血浆 C 反应蛋白, 并记录了被试者的情绪。与对照组相比, “森林浴” (为期 3 天) 对被试者有显著的积极影响。此外, 研究发现实验组和对照组所处环境中的挥发性有机化合物主要成分差异较大, 因此需要谨慎解读该研究结果。

Rantanen 等^[34] 对参与每周个性化户外活动干预项目的残疾人 ($N=121$) 的生活质量 (quality-of-life, QoL) 进行了研究。该项目由志愿者组织, 为期 3 个月, 干预措施不仅包括参加文化活动或散步, 还包括参观港口和公园。研究表明, 虽然干预项目对被试者的 QoL 没有影响, 但对被试者的体能评分有显著影响, 干预措施对行动能力严重受限的老年人有积极作用。

Demark-Wahnefried 等^[20] 进行了一项为期 1 年的针对家庭菜园项目的小规模 RCT, 探索了该项目对改善癌症幸存者 ($N=42$) 健康状况的可行性及效果。结果显示该项目是可行的, 且受到了被试者的欢迎。数据显示被试者的身体状况和行为习惯均出现积极的变化。

Han 等^[20] 对患有心理健康问题的老年人 ($N=28$) 开展了为期 10 周、每周 1 次的 HT 项目, 并探究了该项目的干预效果。研究显示, 被试者的皮质醇水平显著下降, 说明 HT 有助于缓解压力, 提高被试者的身体机能。

5.2 准实验研究

Gamble 等^[38] 研究了老年人 ($N=30$) 与大学生 ($N=26$) 浏览自然场景图片 (仅 1 次, 持续 6 min) 能否提高他们的身体机能, 以及 2 个群体之间的差异。研究发现浏览自然场景图片 (非城市图片) 能显著提高 2 个年龄组被试者的注意力水平, 但他们的警觉性和定向注意力水平未受影响。

Kling 等^[37] 研究了社区公园基础体育活动项目在改善被试者 (55 岁及以上) 心血管系统功能、肌肉力量和活动能力方面的效益。研究共招募了 192 名被试者, 年龄范围为 57~89 岁, 其中 51% 以上的被试者年龄在 70 岁及以上。21 周后, 共获取 106 名被试者的有效数据。结果表明, 公园体育活动项目 (由教练监督的循证健身课程, 每周 2~3 次、每

次 1 h、为期 3 个月)可以改善老年人的心血管功能,并提升肌肉力量水平。

Kojima 等^[23]研究了健康老年人(N=92)参与 HT 项目(每周 3~4 h,为期 3 个月)前后的认知表现。实验组和对照组的记忆能力和数字广度测验结果没有差异,但实验组的信息处理能力和算术能力均显著提高。研究表明,HT 活动(包括园艺、交流和/或创意工作)有助于提高老年人的认知能力。该研究只进行了配对 *t* 检验,并未分析随时间变化时组间的差异。

Sia 等^[19]发布了一份细节较少的 HT 干预项目(每周 1 次,持续 24 周)简要报告,该报告评估了被试者(N=47)的幸福水平,发现参与了干预项目后被试者的积极情绪显著增加。在干预完成后,Sia 等进行了一次简单的定性调查,发现被试者喜欢干预项目中的所有 HT 活动(共 24 项)。

Park 等^[20]针对老年女性(N=50)开展了一项为期 15 周、每周 50 min 的园艺活动项目,旨在探究该项目对老年女性身心健康的影响。结果显示,实验组的生理(如肌肉量和有氧耐力)和认知(如注意力和记忆力)情况均得到显著改善,但抑郁评分未见变化。然而,对照组的抑郁评分则显著升高。

5.3 定性研究

Infantino^[27]通过对 5 位老年女性进行访谈,运用现象学研究方法探讨了园艺活动作为健康促进策略的疗愈价值,指出园艺活动具有 4 个特征:1)挑战和工作;2)人与自然的连接;3)持续性的学习过程;4)感官和审美体验。Infantino 将参与者与园艺活动的关系描述为蜘蛛与蛛网之间的关系:园艺活动连接着为人们提供生活支持的内部和外部环境。研究表明,园艺活动是一个持续发展、终身参与的过程,有助于老年女性认知和精神健康水平的发展。

Ducdahl 等^[22]进行了一项为期 6 个月的研究,涉及 3 组被试者(当地居民 N=19、二手房业主 N=11、游客 N=8),研究地点位于丹麦最大的国家公园。研究借助海德格尔提出的“此在”(dasein)概念^[30]来理解健康老龄化(即对老龄化的重构)。“dasein”是一个

德语词汇,可译为“此在”(being there),即相对他人而言的某种时空关系。所有被试者都在导游的带领下在公园漫步,同时进行互动和交流^[40]。当地居民在 3 个月内还进行了每周 1 次、每次半天、持续 10 周的 NBIs 课程。Ducdahl 等借鉴了海德格尔的哲学思想,提出人与自然的 3 种关系:“在”(being-in)、“与”(being-with)和“成为”(becoming-with)。研究表明:1)不同老年人与自然的接触方式存在显著差异;2)与自然接触是一个复杂、动态的变化和学习过程;3)自然不是静态的,而是存在和发展的。

Barley 等^[24]对一个社区花园的 16 名使用者进行了访谈。这些使用者年龄在 38~91 岁之间,都患有严重的身心健康问题。通过主题分析和比较分析,研究发现使用者对加入社区花园干预活动的态度都非常积极,他们表示参加户外团体活动最有价值的方面是促进社会交往。

Christie^[25]对参与了城市公园项目的 5 名退休和半退休志愿者进行了长达 3 年的追踪调查,发现城市公园 NBIs 活动有 3 个方面的特点:1)有益于身心健康;2)增加个人、社会和社区的资本投入;3)激励首次参与和持续性参与。Christie 指出,赋权、社会交往、可达性、动机以及无压力的活动都是促使志愿者对 NBIs 持续产生兴趣的因素。

Raine 等^[33]邀请了 14 名有过不同时长自然漫步经历的人(6 名漫步小组领队、8 名漫步小组成员)参与焦点小组访谈。其中一个焦点小组由学龄儿童的家长组成,部分家长可能是老年人。受访者表示,加入漫步小组不仅有助于在团体活动中获得社会支持,还有助于提升幸福感并与自然建立连接。研究指出自然漫步有助于鼓励公众积极参与健康促进活动。

