第十七篇：

Impact of a Dynamic Orthosis on Manual Dexterity Among People With Parkinson’s Disease: A Randomized Trial

論文研究目的：動態副木對帕金森氏症患者手部靈巧度之療效評估

本研究的核心目的在於評估**動態彈性織物副木（Dynamic Elastomeric Fabric Orthosis, DEFO）**作為一種新型非藥物治療手段，對於帕金森氏症（Parkinson's Disease, PD）患者手部功能改善的有效性。

具體研究目標包含以下四大面向：

- **評估手部靈巧度的改善情況**：驗證 PD 患者在佩戴專門設計的 DEFO 時，其上肢手部靈巧度（Manual Dexterity）與功能性是否能獲得顯著提升。

- **比較不同藥物狀態下的療效**：探討副木在患者藥物發揮療效時（On state，服藥後）以及藥物效果消退時（Off state，下次服藥前一小時）對運動症狀的影響差異。

- **區分即時效果與長期持續效果**：研究包含兩個時間點的評估，以確認副木是僅在佩戴時產生即時效果，還是經過 2 個月的長期使用後，即使在移除副木的情況下仍能維持療效。

- **作為非藥物介入手段的探索**：由於現行 PD 治療以藥物為主但具侷限性，本研究旨在確認這種質輕、易於操作的副木是否能有效減少震顫（Tremor）與僵硬（Rigidity），並進而提升患者的日常活動能力（ADLs）與生活品質（QoL）。

研究結果彙整

1. 佩戴副木時的即時改善效果

研究顯示，當患者**佩戴**DEFO 時，手部靈巧度與運動症狀有顯著改善。特別是在明尼蘇達手部操作測驗（MMDT）與普渡釘板測驗（PPT）的部分項目中表現優於未佩戴時。

- 原文引用：
    - "The study found that while wearing the orthosis the motor symptoms of PD were reduced and manual dexterity and upper limb functionality improved."
    - "Some participants improved on some manual dexterity items while wearing the orthosis."
    - "The main results of this study indicate that improvements in certain aspects of motor dexterity occur when participants wear the orthosis."

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2. 移除副木後無持續療效

雖然佩戴時有明顯進步，但經過兩個月的持續使用後，一旦**移除**副木，患者的手部靈巧度並未獲得統計學上的顯著改善。

- 原文引用：
    - "However, it was not sustained when the orthosis was removed after 2 mo of use."
    - "However, after using the orthosis regularly for 2 mo, no differences were observed in manual dexterity of the UL when the orthosis was removed."
    - "Although no differences in manual dexterity were found after the orthosis was removed, occupational performance improved with the orthosis on."

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3. 實驗組與對照組的比較結果

在介入 2 個月後（T2），若在「不佩戴副木」的條件下進行測試，實驗組（使用副木組）與對照組（維持日常生活組）在所有測驗（PPT、MMDT、ST）中皆**無顯著差異**。

- 原文引用：
    - "No differences were observed between the CG and the EG on the PPT, MMDT, or ST without orthosis after the EG had worn the orthosis for 2 mo."
    - "after using the orthosis for 2 mo, no differences were observed between the CG and EG when the tests were performed without the orthosis."

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4. 藥物狀態與統計顯著性之觀察

研究觀察到副木在藥物發揮作用（On state）時似乎有更明顯的差異趨勢，但在應用 Bonferroni 校正（Bonferroni correction）後，部分結果失去了統計上的顯著性。

- 原文引用：
    - "The results show a tendency toward greater differences between wearing or not wearing the orthosis in the on state; however, they lack statistical significance after the Bonferroni correction is applied."

論文結論彙整

1. 效果的即時性與侷限性

研究結論指出，DEFO 副木能改善 PD 患者手部靈巧度與功能性的特定面向，但這種效果僅在**佩戴時**存在。當副木移除後，並未觀察到持續性的運動功能改善。

- 原文引用：
    - "The orthosis may improve certain aspects of manual dexterity and functionality among people with PD, but only while it is worn."
    - "However, it was not sustained when the orthosis was removed after 2 mo of use."

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2. 作為非藥物輔助治療的潛力

DEFO 被視為一種易於實施且無副作用的設備，可作為標準治療（藥物治療）之外的有效非藥物輔助手段，用以減輕運動症狀並改善手部操作能力。

- 原文引用：
    - "The DEFO is an easy-to-implement device that may improve manipulative dexterity when worn, and it may therefore be a nonpharmacological adjunct to standard treatment to improve the motor aspects of PD."
    - "This research shows an alternative nonpharmacological treatment that could reduce patients' motor symptoms, improve their functionality, and increase their QoL without adverse side effects."

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3. 對功能獨立性與生活品質的影響

研究強調，手部靈巧度是 PD 患者功能獨立性的重要預測指標。佩戴此副木有助於減少震顫與僵硬，進而提升患者在日常生活活動（ADLs）中的自主性、社會參與感及生活品質。

- 原文引用：
    - "Wearing the orthosis has the potential to enhance functionality, foster greater autonomy, and substantially improve the quality of life of people with PD."
    - "The implications of implementing DEFO could lead to a reduction in bothersome motor symptoms such as tremors and rigidity, thereby

enhancing functionality and fostering greater autonomy in patients' daily lives."

