

***“Falls risk and psychological variables (catastrophizing, depression, anxiety) in patients undergoing orthopaedic total joint (hip or knee) replacement”***

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A thesis submitted in fulfilment of the requirement of the Degree of Masters of Physiotherapy

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## **CERTIFICATE OF ORIGINAL AUTHORSHIP**

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I, Sathiyapriya Gnanakumaran declare that this thesis is submitted in fulfilment of the requirements for the award of Masters in Physiotherapy, in the Graduate School of Health, Discipline of Physiotherapy at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This research is supported by the Australian Government Research Training Program.

Signature:

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## **Statement on the format of the thesis:**

This thesis is presented in the format of Thesis by publication. Chapter 1 is the introduction chapter to the thesis. Chapter 2, representing the first half of the study, is a manuscript that has been prepared for submission. Chapter 3, representing the second half of the study, is a manuscript that is ready for submission to a peer review journal and Chapter 4 is the conclusion chapter of the Thesis.

## **List of Manuscripts:**

1. Sathiyapriya Gnanakumaran, Arianne Verhagen, Poonam Mehta, Toby Newton-John, David Kennedy. (2020) Predicting hospital outcomes for total hip and knee replacement: falls, falls risk and psychological factors.
2. Sathiyapriya Gnanakumaran, Arianne Verhagen, Poonam Mehta, Toby Newton-John, David Kennedy. (2021) Changes in falling behaviour and psychological functioning following total joint replacement surgeries: An observational study.

## **List of presentations:**

*The study has been presented at,*

1. *Sathiyapriya Gnanakumaran, Poonam Mehta, Toby Newton-John, David Kennedy. Falls risk and psychological variables in patients undergoing total joint replacement surgery. Concord Hospital, Physiotherapy Department, Sydney, NSW, Australia, 25/06/2019.*
2. *Sathiyapriya Gnanakumaran, Poonam Mehta, Toby Newton-John, David Kennedy. Falls risk and psychological variables in patients undergoing total joint replacement surgery. Musculoskeletal network meeting, Sydney Local Health District, Sydney, NSW, Australia, 23/08/2019.*
3. *Sathiyapriya Gnanakumaran, Poonam Mehta, Toby Newton-John, David Kennedy. Falls risk and psychological variables in patients undergoing total joint replacement surgery. Research lab meeting, Graduate School of Health, Discipline of Physiotherapy, University of Technology Sydney, 25/11/2019.*

4. *Sathiyapriya Gnanakumaran, Poonam Mehta, Toby Newton-John, David Kennedy. Falls risk and psychological variables in patients undergoing total joint replacement surgery. Higher Degree Research student seminar, Graduate School of Health, Discipline of Physiotherapy, University of Technology Sydney, 25/09/2020.*

## **Ethics Approval:**

Ethics approval was obtained prior to the commencement of the research project through Sydney Local Health District Human Research Ethics committee CRGH (Reference number: LNR/17/CRGH/274; Ref: CH62/6/2017-190). The site-specific approval for CRGH Human Research Ethics committee was obtained (Reference number STE09606) and Ethics ratification was also obtained through University of Technology Sydney High Risk Ethics Committee (Human) as per requirement of the Masters Research Study (Reference number: ETH19-3410). The study protocol was registered with the Australian New Zealand trial registry: registration number ACTRN12618000334202.



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## **List of abbreviations:**

|       |  |
|-------|--|
| ABS   | Australian Bureau of Statistics                                |
| AIHW  | Australian Institute of Health and Welfare                     |
| CSRT  | Choice Stepping Reaction Time                                  |
| CCI   | Charlson Comorbidity Index                                     |
| HADS  | Hospital Anxiety and Depression Scale                          |
| IQR   | Interquartile range  |
| LOS   | Length of Stay   |
| NSAID | Non-steroidal anti-inflammatory Drug                           |
| OA    | Osteoarthritis   |
| PCS   | Pain Catastrophizing Scale                                     |
| PPA   | Physiological Profile Assessment                               |
| SD    | Standard Deviation   |
| SEIFA | Socio-economic Indexes for Areas                               |
| THR   | Total Hip Replacement  |
| TKR   | Total Knee Replacement   |
| TUG   | Timed Up and Go Test   |
| WOMAC | Western Ontario and McMaster Universities Osteoarthritis Index |
| 6MWT  | 6 Minute Walk Test   |

## **Abstract**

Evidence-based management of osteoarthritis (OA) has progressed over the past decades. However, there are still evidence gaps related to the management of osteoarthritis, particularly for surgical options for total knee replacement (TKR) and total hip replacement (THR) and the factors affecting the outcomes of these procedures. This thesis investigates the relationship of potential contributors affecting outcomes of surgical management in osteoarthritis patients.

A prospective cohort study of 100 participants who underwent TKR and THR surgery was undertaken. Chapter 2 reports on the role of previous falls, falls risk, and psychological (pain catastrophizing, anxiety, depression) and functional factors such as Timed up and Go Test (TUG) and Choice Stepping Reaction Test (CSRT) associated with post-operative outcomes of length of hospital stay (LOS), need for inpatient rehabilitation, and need for community support services at discharge. We found that the presence of high level pre-operative pain catastrophizing and depression, and pre-operative poorer function measured with TUG and CSRT, had positive associations with LOS. Pain catastrophizing and pre-operative falls were associated with an increased need for rehabilitation, and the CSRT with the need for community support services upon discharge.

Chapter 3 reports the change in falls, falls risk, and psychological factors prior to surgery to 6-weeks post-surgery. Of 100 participants described in Chapter 2, 68 participants completed the 6-week follow-up for this study. This study found that WOMAC, PCS, HADS scores improved from pre-and post- surgery of a total joint replacement. We found no differences on fall risk.

In summary, these studies showed that psychological factors, falls, and function are associated with post-operative outcomes of LOS, need for inpatient rehabilitation and services. The findings suggest the need for careful assessment and management of psychological factors, function, and falls in patients awaiting joint replacement surgery to improve pre- and post-operative outcomes. These findings empower clinicians and health managers to target relevant pre-operative factors and allocate resources appropriately leading to patient-centred care approach in patients undergoing TKR and THR procedures.