



**CORONERS COURT
OF NEW SOUTH WALES**

Inquest:	Inquest into the death of James Edwin Roberts
Hearing dates:	1 April 2022
Date of findings:	16 May 2022
Place of findings:	Coroners Court of NSW, Lidcombe
Findings of:	Magistrate Harriet Grahame, Deputy State Coroner
Catchwords:	CORONIAL LAW – Cycling death – bicycle helmet – star system rating with respect to bicycle helmets
File Number:	2019/47091
Representation:	Advocate assisting : Ms Karissa Mackay (Sgt)
Findings:	<p>Identity</p> <p>The person who died was James Edwin Roberts</p> <p>Date of death</p> <p>He died on 11 February 2019</p> <p>Place of death</p> <p>He died at St George Public Hospital, Kogarah NSW</p> <p>Cause of death</p> <p>He died of a head injury.</p> <p>Manner of death</p> <p>He died from injuries caused by falling from his bicycle at speed.</p>

Recommendations:	To Transport NSW (TfNSW) That Transport for NSW give immediate consideration to working with stakeholders and relevant experts to conduct a feasibility study to assess the need for a star rating system with respect to bicycle helmets. Any feasibility study should include an audit of the current conformity of bicycle helmets to AS/NZS 2063 in NSW

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Introduction

1. This inquest concerns the tragic death of James Edwin Roberts.
2. James died as a result of injuries sustained when he fell from his bicycle on 7 February 2019. His significant head injury was incompatible with life and despite treatment, he died on 11 February 2019. His sudden and unexpected death devastated his family and friends.

The role of the coroner and the scope of the inquest

3. The role of the coroner is to make findings as to the identity of the nominated persons and in relation to the place and date of their death. The coroner is also to address issues concerning the manner and cause of the person's death.¹ A coroner may also make recommendations, arising from the evidence, in relation to matters that have the capacity to improve public health and safety in the future.²
4. In this case there was no dispute in relation to the identity of the deceased or the date, place or medical cause of death. However, the *manner* or *circumstances* of the death required investigation. The court was particularly interested in understanding whether anything could have been done to prevent this kind of tragic accidental death.
5. The court was keen to place James's death in context. Every year a number of NSW citizens die in cycling accidents, however these deaths have rarely been the subject of coronial inquest. In most cases, because the cause of death can be readily determined, there is little consideration of the wider issues or relevant policy framework.
6. A review of deaths conducted by the National Coronial Information System estimated that from January 2005 to March 2021, there was an average of around ten cycling deaths in NSW and the ACT every year.³ In 2019 there were 15 cycling deaths reported to the Coroner, of those at least seven riders were wearing a helmet, one had no helmet and the information is not recorded in seven cases. I note that most deaths occurred in the 41-70 age group. Most riders who died were males.
7. The court was advised that we may see an increase in the number of cycling deaths and cycling injuries with the growing prevalence of electric bicycles which can consistently travel at high speeds. On the other hand, that may be balanced against safety improvements achieved with the introduction of segregated pathways for cyclists in some areas. Clearly helmets are just one part of the overall safety picture.

¹ Section 81 *Coroners Act 2009* (NSW).

² Section 82 *Coroners Act 2009* (NSW).

³ Cyclist death in NSW and the ACT 2005-2021 (CR21-07) NCIS – released March 2021.

The evidence

8. The court took evidence and submissions on 1 April 2022. The court also received documentary material. This material included witness statements, medical records and expert reports. The court heard oral evidence from the officer in charge of the investigation, Sergeant Lachlan Pritchard, and from two eminent experts whose research areas of interest overlapped. Professor Raphael Grzebieta, Emeritus Professor of Road Safety within the Transport and Road Safety (TARS) Research Unit at the University of NSW and Dr Andrew McIntosh whose expertise lies in biomechanics, with a special interest in bicycle and motorcycle crashes and the injuries they can cause, gave oral evidence concurrently. The court was greatly assisted by these experts who had carefully reviewed the material before the court and offered their opinions on the broader systemic issues raised.