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4. 未來研究方向

由於目前針對 PD 患者使用 DEFO 的研究尚少，結論指出仍需進一步研究來驗證其長期療效，以及手部靈巧度的改善是否能轉化為職能表現與參與度的提升。

- **原文引用：**
  - "Few studies have been conducted with the DEFO among people with PD; thus, further research is needed to verify its efficacy... as well as to determine whether these possible improvements in manipulative dexterity translate into improvements in occupational performance and participation."

研究限制彙整 (Research Limitations)

1. 盲法實施的缺失

本研究採觀察性性質，且評估者與受試者皆未進行盲法（Non-blinded），這可能引入主觀偏差。

原文引用："The observational nature of the study and not having blinded evaluators or patients are limitations of this study." "Neither participants nor evaluators were blinded."

2. 追蹤時間過短

介入期間僅為 2 個月，難以評估長期使用是否能產生神經塑性變化，或是否能減緩帕金森氏症這種退化性疾病的惡化進程。

原文引用："Because of the study's limited duration, it was not possible to ascertain whether longer-term treatment might lead to further improvements or whether it could slow down the progressive deterioration of the disease."

3. 缺乏客觀的遵從性監測

研究對於患者佩戴副木時間的數據，完全仰賴患者的自我報告及電話訪查，缺乏內建感測器提供客觀的佩戴時間數據。

原文引用："These devices do not include a sensor that allows objective data on patient adherence to be obtained." "Obtaining objective data about both adherence and participation would be useful."

4. 統計校正過於保守

為了控制誤差率而使用的 Bonferroni 校正，雖然降低了偽陽性風險，但也可能因過於保守而降低統計檢定力，導致某些具有臨床意義的結果未達顯著標準。

原文引用："It may be too conservative, reducing the power of each test and increasing the risk of false-negative errors... when the corrected α value is applied, some results that would be positive at a significance level of .05 are lost."

5. 氣候與材料侷限性

研究是在寒冷氣候下進行，副木的保暖特點可能成為優勢；但在炎熱氣候下，非透氣材質可能降低患者的佩戴意願。

原文引用："This orthosis was implemented during the winter months in a city with a cold climate... The orthosis may be less comfortable in warmer climates and thus affect adherence to wearing it."

6. 取樣方式

採用的是連續非機率取樣（Consecutive nonprobabilistic sampling），可能限制了研究結果的推論普遍性。

原文引用："Consecutive nonprobabilistic sampling."

學術意義與臨床應用價值彙整

一、 臨床應用的核心意義：提升自主性與生活品質

對於帕金森氏症患者而言，手部靈巧度是預測功能獨立性的關鍵指標。DEFO 的介入提供了以下臨床價值：

- **改善運動症狀與功能：**副木能有效減少震顫與僵硬，進而增強上肢功能並促進患者在日常生活中的自主性。
    - *原文引用：*"reduction in bothersome motor symptoms such as tremors and rigidity, thereby enhancing functionality and fostering greater autonomy in patients' daily lives."
- **強化心理與社交韌性：**透過減輕震顫症狀，副木有助於建立正面的自我形象，減少因疾病特徵產生的尷尬與不安全感，進而提升社交參與度。
    - *原文引用：*"fostering a positive self-image and reducing embarrassment and insecurity associated with symptoms such as tremors."
- **提升職能參與意願：**當功能限制減少，患者更有勇氣重拾先前放棄的活動（如釣魚、縫紉），或探索新的職能體驗。
    - *原文引用：*"enhance social integration and rekindle interest in activities that patients may previously have abandoned."

二、 學術價值與貢獻：填補非藥物治療的實證缺口

本研究不僅驗證了設備的有效性，更在學術研究層面奠定了基礎：

- **開創 PD 非藥物治療的新領域：**過去 DEFO 多用於腦性麻痺或中風，本研究證實其對於 PD 亦具備即時療效，填補了該領域的實證空缺。

    - *原文引用：*"its effectiveness among people with PD remains uncertain... the aim of this study is to assess the effectiveness of this device on UL manual dexterity of people with PD."

- **解決現有輔具的限制：**傳統的震顫抑制裝置通常笨重且外觀不佳，導致醫囑順從性低；本研究使用的 DEFO 輕巧且易於實施，為未來輔具開發提供了新方向。

    - *原文引用：*"existing devices are often bulky and heavy, resulting in low treatment adherence... a need exists to design orthoses that are lighter and more appealing to patients."

- **強化職能治療的角色：**研究強調了職能治療在 PD 整體介入中的重要性，鼓勵 OT 專業人員更深入地參與非藥物介入的研發。
    - *原文引用：*"Studies such as this one can encourage greater involvement of occupational therapy with this and other populations."

三、 總結學術定位

本研究被視為 PD 輔助設備研究的重要「起點」，雖然觀察到效果僅在佩戴時顯現，但它成功證明了輕量化副木在改善日常生活活動（ADLs）參與度上的潛力。

- *原文引用：*"The results obtained in the current study can be a starting point for research on these devices for people with PD or for encouraging the development of new ones."