Doughty^[32]的民族志案例研究探讨了“共同运动”(即共同徒步的身体运动)中疗愈景观对参与者产生的情感影响。Doughty 认为乡村徒步疗愈景观可被认为是“一个随着徒步者的共同运动而展开的、充满支持性人际关系的动态领域”。研究发现,共同徒步对社交互动有显著影响,特点是参与者对健康

的取向、与他人的交流以及对乡村有相同的感官体验。

5.4 问卷调查研究

Park 等^[20]对老年园艺活动者和非园艺活动者的身心健康状况进行了比较。研究招募的老年人(N=53)被分为 3 组:积极的园艺活动者、普通园艺活动者和非园艺活动者。3 组人员在心理健康状况方面没有显著差异,但所有组的生理健康水平得分均高于美国人的平均水平。积极的园艺活动者、普通园艺活动者的手部力量和握力大于非园艺活动者。3 组人员的平均骨密度没有显著差异,但得分均高于同龄男性和女性的平均水平。研究发现园艺活动有助于提高手部力量、握力和整体健康水平,是一种行之有效的健身方式。

Marselle 等^[30]比较了在自然环境和城市环境中行走的群体(N=708)的心理和情绪健康状况,发现在农田或绿色廊道中行走的群体感知到的压力和负面情绪显著较少。然而不同环境类型对抑郁情绪和积极情绪的影响未见显著差异。

2014 年,Marselle 等^[31]在英国开展了一项调查,研究在自然环境中行走的群体与未在自然环境中行走的群体在心理、情绪和社会健康方面的差异(N=1 516)。被试者来自英国“健康行走”(Walking for Health, WfH)项目数据库,研究人员通过在线问卷调查的方式在 3 个时间点(第一次行走前、研究开始时、13 周后)收集了被试者的数据。结果显示,在自然环境中行走的群体的抑郁等负面情绪显著减少,压力水平显著降低,同时心理健康状况显著改善,积极情绪显著增加。

5.5 混合方法研究

Hall 等^[21]采用定量和定性相结合的研究方法,探讨了一个为期 10 周的 HT 项目能否提升患有认知症且正在日间照护中心就护老年人(N=14)的园艺活动参与度。研究发现在进行 HT 干预后,这些老年人的身心健康状况得到显著改善,即使在研究结束后,这种积极效果仍持续存在。

5.6 对 2 个研究问题的进一步探讨

5.6.1 研究问题 1:面向社区老年人的 NBIs 类型
在纳入的文献中发现了多种为社区老年

人设计和提供的 NBI 类型：HT、园艺活动、在自然中漫步、多模态活动（如社交互动）、森林漫步、户外活动（如公园健身项目）和图片欣赏等。本综述研究共纳入了 22 篇文献（可能来自 21 项研究），数量非常有限。遗憾的是，22 篇文献中没有一篇详细说明了关于老年人的 NBI 设计应该考虑哪些特殊因素。这些研究可能确实为满足老年人这一特殊群体做了特殊规定，但并没有体现或讨论这些方面。只有 1 篇在介绍干预措施时提到了针对老年人进行的特殊调整，即在可视化信息的呈现中放大字体。本研究证实了预期假设，即 NBI 项目的设计对老年人的特殊需求考虑不足。

5.6.2 研究问题 2：用于指导 NBI 研究的理论或概念框架

运用理论或概念框架指导针对老年人的 NBI 的研究成果相对较少，在 22 篇文献中仅有 3 篇：Gamble 等^[58]采用了 Kaplan^[41]著名的 ART，Ng 等^[17]采用了“生物-心理-社会”三维归因模型，Duedahl 等^[22]以海德格尔的“此在”哲学思想为指导。Lee 等^[53]和 Wu 等^[50]则没有采用任何模型，但从生物医学视角探讨了健康问题。其余研究在设计 NBI 项目时未讨论任何理论或框架。

6 讨论

Nejade 等^[9]区分了 6 种类型的 NBI：自然教育、在自然中开展体力活动、野外疗法、休闲活动、园艺活动、人工环境的自然化营造。本研究对 NBI 的理解与 Nejade 等有所不同，排除了人工环境自然化营造的研究成果。事实上，本研究在筛选文献时只找到了探讨健康情况（如死亡率）与人工环境之间关系的研究，这些文献中有证据表明虚拟现实（virtual reality, VR）环境可能会对老年被试者产生积极影响^[43]。尽管 VR 或其他类型的模拟不能被视为自然环境的替代品，但 Kalantari 等^[42]认为在难以接触到自然环境的情况下，这也是一种有效的方法。目前关于 VR 效果的假设仍有待检验。

对社区老年人使用 NBI 的探讨，揭示了学界对老年人特殊需求关注的不足。人们随

着年龄的增长，身体逐渐出现多种并发症的可能性越来越大^[43]，身体机能逐步退化^[44]。听觉等感官障碍影响社交互动等问题^[45]急需学界广泛关注。老年人是一个有着多样化需求的异质群体，专业人员在与他们合作时需要采用特殊方法^[46]。在 22 篇文献中，仅有 1 篇提到需要对老年人的评估方案进行相应调整（如加大字体）。虽然研究人员只发表他们认为重要的内容，但这的确是老年学研究中易被忽视的一个方面。因此，本综述聚焦了迄今为止 NBI 研究中存在的知识空白。未来的研究需要纳入满足老年人特殊需求的设计元素。

以个人为中心的健康教育到以社区为中心的健康促进是一种根本性转变^[47]。本研究发现多篇文献讨论了在老年群体中实施 NBI 的潜在益处。这些文献的被试者均为老年人，但侧重于负面症状调节或疾病管理，而非健康促进。如 Infantino^[27]讨论了如何维持认知和精神健康的问题；Duedahl 等^[22]探讨了与自然的积极、健康互动的方式；Iwano 等^[48]研究了增进老年人幸福感的措施。虽然 WHO 将 2021—2030 年指定为“健康老龄化行动十年”，但这 22 篇文献中没有一篇强调健康促进议题。未来的研究应重点提高老年人的幸福感，而不仅是控制疾病的负面症状，从而为能够促进老年人健康的 NBI 的科学发展做出贡献。