Background

9. James Roberts was 51 years of age at the time of his death. He was the loved son of Robert and Lorraine. He was a brother, an uncle and a friend to many. He was described as a creative and intelligent man with wide ranging interests in the arts and the natural environment. At the time of his death he was a student at the National Art School. He was due to complete his master's degree, with a firm intention to proceed to a doctorate.
10. James was described as fun, loving and caring. He is deeply missed by a close circle of friends and relations. The court heard that James was a talented artist with a love of colour, nature and music. His creativity found expression in everything he did. James worked at the Sydney Opera House as a stage mechanist for 16 years prior to his death.
11. His sudden and unexpected death has caused profound grief. His parents created a beautiful book to honour his memory. The court had the opportunity to read "Robbed of a PhD dream" and heard a little of his parent's journey through grief using colour therapy. Their book "Balance With Colour" reflects their journey through the sadness they experienced.

The accident on 7 February 2019

12. James left his home at 41 Clarence Street, Rockdale at about 2.30pm on 7 February 2019. He was wearing an orange coloured "Sai Global Fluid" cycle helmet and riding a red Repco pedal bicycle. James was dressed in a t-shirt, shorts and black leather work boots.

13. He was travelling in a south-easterly direction along Clarence Street. When passing number 23, it appears that, for some reason, the bicycle chain dislodged from the sprocket and jammed into the rear wheel. James was ejected over the handlebars and landed heavily on the bitumen roadway. Marks on the road indicate that he skidded for about 20 metres. When James came to a stop he was on his back with one leg on top of the bike and the other underneath.
14. CCTV from a neighbouring house captured a small part of his journey before the crash. It indicates that as James rode down the hill in a south-easterly direction he was travelling at a high speed. Local residents came to assist and quickly called for an ambulance.
15. Clarence Street, Rockdale is a two-laned bitumen residential street with a speed limit of 50 kilometres an hour. Cars can be parked on each side of the street. A later inspection of the road found that it was smooth without obvious potholes, grating or ridging.
16. James's bicycle was relatively old but appeared to be in reasonable working condition. It was a six speed Repco Cambridge pedal cycle. It had road-specific tyres, each with sufficient tread and pressure. The bicycle's drive chain consisted of a two geared front crank set. The pedals attached to the crank set are separate to the rotation of the wheels. This means that the pedals are not forced to rotate as the bike is in motion. There were no cleats on the pedals and the breaking mechanism appeared to be in good working condition. There was a wire basket over the rear wheel.
17. The bicycle was later examined by Senior Constable Davies, a NSW Police bicycle operative. He observed that at the time of the inspection the front and rear derailleurs were misaligned. Derailleur gears are a variable ratio transmission system commonly used on bicycles consisting of a chain, multiple sprockets of different sizes and a mechanism to move the chain from one sprocket to another. The rear derailleurs on the right side were resting against the spokes of the rear wheel. The chain was being fed around the crank set and the rear cassette, however the misalignment meant that the chain could not flow freely.

Medical treatment and cause of death

18. According to records, ambulance officers arrived at the scene at 2.44 pm⁴. James was observed to be unconscious, pale and diaphoretic. His airways were obstructed due to his postural position. He was unresponsive to painful stimuli. He had multiple episodes of vomiting. It was immediately clear that James had suffered significant injuries. He was

⁴ Autopsy report, page 2

badly grazed. Paramedics noted a haematoma in the left occipital area. He was intubated at the scene and immediately transported to St George Hospital.

19. James was examined at the Emergency Department and doctors confirmed a boggy occipital mass. Chest drains were inserted and he was treated with medication, antibiotics and blood transfusion. CT scanning confirmed a skull fracture as well as an underlying acute subdural haemorrhage, among other injuries. James was taken to the operating theatre and the large subdural haemorrhage under pressure was drained. Tragically he did not improve the following day and was subsequently diagnosed with an unsurvivable brain injury. His parents were anxious to do all they could and sought further medical opinions, but it was confirmed that his very significant injuries were incompatible with life. Family and friends gathered to say farewell and express their love. After brain death was confirmed, ventilator support was withdrawn and James died on 11 February 2019.
20. A limited autopsy was conducted by Dr Little on 14 February 2019. While noting other injuries, Dr Little confirmed the head injury as the cause of death. Toxicological analysis, taken soon after his admission to hospital, indicated a reading of alcohol at a blood level of 0.054 g/100mL and methadone at a therapeutic range. Morphine and codeine were also detected. While the toxicology is noted, it is not possible to make a definitive finding on its relevance to the accident.
21. I have carefully considered all the information before me and find on balance that the medical cause of James's death was a head injury.

Could his death have been prevented?

