A bibliometric analysis of statistical terms used in American Physical Therapy Association journals: Pre-to Post-COVID lockdown

Clarisa Martinez & Julie Tilson
University of Southern California
Background

• Evidence based physiotherapist (PT) practice education should be informed by evidence
  • In 2011-12, most common study designs PTs likely to encounter:
    • Prospective cohort, case report, randomized controlled trials
  • Update is needed
• Research productivity was impacted by worldwide COVID-19 shutdowns
  • Shift in types of studies published pre- to post- COVID

¹Tilson et al., BMC, 2016
Background

Number of studies indexed in PubMed

- Search query: (randomizedcontrolledtrial[Filter])
- Search query: (systematicreview[Filter])

COVID-19 Shutdown
• Large language models, like ChatGPT, may be useful to pull study information—like study design—from abstracts
Aims

• To use Generative Pre-Trained Transformer (GPT) to identify the most common study designs used in published physiotherapy research before and after COVID-19 lockdown
Three American Physical Therapy Association journals selected:

- Physical Therapy & Rehabilitation Journal (PTJ)
  - Impact factor: 4.0 (2023)

- Journal of Orthopedic & Sports Physical Therapy (JOSPT)
  - [https://www.jospt.org](https://www.jospt.org)
  - Impact factor: 6.1 (2023)

- Journal of Neurologic Physical Therapy (JNPT)
  - [https://journals.lww.com/jnpt/pages/default.aspx](https://journals.lww.com/jnpt/pages/default.aspx)
  - Impact factor: 3.8 (2023)
Adding Physical Activity Coaching and an Activity Monitor Was No More Effective Than Adding an Attention Control Intervention to Group Exercise for Patients With Chronic Nonspecific Low Back Pain (PAyBACK Trial): A Randomized Trial

* OBJECTIVE: To investigate whether adding physical activity coaching and an activity monitor enhanced the effects of a group exercise program on pain intensity and disability for people with chronic nonspecific low back pain. * DESIGN: Randomized controlled trial with concealed allocation, intention-to-treat analysis, and blinding of participants and assessors. * METHODS: One hundred sixty participants with chronic nonspecific low back pain who were aged between 18 and 60 years and seeking care at an outpatient physiotherapy clinic participated. Both groups received supervised group exercise therapy. The intervention group also received physical activity coaching sessions aimed at improving physical activity, and physical activity electronic feedback delivered by an activity monitor. The attention control group received modified approaches of coaching sessions and an activity monitor. Disability was measured using the Roland Morris Disability Questionnaire (0-24), and pain intensity was measured using the 11-point Numerical Rating Scale (0-10). Linear mixed models were performed to test for differences between groups. * RESULTS: There were no differences between groups for reductions in disability (mean difference [MD] = -0.5 out of 24 points; 95% confidence interval [CI]: -2.2, 1.1) and pain intensity (MD = -0.4 out of 10 points; 95% CI: -1.3, 0.5) at 3-month follow-up. There were no between-groups differences at 6- and 12-month follow-up assessments. * CONCLUSION: Adding targeted physical activity coaching and an activity monitor did not reduce pain intensity or disability more than an attention control approach in participants with chronic low back pain who were undertaking a group exercise program. ABSTRACT FROM AUTHOR
Methods

- Python code to query GPT for each title and abstract, output a JSON file
- GPT output checked by reviewer.

<table>
<thead>
<tr>
<th>Title</th>
<th>Abstract</th>
</tr>
</thead>
</table>
| Adding Physical Activity Coaching and an Activity Emphasis Program Is More Effective Than Adding an Activity Emphasis Program to Pain Management in Patients With Chronic Pain: A Randomized Controlled Trial | To investigate whether adding physical activity coaching and an activity emphasis program improved pain intensity and disability for people with chronic non-specific low back pain. A randomized controlled trial with a parallel allocation, intention-to-treat analysis, and blinding of participants and assessors. The study included 194 participants, with 97 participants randomized to the intervention group and 97 participants to the control group. The intervention group received physical activity coaching sessions aimed at improving physical activity and pain intensity. Disability was measured using the Roland-Morris Disability Questionnaire. The intervention group had significantly lower pain intensity and disability scores than the control group. The intervention group showed improvements in physical activity levels and pain intensity. The control group did not show any significant improvements. | GPT Model

gpt-3.5-turbo
Temperature = 0

Randomized Controlled Trial

Summary of Query:
- Use title and abstract to determine the study design and choose a category from a provided list, without deviation. If abstract is blank, identify as “not applicable”
- Put the study design and category responses without explanations in a compliant JSON format

URL for example query
Results

- 716 total articles in 3 journals
  - 2019: 352
  - 2022: 364
- GPT performance varied by category

<table>
<thead>
<tr>
<th>Study category</th>
<th>N</th>
<th>GPT/Rater agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Practice Guideline</td>
<td>10</td>
<td>100.0%</td>
</tr>
<tr>
<td>Systematic Review</td>
<td>84</td>
<td>70.2%</td>
</tr>
<tr>
<td>Randomized Controlled Trial</td>
<td>40</td>
<td>32.5%</td>
</tr>
<tr>
<td>Observational Cohort, Cross-Sectional, Case-Control</td>
<td>118</td>
<td>78.0%</td>
</tr>
<tr>
<td>Single subject/case study</td>
<td>43</td>
<td>41.9%</td>
</tr>
<tr>
<td>Commentary, Perspective paper, or narrative review</td>
<td>146</td>
<td>86.3%</td>
</tr>
</tbody>
</table>
Results

Post-COVID: more synthesized research, fewer primary studies

Study designs identified from title/abstract from 3 PT journals, 2019-2022

- Clinical Practice Guidelines
- Systematic Reviews
- Randomized Controlled Trials
- Cohort, Cross-sectional, Case-Control Studies
- Case Series, Case Reports

2019 vs 2022
Limits

• Limited to three American physiotherapy journals
• Newer GPT models have data rate limits
  • Requires running queries in batches
  • Limits review of full text
• GPT output requires double-checking\(^2,3\)
  • Articles often met criteria for multiple categories

\(^2\)Tang et al., *npj Digital Med*, 2023
\(^3\)Shaib et al., *arXiv*, 2023
Conclusions

• More synthesized research in PT journals post-COVID, fewer primary studies
• Feasible to use GPT to assist with abstract review
  • Requires careful query construction, process to double-check GPT results
• Can improve output consistency by instructing GPT:
  • To categorize study design based on a provided list
  • How to respond to missing data
• Future work:
  • Need systematic mechanisms for reporting the use of generative AI in research like this and beyond