长期以来，人们从生物学的角度看待老龄化问题，认为老龄化是一个渐进、不可逆、累积性衰退的过程。人们普遍认为，这种过程必然会导致身体机能下降和适应能力减弱^[49]。然而，Tournier^[50]发现这种对老龄化的消极看法与大量关于老年人幸福感和生活满意度的研究结果不符。老龄生态学理论^[51]认为，老年人的能力受所处环境的影响^[50]。因此 NBI 研究或项目设计需考虑老年人的身体机能状态。这是本研究对现有研究工作的及时批评，未来的研究将需要解决这一问题。

本研究发现了一个与老年人生理、社会心理方面有关的社会生态框架（socioecological framework）。后疫情时期，人们愈发认识到社会心理因素和精神健康的重要性，主要体

现在可以促进身心健康的团体活动（如气功、太极拳）、在自然中开展的活动（如在公园中散步），以及艺术疗法（如戏剧）等疗愈项目的蓬勃发展^[1]，尤其是在户外进行的活动^[52]。然而在纳入的文献中，只有 1 篇文献运用了健康社会决定因素（social determinants of health, SDOH）框架，从更广泛的社会学或系统论的角度对 NBI 展开论述。

文献中所运用的理论或概念框架为设计、实施和评估社区老年人健康促进计划提供了循序渐进的研究方案^[53]，为思考特定历史文脉、阐释情境、提出待检验的结构关系、预测和评估结果提供了系统化方法^[11]。有助于从业者理解学术研究成果，有助于研究人员在尊重客观事实的基础上更好地理解人类行为和环境之间的相互作用^[53]。尽管学界愈发关注以理论或概念框架为指导的系统研究方法，但相关文献较少且有待整合^[54]。

本研究认为，理论或概念框架的适用性有限，有待构建多种理论模型来满足所有健康促进环境的需求^[10]。在研究时选择适合特定情境的理论或模型至关重要。针对个体、组织或社区等不同层面的 NBI，需要使用不同的理论或模型的系统性观点^[53]。赖锦玉等^[55]讨论了从跨学科视角推动相关研究和实践的必要性。本研究提议，跨学科合作是 NBI 研究未来的发展方向，且必须纳入包含环境要素的理论模型。综上所述，我们亟须建立人类健康与社会科学、设计学、工程学之间的跨学科合作。如 WHO 推广的 SDOH 框架是一种被广泛使用的系统性框架，认为健康状况与人们出生、生活、学习、娱乐和工作的环境有关。在使用 SDOH 框架推进 NBI 的健康促进目标时，研究人员需要考虑 SDOH 框架的 5 个方面，即获得教育的机会和质量、获得医疗服务的机会和质量、社区和建成环境、社会背景以及经济稳定性^[56]。仅从单一学科视角实施干预措施，而不充分考虑复杂的健康护理环境或缺乏其他学科领域专业研究人员的参与，可能难以取得理想的效果。

7 研究局限

本研究采用了广义的 NBI 定义。在研究

过程中, 本研究发现 NBI 存在多种定义, 如有定义指出 NBI 必须包含在户外自然环境中开展的活动^[7]。对 NBI 的定义不同会导致文献检索结果的差异, 这是综述研究的局限性。因此, 本研究团队建议制定一套 NBI 的命名方法, 以进一步推动 NBI 的科学发展。只有当学术概念被清晰界定时, 才能更好地厘清概念之间的关系。

尽管本研究在检索 6 个数据库时纳入了中文文献, 但并未检索到, 原因可能是发表在这些数据库中的中文文献数量有限。如果检索时将在中国开发的数据库包括在内, 可纳入综述的文献数量将发生变化。由于时间和资源限制, 仅审阅了英文文献是本研究的不足之处, 需要在今后的工作中加以改进。韩国、日本也拥有 HT 和其他 NBI 方面的专业知识, 如果将韩语或日语数据库纳入检索范围, 将进一步丰富对本研究主题的理解。

8 研究结论

医疗保健领域越来越重视与自然接触所带来的治疗效果, 这开辟了 NBI 研究的多种方向。然而, 大多数实验研究都在养老院和护理机构中进行, 而非社区环境。关于使用 NBI 提高社区老年人健康和福祉的研究数量有限。NBI 可能是一种有效的非药物干预措施, 可以提升社区老年人的生理、心理和社会健康水平, 因此亟待进行更深入的研究。

一个人的身心健康和福祉终生受到更广泛的健康决定因素的影响。令人失望的是, 目前对指导 NBI 研究的理论和概念框架的讨论还非常匮乏。WHO 敦促利益相关者和各国在 SDOH 框架的背景下考虑健康和福祉问题。

随着健康促进概念工作的进一步开展, 科学家和研究人员逐渐认识到健康促进不仅需要改变健康行为, 还需要考虑个人、环境和可利用资源之间的相互作用。学界必须摒弃地域思维模式, 开展深入合作, 以解决人类健康和福祉相关问题。

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注释:

① 译者注: 自然疗愈 (nature-based intervention, NBI), 亦称自然干预, 是欧美国家医疗照护领域常用的一种概括性术语 (umbrella term) 或总术语, 用于描述以健康为目的, 在具有自然要素的环境中进行的健康促进活动, 包括园艺疗法 (horticultural therapy, HT)、治疗性园艺 (therapeutic horticulture, TH)、植物疗法 (plant therapy, PT)、自然康复 (nature-based rehabilitation, NBR)、自然疗法 (nature-based therapy, NBT) 等。考虑到国内风景园林、城乡规划和建筑学等学科的用词习惯, 以及国外医疗照护领域自然干预措施逐渐融入于日常生活的趋势, 在一般场合将 NBI 统称为自然疗愈, 而在医疗照护特殊背景下则沿用自然干预, 以反映专业和应用场景的差异性。

② 检索过程与参数详见本刊官网该文章资源附件 (附件 1, <http://www.lalavision.com/cn/article/doi/10.3724/j.fjyl.202312100552>)。

③ 22 篇文献的具体情况详见本刊官网该文章资源附件 (附件 2, <http://www.lalavision.com/cn/article/doi/10.3724/j.fjyl.202312100552>)。

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图 1 由作者绘制。

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Nature-Based Interventions for Community-Dwelling Older Adults: A Scoping Review

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Abstract: [Objective] Active healthy ageing is a policy priority advocated by the World Health Organization (WHO). It involves proving the conditions to enable a heterogeneous older population to continuously engage in an active life. Efforts to promote nature-based interventions (NBIs), which are increasingly popular, are gaining traction amongst scientists and researchers. [Methods] This scoping review examines the types of NBIs that are applied in health promotions for older adults in the community, and whether these studies were guided using a conceptual framework. The following six databases were searched via EBSCOhost: Academic Search Premier, Art & Architecture Complete, CINAHL Complete, Education Resources Information Center (ERIC), GreenFILE, and MEDLINE. All articles published in English and Chinese were included, but only articles in English were found. A total of 22 papers were included in the final analysis. [Results] The NBIs for older adults were diverse, and only three papers

discussed the use of models in guiding their study design. All 22 papers centered on individual health, and none focused on health promotions for older adults despite healthy active ageing having been on the WHO's key health priority for national policy agendas worldwide. [Conclusion] Older adults are a heterogeneous group with individualized needs as they age. Because of diminishing functional capabilities over time, special attention needs to be paid when designing health promotion programs for them. Researchers and practitioners need to be in tune with the current trend of viewing health from a bigger picture and consider the topic from a systems framework.