22. At the time of the accident James was wearing a SAI Global Fluid branded pedal helmet. It was manufactured in 2017 and sold by Anaconda stores, Australia wide. It was described as appearing old and well used.
23. The court was interested to know whether the helmet James was wearing offered adequate protection. For this reason experts were engaged to assess the helmet and to comment on systemic issues arising from the tragic circumstances of James's death.
24. There is no doubt that helmets can save lives and reduce serious injury. Peer-reviewed studies have repeatedly shown that bicycle helmet use is associated with a decrease in brain injury and the severity of brain injury.⁵ Mandating helmet use is appropriate and evidence based. Accepting the important part compulsory helmet regulation plays in reducing brain injury as a given, the court was interested to know what more can be done. The court was assisted by the experts in understanding whether, given the great speed Mr

⁵ Report of Professor Grzebieta, Exhibit 2, page 6. See also the references to his paper

Roberts was travelling, any existing helmet would have been adequate to prevent significant injury and death.

The evidence of Professor Raphael Grzebieta

25. Professor Grzebieta was originally trained as a structural engineer. Over the course of a long career he specialised in the area of vehicle safety⁶. Professor Grzebieta explained that he had a particular interest in “structural crashworthiness” and “looking at how injuries occur to people”.⁷ His expertise relates to “how to decelerate people using protective structures to reduce the loads that are imparted”.⁸
26. Professor Grzebieta carefully analysed the CCTV of James fall and slide, along with photographs taken of the crash scene and roadway. He estimated that it is likely that James was travelling between 38-40 kilometres an hour when he struck the road. He told the court that this was “analogous to reaching the same speed at the road surface as would occur if falling from a height of 5.5 metres, ie akin to falling out the window of a second story building”.⁹ I accept his expertise in coming to these calculations.
27. Professor Grzebieta stated that the speed James was travelling was “not representative of most real world” single vehicle bicycle impacts, but rather significantly *faster* than a cyclist would, on average, ride. The impact energy management capacity of his helmet was “saturated” such that “the expanded polystyrene (EPS) crushable foam liner bottomed out”.¹⁰ In other words the helmet’s liner crush capacity was not capable of preventing the fatal injury by reducing the deceleration force.
28. Professor Grzebieta stated that, although well worn, there were no obvious signs that the helmet was already compromised at the time of the accident. He stated that the EPS liner “appeared to be of adequate quality in those parts of the helmet where it wasn’t damaged or crushed.”¹¹ The harness fasteners appeared to still be attached to the helmet. The photographs examined indicated that the helmet was likely to have been removed by paramedics by cutting the chin strap and had thus remained in place during the collision.
29. Professor Grzebieta explained that Federal and State Governments require bicycle helmets sold in Australia comply with Australian Standard AS/NZS 2063. It is noted that James’s helmet had the correct compliance sticker stuck inside. While the model may

⁶ His full CV is at Tab Appendix M to his report

⁷ 1/4/22 T 8.6

⁸ 1/4/22 T 8.12

⁹ Report of Professor Grzebieta, Exhibit 2, page 4

¹⁰ Report of Professor Grzebieta, Exhibit 2, page 4

¹¹ Report of Professor Grzebieta, Exhibit 2, page 4

have been the subject of a recall related to the harness straps, Professor Grzebieta was of the view this factor had little or no impact on the circumstances of James's death¹².

30. The standard in place at the time of James's death has recently been updated to AS/NZS 2063:2020 and batch testing of helmet production is now required for compliance purposes. Nevertheless, helmets bought from overseas via the internet may not be compliant.¹³
31. Professor Grzebieta stated that the current Australian standard, while providing significant protection, should nevertheless be treated as a "baseline minimum performance requirement" for cycling helmets. Further he suggested that consideration should be given to instituting an Australian consumer safety rating system similar to the safety rating system for motorcycle helmets. He stated "such a consumer star rating system would precipitate the development of novel helmet designs that are likely to make such higher speed impacts possibly survivable as well as provide protection for the more wide and common concussion injuries."¹⁴ He told the court that both Sweden and some parts of the USA have bicycle helmet consumer rating systems. He also outlined some of the more recent novel designs being developed overseas, including an airbag system in Sweden.¹⁵
32. In oral evidence Professor Grzebieta developed an argument about the possible benefits that have been seen with the introduction of other product star systems. He suggested that the Australasian New Car Assessment Program has encouraged vehicle safety and the development of improved safety systems.¹⁶
33. In his view, the impact James suffered was so great that even a helmet compliant to current standards could not have adequately protected him. Nevertheless he appeared optimistic about the ability to continue developing helmets which may offer greater protection in the future. In oral evidence he drew the court's attention to an innovative inflatable collar developed in Sweden. He conceded that it had not been comprehensively tested but pointed out "we have some incredibly talented people around the world that invent different things on how to protect humans in such impact events and we can't discount that...if we had a star rating system that someone would invent a system that could have protected Mr Roberts...having a star rating system would provide that incentive for manufacturers to try and so from that perspective we're always trying to push boundaries of how to protect humans better in such events, particularly with cycling."¹⁷

