

Biomechanical analysis of lying postures in mature adults.**QUT Ethics Approval Number 170000335****RESEARCH TEAM**

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Associate Researchers:	Mrs Maree Izatt	Project Coordinator
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Science and Engineering Faculty, Queensland University of Technology (QUT)**DESCRIPTION**

In the QUT Biomechanics & Spine Research Group (BSRG) we are currently conducting a study into the biomechanics of lying and how this might affect sleep quality. In Western society we spend more time lying down to sleep than any other single daily activity. However, the scientific literature describing the biomechanical evaluation of lying substrates, particularly commercial mattresses, is scarce.

The present study aims to provide a broader understanding of:

- How healthy individuals, of mature age, lie on surfaces of differing stiffness/firmness,
- Biomechanical parameters which are relevant for lying comfort,
- How the internal spinal anatomy, external spinal posture and lying pressures (i.e. pressure between the person and the mattress) are related, and
- How these biomechanical and postural factors might influence a person's quality of sleep at night.

You are invited to participate in this project because you are a healthy male or female between the ages of 55 and 70, and you do not suffer from Claustrophobia, have a Pacemaker, neurostimulator or other metallic implants, have no prior history of acute spinal conditions, and no prior diagnosis of sleep conditions. Currently to comfortably participate, you can only have a maximum shoulder width of 50cm to fit inside the MRI scanner. You should also be able to complete a 2 month at home trial of a foam mattress.

PARTICIPATION

We will ask you to visit our lab so we can collect measurements and clinical scans of your body while you are standing and lying down. Following this, we will ask you to take part in a home-trial of Sealy mattresses while receiving a professional sleep quality assessment in your home

Lab Measurements: On the testing day, we ask you to either arrive in close fitting activewear (eg. running shorts), or we will provide you with running/gym shorts and a sports crop top for female participants. Firstly you will be asked to complete a short survey recording some demographic information, such as height, weight, age, and gender, and any family or personal history of spinal disorders/injuries or sleep conditions.

In the next part of the study your participation will involve standing still for a few minutes while we capture a 3D scan of you. This gives us a 360° representation or 3D photo of your body size, shape and posture.

You will then be asked to lie on two different foam surfaces, a rigid board (which is our baseline measurement of body shape when lying), and then two foam mattresses, one firm and the other soft. You will be asked to lie on each surface while on your back and then on your side. You will be in each position for a few minutes while measurements are taken underneath you, and another 3D scan is captured of your body shape and posture.

Following the lab measurements, you will be asked to lie on your back and then on your side inside an MRI machine while a radiographer takes an MRI scan of your torso. You will then receive a scan of your spine with an EOS scanner (low-dose x-ray) so we can measure the shape of your spine when you are standing.

Home-trial, sleep quality measurements: Sealy Australia will deliver two mattresses to your house – one in the first month, one in the following month. We will ask you to sleep on each mattress for at least one week, and preferably for the entire month (it is fine for you to sleep on the mattress with your partner for this time). We will provide you with a watch to wear while you sleep, which monitors your sleep quality. As well as this, specialised measurements of your sleep quality will be taken for 1-2 nights during your second/third week sleeping on the mattress. These measurements will be scored by a trained sleep technician to assess the quality of your sleep (ie. How much sleep you have each night and if it is restful).

During this time you will be sent weekly links to online questionnaires on your sleep quantity and quality, and your comfort on the mattress.

Your participation in this project is entirely voluntary. If you do agree to participate you can withdraw from the project without comment or penalty at any time during the project. Your decision to participate or not participate will in no way impact upon your current or future relationship with QUT.

EXPECTED BENEFITS

It is expected that this project will not benefit you directly. However, it may benefit the general public in the future as lessons learned in terms of the biomechanics of lying comfort and sleep quality will feed into the bedding industry, leading to more supportive and comfortable beds being created and sold.

To recognise your contribution should you choose to participate, you will be given \$75.

A car park will be available onsite during your participation in the research project with prior arrangement; please contact the research team if this is needed.

RISKS

There are minimal risks associated with your participation in this project. These include: mild discomfort from lying on the rigid surface; and exposure to a small amount of radiation during EOS scan.

As part of everyday living, everyone is exposed to naturally occurring background radiation (from things such as the ground, building materials, food, air) and receives a dose of about 2 millisieverts (mSv) each year. The effective dose from this study is about 0.21mSv. At this dose level, no harmful effects of radiation have been demonstrated as any effect is too small to measure.

Please note that MRI does not expose you to any radiation and so is safe for use as long as you do not have any metallic implants such as pace makers, neurostimulators or other implants.

There is a risk that abnormal findings may be found on the MRI or EOS scans of healthy participants. If any abnormality is found, Medical Imaging Radiographers/Radiologists will follow their normal procedures, such that the participant and the researchers will be advised of any findings, and told what to do next and/or a referral to an appropriate medical doctor will be arranged.

PRIVACY AND CONFIDENTIALITY

All comments, responses and imaging will be treated confidentially unless required by law.

As the project involves 3D scanning:

- You will have the opportunity to view the models created of yourself at the end of testing.
- Identifying features (i.e. your face), can be obscured or removed from the scan if requested
- It is not possible to participate in the project without being 3D scanned.

Any data collected as part of this project will be stored securely as per QUT's Management of research data policy.

The project is funded by **Sealy of Australia**. To facilitate the in home trial, Sealy will have access to personally identifying information about you such as your name, address and contact details. They will only have access to other research data obtained during the project in a non-identifiable manner.

Please note that non-identifiable data from this project may be used in future projects or stored on an open access database for secondary analysis.

CONSENT TO PARTICIPATE

We would like to ask you to sign a written consent form to confirm your agreement to participate.

QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT

If you have any questions or require further information please contact one of the listed researchers:

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CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT

QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Advisory Team on 07 3138 5123 or email humanethics@qut.edu.au. The QUT Research Ethics Advisory Team is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.

**THANK YOU FOR HELPING WITH THIS RESEARCH PROJECT.
PLEASE KEEP THIS SHEET FOR YOUR INFORMATION.**