Keywords: nature-based interventions; horticultural therapy; community; older adults; health promotion; scoping review

Older people constitute 10% of the global population by 2022. China has the largest number of older people in the world. The projection is that by 2040, there will be 402 million older people, constituting 28% of the total population in China^[1]. By 2050, the United Nations projects that globally there will be one older adult for every 6 persons^[2]. To cope with the increasing speed with which populations are ageing, the World Health Organization (WHO) has advocated healthy ageing as a key health priority for national policy agendas worldwide^[3].

There has been a rise in interest in research on nature-based interventions (NBIs) in the past decade. Interactions with green environments have been found to lead to a wide range of positive health outcomes^[4]. NBIs promote engagement in physical activity, combat depressed moods, reduce stress, heighten energy levels, enhance cognitive performance, and foster social connections^[5]. Therefore, it is important that the healthcare sector understand the application of NBIs for older adults.

A large body of evidence on the effects of nature can be found in the literature^[6]. There have

been some studies on the use of NBIs for certain patient populations, such as those with mental or physical health problems; however, discussions on the use of NBIs for community-dwelling older adults are limited. Currently, the evidence focuses mainly on general and vulnerable adult populations^[7] or children who are developmentally challenged (such as those with autism)^[8]. Explorations of the health effects of horticultural therapy (HT) on older adults have focused mostly on mortality, or morbidities such as cardiovascular and respiratory diseases, or cancer^[9]. Hartig et al.^[10] found that research and evidence on older adults as a group, however, has been insufficiently synthesized. All these point to the lack of attention in health promotion of older adults in the community. As such, it is important for researchers to examine the state of knowledge development in this respect.

One aspect that is especially important in scientific endeavors is the adoption of systematic and conceptual thinking to guide the development and gauge the impact of NBIs. Using theories and/or frameworks is crucial in its development. Theories and/or frameworks help researchers to

approach a phenomenon in a systematic manner. They offer a roadmap that facilitates understanding of the dynamics of health behaviors. Not only can they help in identifying suitable interventions for target populations, but they can also be of assistance in evaluating outcomes^[11]. Approaching an issue conceptually would help researchers to avoid blind spots and minimize the lack of recognition of gaps in knowledge. Because the contents of the NBIs described in the literature are highly diverse, it is inappropriate to conduct a narrative synthesis. This study team, therefore, designed a scoping review.

1 Research Aims

The aim of this review is to explore the use of NBIs for community-dwelling older adults, and to determine whether theories or frameworks have been used in their design and application for the community-dwelling older adults. This review addresses two research questions. 1) What are the NBIs that have been designed for community older adults? And 2) what theories or conceptual frameworks have been used to guide the design and application of NBIs for older adults?

2 Methods

This review protocol is registered with the Open Science Framework (DOI: <https://doi.org/10.17605/OSF.IO/2XGCA>). The design of this scoping review was guided by Arksey et al.'s framework^[12]. A scoping review examines the extent, range, and nature of the research activity in a particular area, and is used to identify gaps in the existing literature^[13]. The stages of a scoping review as proposed by Arksey and et al. included the following five stages. 1) Identify the research question. 2) Identify the relevant studies; determine the time span for searches of the literature; determine the language(s) to be used. 3) Select reported studies based on the inclusion and exclusion criteria; at least two reviewers will be required to confirm whether an article should be included in the review. 4) Retrieve data from the selected articles according to pre-determined variables that correspond to the research question(s); chart and sort the data to facilitate a broader view to enhance understanding of the phenomenon of interest; interpret the data. 5) Collate, summarize, and report results.

Since this review team noticed that there have only been a limited number of studies on NBIs for community-dwelling older adults, we used a broad-based approach to include databases from various disciplines that may contain reports pertaining to NBIs. Any types of studies, programs, guidelines, or discussion papers on NBIs, defined as any therapy or intervention related to nature (the natural environment or elements) intended for community-dwelling older adults (defined as those aged 65 or above) were included. Papers that did not have a clear focus on nature or did not specifically discuss its use in relation to older adults were excluded. Review papers were not excluded because scoping review is typically broad-based and may include evidence of various types, i.e., primary research, non-empirical evidence, reviews, and so on^[14].

The inclusion criteria of this scoping review study are: 1) gardening (individual or community

gardens); 2) use of green (e.g., park or forest) or blue (e.g., river or lake or sea) space; 3) therapy or intervention or programs or guidelines related to nature-based activities (i.e., activities that involved exposure to natural environments or elements from nature; 4) multimodal programs whereby one of the integral components is nature-based activities; 5) virtual simulation of scenes, spaces and/or elements associated with nature. The exclusion criteria of this scoping review study are: 1) interventions or programs or discussions that targeted at environment modification (e.g., studies related to building modifications); 2) studies or discussions that examined the relationship between the space (or its use) and mobility or activity or human functions, or the relationship between environmental characteristics with health characteristics such as obesity or mortality in general; 3) intervention or programs that did not have a clear focus on nature (e.g., interventions that focused on investigating management of certain diseases such as memory problems or depressive symptoms, or the focus is only on physical activity or isolation); 4) studies or discussions that approached NBIs in general, or with no distinction/differentiation of concepts pertaining to older adults; 5) studies or discussions of economic evaluation (e.g., cost-effectiveness of NBIs); 6) prehistoric or archaeological investigations of humans; 7) studies or discussions that are found unrelated to NBIs (e.g., may have a keyword such as nature or outdoor but is about examining opportunities to promote quality of life, or about parent-child interactions).