¹² For discussion of this issue see Report of Professor Grzebieta, Exhibit 2, page 52

¹³ For further discussion of this issue see Report of Professor Grzebieta, Exhibit 2, page 6

¹⁴ Report of Professor Grzebieta, Exhibit 2, page 6

¹⁵ Report of Professor Grzebieta, Exhibit 2, page 73

¹⁶ 1/4/22 T 19.13 onwards

¹⁷ 1/4/22 T 20.47 onwards

The evidence of Dr Andrew McIntosh

34. Dr McIntosh commenced his working life as a physiotherapist but later completed a doctorate from the School of Biomedical Engineering at UNSW.¹⁸ His doctoral research was on bicycle crashes, bicycle helmets performance and the biomechanics of head injuries. Since that time he has completed further research in the area. He has been involved in the revisions of AS/NZS 2063, which is the bicycle helmet standard, since the mid-1990s. He provides technical support and input into the CRASH program, which is the star rating program for motorcycle helmets.
35. Dr McIntosh agreed that the current Australian Standard for bicycle helmets is the baseline minimum performance requirement for cycling helmets. He told the court that the standard has become more stringent over the years and translates into substantive protective benefits for cyclists in a crash.
36. Dr McIntosh explained that AS/NZS 2063 compliant helmets are assessed on “ability to manage an impact (impact energy attenuation and load distribution), stability during an impact and strength of the retention system.”¹⁹ He explained that helmets offer a defined level of minimum protection within a defined area of the helmet. Typically protection will be offered to the “forehead, cranial area, sides of the head to ear level (approximately) and to the rear of the head (occiput).”²⁰ While I do not intend to repeat his detailed explanations in these findings he described the performance testing which takes place and demonstrated the way two differently designed helmets were both compliant to the same performance requirements.²¹
37. Dr McIntosh outlined a number of benefits of introducing a star safety system. These included
- Consumer programs are more responsive (quicker and focussed) to novel helmet designs than standards
 - A consumer program would highlight helmet designs that offer greater protection to the wearer than other designs (eg area of protection and angular head acceleration management)
 - A program would highlight helmet designs that appear to offer greater protection, but do not when properly tested

¹⁸ His full CV is at Tab

¹⁹ Report of Dr Andrew McIntosh, Exhibit 2 page 4

²⁰ Report of Dr Andrew McIntosh, Exhibit 2 page 4

²¹ For his detailed analysis see Report of Dr Andrew McIntosh, Exhibit 2, page 5

- A program would provide information tailored for specific groups (eg children, general riders, road cyclists (racers), mountain bike riders. It could provide information for consumers specific to their particular needs.
- A program would specify tests and ratings unique to the specific rider groups.
- A program could assess important capabilities, not currently directly assessed by AS/NZS 2063 such as angular head acceleration management. This kind of assessment has now been introduced in relation to the standards set for motorcycle helmets.²²

38. While a long term advocate for a consumer star safety system for bicycle helmets, Dr McIntosh was less persuaded than Professor Grzebieta that such a program “would precipitate the development of novel helmet designs in Australia or that such a program, had it existed prior to Mr Robert’s death, would have prevented his death.”²³ He noted that while Australia has been a leader in mandating helmet use and maintaining a robust helmet standard, currently there is little in the way of local helmet design and development. For this reason he expressed the view that the main beneficiaries of a star rating program will be consumers. However he did not rule out the possibility that with promotion and awareness “local and international bicycle helmet designers and suppliers may pay attention to the results of an Australian star rating system, especially if it provides unique performance data relevant to specific cycling groups”.

39. Having heard all the expert evidence I accept that none of the currently compliant helmets on the market could have provided James with sufficient protection for him to avoid significant brain injury, given his speed and the surface on which he fell. Dr McIntosh identified a factor that could have made a difference in principle. He stated that if there had been “a better angular acceleration management system in the helmet so that it reduced the ...angular velocity change of the head or the angular acceleration of the head” injury may have been less severe.²⁴ Subdural haemorrhage is generally thought to be caused by angular acceleration which causes a tearing of the vein that then bleeds. There are other causes of subdural haemorrhage but in cycling incidents this kind of subdural haemorrhage tear can occur.