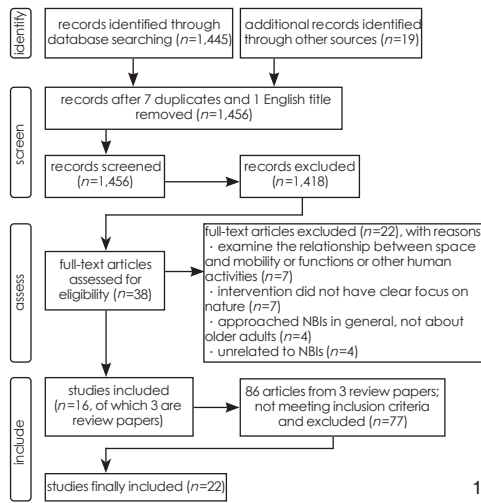
Our data extraction procedures adopted Levac et al.'s advanced model^[14], further modified from Arksey and et al.'s framework^[12]. A critical appraisal of the evidence reported in the included studies was not conducted because our intent was not to appraise the robustness of the evidence. This paper follows the requirements of the PRISMA Extension for Scoping Reviews (PRISMA-ScR) Checklist^[15] in reporting.

The following search terms and approach were used after several rounds of pilot testing: (nature or nature-based or garden or gardening or horticulture or horticultural therapy or green space or blue space or outdoor or parks) AND (intervention or therapy or program or guideline) AND (older adults or older people or geriatric or ageing or aged or senior) AND (theory or theoretical framework or model or theoretical model or conceptual framework or conceptual model). Six electronic databases were searched via EBSCOhost, namely, Academic Search Premier, Art & Architecture Complete, CINAHL Complete, Education Resources Information Center (ERIC), GreenFILE, and MEDLINE. All articles published in English and Chinese were included without any restrictions on period (year or month). They all were searched from the inception of the databases up to October 15, 2023. A standard set of search terms and strategies was used when searching each database to ensure consistency. Only reports and articles published in periodicals and scientific publications were included. Articles appearing in publications such as magazines or newspapers were excluded. All volumes and issues of the *Journal of Therapeutic Horticulture*, published by the American Horticultural Therapy Association (AHTA), were hand-searched^[1].

Two members of the study team independently reviewed the titles and abstracts of the retrieved articles according to the inclusion and exclusion criteria, followed by a review of the full text of papers that had initially been screened, to determine if they should be included in the final review process. In the case of any disagreements over the appraisal of the retrieved titles, abstracts or of the full-text papers, a third reviewer was invited to join in the deliberations. Any differences in opinion were discussed until a consensus was reached.

3 Data Collection, Extraction and Analysis

The approach to collecting data follows the



1 PRISMA flowchart showing the processes and result of literature selection

iterative processes described by Levac et al.^[14]. Multiple rounds of pilot literature searches were conducted until the search strategy was finalized. The collecting of data was conducted in a single university library by a member of the study team to assure that there would be no variance in the data collection approach. After titles were located from the databases, they were shared with the second and third reviewers.

The data extraction template from Pollock et al.^[14] was referred to during the process of extracting data and creating tables. The form to extract data recorded information including the author(s), year of publication, country, study type, research aim(s), sample, model/framework, intervention type, duration of the intervention (e.g., frequency and duration) and key findings. Data items relevant to the research questions were first extracted. A basic analysis including frequency counts plus a basic qualitative content analysis were then conducted. A narrative summary was used to answer the research questions.

4 Results

A total of 1,445 titles ($n=1,445$) were located from the six databases. Nineteen additional records

were found in the *Journal of Therapeutic Horticulture* while conducting the searches. After the removal of seven duplicates (six duplicates from the six databases and one from *Journal of Therapeutic Horticulture*) and one English title, 1,456 titles remained and were screened (Fig. 1). Of these, 1,418 records were excluded after reviewing the titles and abstracts, leaving 38 articles for a full-text reading to determine their eligibility for inclusion. Subsequently, 22 studies and discussion papers were excluded for the following reasons: they examined the relationship between space and mobility or functions or other human activities ($n=7$), the intervention did not have a clear focus on nature ($n=7$), studies dealt with NBIs in general with no distinction made in concepts pertaining to older adults ($n=4$), or the paper was found to be unrelated to NBIs ($n=4$). There were three review papers in the remaining 16 papers. We went through all 86 individual papers that were included in these three reviews and found only nine that met our inclusion/exclusion criteria. Among these 77 excluded papers, one had already been included in the 16 screened titles, and there were two papers that belonged to the same study. Most of them were unrelated to NBIs, and some were about adults and not older adults. Those about older adults were excluded because the study populations were nursing home residents. In the end, 22 papers were selected in our final review².

The 22 included papers were published from 2004 to 2022. Six papers were from the United Kingdom (UK), five from the United States (US), three from Singapore, three from South Korea, and one each from Canada, China, Denmark, Finland, and Japan (classified by the nationality of the first author).

The total sample (participants) size (N) of the included studies was 3,136. The sample size of individual studies ranged from 5 to 1,516. A few studies ($n=4$) had included adults aged 55 or above as the samples. One study included samples ranging in age from early 20 to 80 years old.

4.1 Types of the NBIs Designed for Community Elderly People

For the first research question raised in this study, among the 22 included articles, the reported interventions were HT^[17-23], gardening^[24-29], walking in nature^[30-31], multimodal activities (e.g., social interactions)^[32-34], forest walking^[35-36], outdoor activities such as park-based fitness programs^[37], and picture-viewing^[38]. The rest were a survey and interviews, and not intervention studies.

The design and duration of the interventions reported in the randomized controlled trials (RCT) and quasi-experimental studies were diverse. They ranged from once (e.g., viewing pictures of nature or walking) to sessions held once, twice, or three times per week lasting between 6 – 24 weeks. The most common format was intervention sessions held once a week for 12 – 15 weeks.

4.2 Related Theories or Conceptual Frameworks of NBIs for Community Elderly People

Concerning the second research question — whether a theoretical or conceptual model or framework had been adopted to guide the study design — few studies did so. Gamble et al.^[38] used the attention restoration theory (ART). Ng et al.^[17] adopted the biopsychosocial model, and Duedahl et al.^[22] adopted Heidegger's concept of *dasein*^[39]. The rest did not adopt any model or framework. Among them, however, two studies used a biomedical lens in discussing health.

5 Description of Individual Studies

The 22 included studies consisted of RCT ($n=7$), quasi-experimental studies ($n=5$), qualitative studies ($n=6$), surveys ($n=3$), and a mixed-methods study.

5.1 Randomized Controlled Trials

Sia et al.'s study^[18] was an RCT conducted in Singapore that evaluated the effects of a HT program (15 weekly sessions). This report focused on the psychological well-being of the participants. The authors found a significant improvement in

the participants' psychological well-being through improving their relationships with others.

The study of Ng et al.^[17] is a report of an analysis of the secondary data of an RCT ($N=59$) conducted in Singapore that examined the biopsychosocial effects of HT by comparing the outcomes of a HT group against a wait-listed control group. The participants had weekly sessions for 3 months, then monthly sessions for another 3 months, i.e., a total of 15 sessions. Social connectedness significantly correlated with levels of the inflammation biomarker IL-6, and significantly mediated the effects of HT at 6 months. The authors suggested that social connectedness is important in bringing out the biological effects of HT in relation to inflammation reduction.

Although not explicitly mentioned by the two teams of authors, the two reports by Ng et al. and Sia et al. likely belong to the same study. Both studies have the same sample size and description (HT group $N=29$, control group $N=30$), a similar screening protocol, and the same number of intervention sessions.

Lee et al.^[33] studied the effect of forest walking (once only) on arterial stiffness and pulmonary function ($N=70$). One hour of forest walking significantly improved the outcomes in the forest walking group but no significant changes were observed in the city-walking group in a paired sample analysis. Between group comparisons of the changes in the outcome measures were found to be significant.

Wu et al.^[34] studied the effect of a forest made up of a single tree species (*Cinnamomum camphora*) on older adults ($N=31$) with hypertension. Blood pressure, pulse oxygen saturation, heart rate, heart rate variability and plasma C-reactive protein as well as the participants' mood were measured. In comparison to the control group, forest bathing (a 3-day program) was found to have a significant positive impact on the participants, including improved mood scores.

However, the authors observed that the main components of volatile organic compounds were different between the experimental and comparison sites. Therefore, the results need to be interpreted with caution.

Rantanen et al.^[34] studied the quality-of-life (QoL) outcomes of a volunteer-delivered individualized out-of-home weekly activity intervention for disabled people ($N=121$) over a 3-month period. The activities included visiting the harbor and parks, and not just attending cultural events or walking. The findings showed no treatment effect on the environment QoL score but a significant effect on the physical capacity subscore. The authors concluded that the intervention had a positive effect for severely mobility-limited older adults.

Demark-Wahnefried et al.'s study^[29] was a pilot RCT that explored the feasibility and outcomes of a year-long home-based vegetable gardening program for improving the health of cancer survivors ($N=42$). The trial was found to be feasible and welcomed by the participants. Their data showed improvements in health and health behaviors.

Han et al.^[20] examined the effects of a once weekly 10-session HT program for older adults with mental health issues ($N=28$). The authors reported significant decrease in cortisol levels in the intervention group, illustrating that HT improved stress and enhanced the physical functional abilities of the participants.

5.2 Quasi-Experimental Studies

Gamble et al.^[38] examined whether viewing pictures of nature (once only for a duration of 6 minutes) would enhance the executive functions of older adults ($N=30$) when compared with young university students ($N=26$). They found that viewing nature, but not urban pictures, significantly improved executive attention in both age groups. However, alerting, and orienting attention scores were not affected by the viewing of pictures.

In their study, Kling et al.^[37] examined

cardiovascular, strength, and mobility outcomes among participants aged 55 or older who joined a community park-based physical activity program. More than 51% of them were aged 70 or older with an age range of 57 – 89. The researchers recruited 192 participants, but only 106 of them provided data at baseline and at the 21-week follow-up. The findings showed that park-based fitness classes (a one-hour evidence-based fitness program supervised by instructors and held two to three times per week within a 5-month period) catering to the needs of older adults from racially diverse backgrounds (with instructors speaking the language of the participants) could improve cardiovascular health and strength.

Kojima et al.^[23] investigated the cognitive performance of healthy older adults ($N=92$) before and after participating in an HT program (3 – 4 hours weekly sessions for 3 months). The memory capacity and digit span test results of experimental group and control group remained unchanged. But the coding performance of the experimental group improved slightly, and their arithmetic performance significantly improved. The authors concluded that HT activities, including horticulture, conversation, and/or creative work, contributed to improving the cognitive function of older adults. Kojima et al. only conducted paired *t*-tests and did not analyze between-group differences over time.

Sia et al.^[19] produced a short report with few details. The weekly HT intervention lasted 24 weeks. The authors evaluated the participants' ($N=47$) happiness levels and concluded that there were significant improvements in positive affect. The authors also conducted a simple qualitative survey post intervention and reported that the participants enjoyed all 24 HT activities in the program.

Park et al.^[29] investigated the physical and psychological impact of a weekly 50-minute session (for up to a total of 15-sessions) gardening program for older women ($N=50$). The intervention group showed a significant improvement in their

physiological (e.g., muscle mass and aerobic endurance) and cognitive (e.g., attention and memory) performances, but there was no change in their depression score. The control group, however, had a significantly increased depression score.

5.3 Qualitative Studies

Infantino^[27] examined gardening as a health promotion strategy for five older women. She explored the meaning of gardening using the phenomenological method through interviews. The four characteristics identified included gardening is: 1) a challenge and work, 2) a connection, 3) continuous learning, and 4) a sensory and aesthetic experience. The phenomenon of gardening is described as the relationship between a spider and its web that links the internal and external environments that provide support in life. Infantino concluded that gardening appeared to be an evolving lifelong process that sustained these older women in their cognitive and spiritual development.

Duedahl et al.'s work^[22] was a 6-month study involving three groups of participants (local residents, $N=19$; second home owners, $N=11$; and tourists, $N=8$) who used or visited the largest national park in Denmark. They adopted Heidegger's concept of *dasein*^[39] to understand active healthy ageing (i.e., a reframing of ageing). *Dasein*, a German word, can be translated into "being there," implying a temporal and existential orientation towards the being of others. All the participants had walk-alongs guided walks through the park and interacting and interviewing at the same time^[40]. The local residents further had 10 weekly half-day NBIs sessions over a 3-month period. Drawing from the philosophy of Heidegger, the authors identified three types of relationships with nature — being-in, being-with, and becoming-with others and nature; and observed three themes — that there were 1) significant variations in the older adults' engagement with nature, 2) engagement with nature is a complex and dynamic process of change and learning, and

3) nature is not a static given but something existing and unfolding.