40. Dr McIntosh noted that there are safety systems aimed at reducing angular acceleration.²⁵ He stated that while it is possible that something like that might have reduced the severity

²² For discussion of these points see Report of Dr Andrew McIntosh, Exhibit 2 page 8 onwards

²³ Report of Dr Andrew McIntosh, Exhibit 2 page 8

²⁴ 1/4/22 T 25.25

²⁵ See his discussion of MIPS 1/4/22 T25.50

of the load on the brain and reduced the likelihood of a fatal injury, it is ultimately very difficult to know.²⁶

41. Nevertheless I am persuaded that it is possible that a consumer star safety system has the long term potential to drive innovation and to provide specific user groups with information that will assist them in choosing the helmet that will offer them the best protection available. I accept Dr McIntosh's view that a star rating system is a "good idea" and replicates the approach taken with motorcycles helmets, child restraint systems and motor vehicles. It has an educative and protective value for consumers.

The need for change and recommendations

42. Both experts stressed the importance of conformity assessment. Dr McIntosh noted that AS/NZS 2063:2020 strengthened conformity assessment by including a mandatory batch testing requirement that specified the test and sample methods.²⁷ I accept his opinion that an audit of the conformity of bicycle helmets would be a valuable first step in introducing a consumer star program. He advised that almost all conformity assessment has moved to China in the last decade. In my view an audit, as part of a star rating program, using Australian facilities would reintroduce confidence in quality assurance.
43. I accept Dr McIntosh's view that a feasibility study is the correct starting point to any consideration of a star rating system. He set out the kinds of matters which should be addressed including the kind of testing which would be required.²⁸ I accept that the expertise is available to conduct such testing at the TfNSW Crashlab, building on their experience with motorcycle helmets. They also have the expertise to identify how such a system could be developed and disseminated.
44. TfNSW was advised of this inquest and closely monitored the proceedings. I was heartened by their ongoing interest, even prior to the hearing. I advised TfNSW of the likely recommendation and asked for their response to the making of a recommendation aimed at ensuring a feasibility study is undertaken. I was advised that TfNSW had no objection.
45. No helmet can protect every rider against injury caused by a collision at significant speed. I accept that helmets commonly available could not have prevented serious injury to James. Nevertheless, it is certainly worth pursuing the possibility of innovation and a

²⁶ 1/4/22 T 26.4

²⁷ Report of Dr Andrew McIntosh, Exhibit 2 page 9 onwards

²⁸ Report of Dr Andrew McIntosh, Exhibit 2 page 10 onwards

system which provides consumers with accurate information about the products available in the marketplace.

Findings in relation to James Robert

46. The findings I make under section 81(1) of the *Coroners Act 2009* (NSW) are:

Identity

The person who died was James Edwin Roberts.

Date of death

He died on 11 February 2019.

Place of death

He died at St George Public Hospital, Kogarah NSW.

Cause of death

He died of a head injury.

Manner of death

Accidental bicycle death. James died from injuries caused by falling from his bicycle at speed.

Recommendations pursuant to section 82 *Coroners Act 2009*

47. For the reasons stated above, having consulted with Transport for NSW (TfNSW), I make the following recommendation,

That Transport for NSW (TfNSW) give immediate consideration to working with stakeholders and relevant experts to conduct a feasibility study to assess the need for a star rating system with respect to bicycle helmets. Any feasibility study should include an audit of the current conformity of bicycle helmets to AS/NZS 2063 in NSW.

Conclusion

48. This inquest occurred some time after James's tragic death. The reasons included delays caused by the pandemic. I would not be surprised if cycling is even more popular today. Certainly the issues addressed by the experts remain relevant. I hope James's family are given some small comfort by a recommendation which calls for a system which may drive creative innovation.

49. Finally, once again I offer my sincere condolences to James's parents. I acknowledge that the pain of losing him in these circumstances is profound.

50. I offer my sincere thanks to my advocate assisting, Ms Karissa Mackay for her hard work in the preparation and conduct of this inquest. I also thank Sergeant Lachlan Pritchard, the officer in charge of the investigation for his assistance.
51. I close this inquest.

Magistrate Harriet Grahame
Deputy State Coroner
16 May 2022
NSW State Coroner's Court, Lidcombe