Barley et al.^[24] interviewed 16 participants of a community garden aged between 38 and 91, who had a range of severe mental and physical health problems. Thematic analyses and constant comparisons found the participants to be overwhelmingly positive about the effects of joining the program. The most valued aspect commented on by the participants was the social contact consequential to joining an outdoor group program.

Christie^[25] interviewed five retired and semi-retired volunteers of an urban park program and tracked them for 3 years. Christie reported three themes, namely, 1) perceived health benefits of participating in an NBIs; 2) increased personal, social, and community capital; and 3) motives for initial engagement and sustained participation. He concluded that empowerment, social connectedness, access and purposefulness, and a non-pressurized activity were factors sustaining continual interest for the volunteers.

Raine et al.'s study^[33] involved focus group interviews of 14 individuals ($N=6$ walk leaders; $N=8$ walking group members) who had joined nature walks of varying durations. One of the three focus groups consisted of parents of school children; some of those parents might or might not be older adults. The participants reported that participating in the walking groups not only helped them to derive meaning from the social support that they received during their walks in a group, but also helped to improve their well-being and connection with nature. The authors concluded that walking groups can help people to engage in health-promoting behaviors.

Doughty's ethnographic case study^[32] examined the affective influence of shared movement (i.e., body in movement while walking together) in producing a therapeutic landscape in led group walks. The therapeutic countryside walkscape, according to Doughty, can be

understood as "a mobile field of supportive relations that unfolds with the walkers through shared movement". Walking together was found to have a significant impact on social interactions, characterized by a shared orientation towards wellness, communicative embodied presence with others, and a shared sensory appreciation of the countryside.

5.4 Survey

Park et al.^[28] compared the physical and psychological health conditions, and physical and leisure activities of older gardeners and non-gardeners. The older adults ($N=53$) who were recruited were differentiated into three groups for analysis: active gardeners, ordinary gardeners, and non-gardeners. No difference was found in terms of their psychological health status, but all groups had higher physical health scores than the general US population. Active gardeners and ordinary gardeners had greater hand strength and pinch force than non-gardeners. There was no significant difference in their mean bone density, but all of them had higher scores than the average level of men and women of their age. The authors concluded that gardening promotes hand strength, pinch force, and overall physical health, and could therefore be a strategy to meet the recommendation to engage in physical activities.

Marselle et al.'s survey^[30] compared the psychological and emotional well-being of groups walking in natural as opposed to urban environments ($N=708$). Groups that walked through farmland or through green corridors had significantly less perceived stress and negative affect. Yet, there was no significant impact on depression or positive effect with regard to types of environments.

In 2014, Marselle et al.^[31] conducted a survey in the UK studying the mental, emotional, and social well-being of matched groups that walked in nature as opposed to those who did not ($N=1,516$). The participants were drawn from the database of the Walking for Health (WfH) program in

England, and their data were collected at three time points through online questionnaires (before their first WfH walk, followed by when the study began, and then 13 weeks later). Group walks in nature were significantly associated with lower levels of negative affect such as depression, perceived stress, and also with significantly increased mental well-being and positive affect.

5.5 Mixed Methods Study

Hall et al.^[21] used both quantitative and qualitative methods to study whether a 10-week HT program could facilitate participant engagement in horticultural activities. These were clients with dementia who attended adult day care centers ($N=14$). High levels of well-being were observed post-intervention. The positive effects were sustained even after the completion of the study.

5.6 Further Exploration of the Two Research Questions

5.6.1 Addressing the First Research Question: NBIs Designed for Community-Dwelling Older Adults

From the extracted data, a variety of NBIs designed and delivered to community-dwelling older adults were found. These included HT, gardening, walking in nature, multimodal activities (e.g., social interactions), forest walking, outdoor activities such as park-based fitness programs, and picture-viewing. Finding a total of 22 papers from probably 21 studies is of course a very low figure. Regrettably, no study detailed the special considerations that were taken when designing NBIs for older adults. It is possible that these studies might have made certain special provisions to meet the special needs of older participants. Nevertheless, this aspect was either not reported or not discussed. Only one out of the 22 studies mentioned in their description of the intervention that a special adjustment was made, which was to enlarge the size of the font used during the visual presentation of information. Our findings confirmed the observation that NBIs studies rarely explicitly considered the special needs of older

adults in their design.

5.6.2 Addressing the Second Research Question: Theories or Conceptual Frameworks Used to Guide the Design and Application of NBIs

There is also a paucity of discussions on the use of theories or conceptual frameworks guiding NBIs' use for older adults. A mere three out of the 22 papers used a theory or conceptual framework. Gamble et al.^[38], used Kaplan's popular ART^[44]. Ng et al.^[17] adopted a biopsychosocial model, whereas Duedahl et al.^[22] was guided by Heidegger's philosophy on *dasein*. Lee et al.^[35] and Wu et al.^[36] did not adopt any models but used a biomedical lens to understand health). The rest of the studies did not discuss any theories or frameworks in the design of NBIs programs.

6 Discussion

Nejade et al.^[6] differentiated between six types of nature-based health interventions: educational interventions, physical activities in nature, wilderness therapy, leisure activities, gardening, and changes to the built environment. Our definition of NBIs differs from that of Nejade and team. We excluded studies on changes to the built environment. In fact, only studies that examined the relationship between health outcomes (such as mortality) and the built environment were found upon screening. On the other hand, there is some evidence in the literature indicating that virtual reality (VR) can have a positive impact on older participants^[42]. Even though VR or other kinds of simulations cannot be regarded as a substitute for nature in real life, Kalantari et al. argued that it is a useful approach when access to nature is not easy to come by. Postulations about the effects of VR remain to be tested.

The exploration of the use of NBIs for community-dwelling older adults revealed an inadequacy of attention to the special needs of older adults. With advancing age, the gradual occurrence of multiple comorbidities becomes

more likely^[43], leading to a deterioration in functional performance^[44]. Hearing and other sensory disorders will affect social interaction and so on^[45], these problems need to arouse extensive attention of the academic community. Older adults are a heterogeneous group with diverse care needs, and specific approaches will be required when professionals work with them^[46]. Only one included study mentioned the need to make some minor adjustments to their assessment protocol specifically for older adults (i.e., larger fonts). Given that researchers reported (and editors published) only what they considered to be important, it is probably appropriate to say that this is a neglected aspect of gerontological studies. This review, therefore, brings into focus the knowledge gap that exists in NBIs studies to date. Future studies need to incorporate design elements that cater to the special needs of aging individuals.

There is already a fundamental shift from person-focused health education to community-focused health promotion^[47]. In our review, we found publications that discussed NBIs as a potential recommended activity for older adults. However, even if the samples in these papers were made up of older adults, the papers focused more on treating negative symptoms or managing diseases, not on promoting health. For instance, Infantino^[27] discussed sustaining cognitive and spiritual well-being and development, Duedahl et al.^[22] explored active and healthy ways to engage with nature. Iwano et al.^[48] examined the provisions that were made to enhance well-being in healthy older adults. While the WHO designated the years 2021–2030 as the Decade of Healthy Ageing, none of the 22 papers emphasized health promotions. This review contributes to the development of the science of NBIs in health promotion of older adults by pointing out that the enhancement of well-being, and not merely managing negative symptoms in illnesses, is important in future investigations.

For a long time, ageing was viewed through a

biological lens that conceptualized the process as a path to progressive, irreversible, and cumulative decline. The common notion is that such processes invariably lead to decreased functional performance and reduced adaptation capacities^[49]. Tournier^[50], however, found that such a negative perception of ageing did not match the plentiful research findings on the reported well-being and life satisfaction of older adults. The ecological theory of ageing^[51] posits that older adult's competencies must correspond to the demands of the environment^[50]. As such, the functional status and capabilities of older adults must be taken into consideration in research and intervention designs. This is a timely critique of current research efforts that arises from the work of this review team. Future studies will need to address this particular aspect.

Another framework that was found in this review was the socioecological framework relating to the physical and social aspects of ageing. An individual's psychosocial dimension and mental health have been recognized as important, especially in the post-lock down period of the pandemic. The increasing realization that the psychosocial aspect is important to health is shown in the flourishing number of mind-body group activities such as chi-kung, tai-chi, and nature-based activities such as walking in parks, as well as art-based therapies such as drama^[3], particularly if conducted outdoors^[52]. Still, only one of the included papers approached the topic from a broader societal or systems angle, adopting the social determinants of health (SDOH) framework.

Theories and frameworks serve as a roadmap with a step-by-step approach for the design, implementation, and evaluation of a health promotion program^[53]. Theories provide a systematic approach to thinking about certain contexts, interpreting situations, postulating relationships for testing, and predicting and evaluating outcomes^[11]. Theories help practitioners to understand and interpret the findings of their research. They help researchers make the leap from factual information

to understanding the dynamic interactions between behavior and environmental contexts^[53]. Despite the increasing attention paid to systems thinking guided by theories or conceptual frameworks and research impact, the literature on these two dimensions is hardly ever brought together to understand phenomena as an integrated whole^[54].

Our position is that one or a few theories or conceptual frameworks will certainly not suit all health promotion contexts. Multiple theories would be needed to facilitate the solving of various challenges that may arise in promoting health^[10]. It is important to use a theory or model that suits the particular situation. Interventions at an individual organizational, or community-level would require the use of a systematic lens from a different theory or model^[53]. Lai et al.^[55] discussed the need to use an interdisciplinary lens to drive research and practice forward. One of our recommendations is that when considering the use of theories, we must incorporate theories or models that include the environment as an integral element. Cross-disciplinary collaborations should be the way of the future in NBI studies. Following the aforementioned discussion, interdisciplinary collaboration between health and social sciences, design, and engineering are sorely needed. For instance, the SDOH framework promoted by the WHO is a widely adopted system perspective that considers health and health outcomes as consequential to varying conditions in the environments where people are born, live, study, play, and work. When pursuing the advancement of NBIs for health promotion purposes using the SDOH framework, researchers would need to take into consideration the five domains of the SDOH, namely, education access and quality, health care access and quality, neighborhood and built environment, social and community context, and economic stability^[56]. Merely offering an intervention from the perspective of a single discipline, without due consideration of the complex context of health care or engaging the

expertise of researchers from other sciences, may have limited success.

7 Limitations

This review undertook a broad definition of NBIs. The team is aware that there are other definitions of NBIs, which state that NBIs must comprise of activities that take place in natural outdoor environments^[57]. With a different definition of NBIs, our search results could have been different. This is a limitation of our review. Our team, therefore, suggests that a nomenclature of NBIs be developed to further the science of NBIs. It is only when concepts are clearly delineated that we can begin to clarify the relationships between these concepts.

Although we included papers in the Chinese language in the six databases when we conducted our searches, articles in Chinese were not located. It is highly likely that only a limited number of Chinese articles were published in these databases. Including searches of databases developed in China would have led to a change in the number of papers that could be included for review. However, our team were constrained by both time and resources. Merely reviewing papers published in English is a weakness of this paper that needs to be addressed in future endeavors. South Korea and Japan also have expertise in HT and other NBIs. Including databases published in Korean or Japanese in searches will further enrich understanding of the subject matter.

8 Conclusions

The increasing focus in the healthcare sector on the therapeutic effects that contact with nature can bring has opened up multiple lines of research on NBIs. Yet most experimental studies have been carried out in nursing home and residential care facilities, not in community settings. Only a limited number of studies on the use of NBIs for the health and well-being of community-dwelling older adults could be found. NBIs may be a useful non-

pharmacological intervention to enhance the biopsychosocial health of community-dwelling older adults, and thus need to be better investigated.

A person's physical and mental health and well-being are influenced throughout life by the wider determinants of health. There is a disappointing scarcity in the discussions of theoretical and conceptual frameworks guiding NBI studies. The WHO urged stakeholders and nations to consider health and wellness in the context of the SDOH framework.

As scientists and researchers further their work along the concepts of health promotion, they have come to realize that promoting health is not merely about changing health behavior. It is about considering interactions between the person, the larger environment, and the resources available. The scientific community must put aside territorial mind-sets and engage in in-depth collaborations to address what needs to be done for human health and welfare.

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Notes:

① The search process and parameters can be found in the resource attachment (Attachment 1) of this article on the official website of this journal (<http://www.lalavision.com/cn/article/doi/10.3724/j.fjyl.202312100552>).

② For specific information on the 22 articles, please refer to the article resource attachment (Attachment 2) on the official website of this journal (<http://www.lalavision.com/cn/article/doi/10.3724/j.fjyl.202312100552>).

Sources of Figure:

Fig.1 is drawn by the authors.

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