Tim Doyle Associate Professor Department of Health Sciences

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### Biography

Associate Professor Tim Doyle is a biomechanics and physical performance researcher. He also holds an adjunct Associate Professor with the Centre for Musculoskeletal Research at Griffith University. He was previously employed as a human performance scientist by the Australian Department of Defence, with published research covering military performance, injury screening, and employment standards. He is an accredited Professional Strength and Conditioning Coach with the Australian Strength and Conditioning Association, a Certified Strength and Conditioning Specialist with the National Strength and Conditioning Association, and an accredited level 2 Sport Scientist, and Exercise Scientist with Exercise and Sport Science Australia. His professional and academic collaborations extend both locally and internationally, including professional sports (Rugby Union and League), and Military and Law Enforcement agencies. He completed his PhD in Biomechanics through Edith Cowan University and before this he completed his Master of Science at Ball State University, and his undergraduate studies at the University of Queensland, Bachelor of Science (Human Movement Studies) - Honours. In addition to project grant funding he has been awarded an Endeavour Executive Fellowship which provided the opportunity to spend time at The Mayo Clinic and Stanford University. His research involves neuromuscular biomechanics, injury prevention, and physical preparation in athletes and tactical populations.

### Qualifications

Biomechanics, Doctor of Philosophy, Edith Cowan University Award Date: 1 Jul 2006

Biomechanics, Master of Science, Ball State University Award Date: 1 Jul 2003

Human Movement Studies, Bachelor of Science (Honours), The University of Queensland Award Date: 1 Dec 2000

### **Research outputs**

# Optimizing wearable device and testing parameters to monitor running-stride long-range correlations for fatigue management in field settings

Fuller, J. T., Thewlis, D., Wills, J. A., Buckley, J. D., Arnold, J. B., Doyle, E., Doyle, T. L. A. & Bellenger, C. R., 1 Feb 2024, In: International Journal of Sports Physiology and Performance. 19, 2, p. 207-211 5 p.

Sensor location influences the associations between IMU and motion capture measurements of impact landing in healthy male and female runners at multiple running speeds

Doyle, E. W., Doyle, T. L. A., Bonacci, J. & Fuller, J. T., 8 Jan 2024, (E-pub ahead of print) In: Sports Biomechanics. 15 p.

# Negative consequences of pressure on marksmanship may be offset by early training exposure to contextually relevant threat training: a systematic review and meta-analysis

Cooper, D., Fuller, J., Wiggins, M. W., Wills, J. A., Main, L. C. & Doyle, T., Jan 2024, In: Human Factors. 66, 1, p. 294-311 18 p.

Association of clinically-measured and dynamic ankle dorsiflexion assessed by markerless motion capture during the drop-jump task on landing biomechanics and risk of ankle injury in military personnel undergoing 10weeks of physical training

Feigel, E. D., Bird, M. B., Koltun, K. J., Lovalekar, M., Mi, Q., Martin, B. J., Forse, J. N., Steele, E. J., Bannister, A., Cruz, A. V., Burns, I., Fain, A. L., Doyle, T. L. A. & Nindl, B. C., Sept 2023, In: Journal of Science and Medicine in Sport. 26, 9, p. 476-481 6 p.

Cue utilisation is partially related to performance on an urban operations course but not experience

Cooper, D., Wiggins, M. W., Main, L. C., Wills, J. A. & Doyle, T., Jul 2023, In: Applied Ergonomics. 110, p. 1-7 7 p., 104024.

## Cumulative patellofemoral force and stress are lower during faster running compared to slower running in recreational runners

Doyle, E. W., Doyle, T. L. A., Bonacci, J., Beach, A. J. & Fuller, J. T., 26 Jun 2023, (E-pub ahead of print) In: Sports Biomechanics. 13 p.

#### **Guest Editorial**

Doyle, T. & Wills, J., Jun 2023, In: Journal of Science and Medicine in Sport. 26, Supplement 1, p. S1-S2 2 p.

## A markerless motion capture system can reliably determine peak trunk flexion while squatting with and without a weighted vest

Andersen, J. T., McCarthy, A. M., Wills, J. A., Fuller, J. T., Lenton, G. K. & Doyle, T. L. A., May 2023, In: Journal of Biomechanics. 152, p. 1-5 5 p., 111587.

Sex-specific physical performance adaptive responses are elicited after 10 weeks of load carriage conditioning Wills, J. A., Saxby, D. J., Glassbrook, D. J. & Doyle, T. L. A., 20 Mar 2023, In: Military Medicine. 188, 3-4, p. 658-664 7 p.

# Evaluating the intra- and inter-day reliability of output measures for the VALD HumanTrak: dynamic movements and range of motion of the shoulder and hip with body armour

McCarthy, A., Wills, J. A., Andersen, J., Lenton, G. K. & Doyle, T. L. A., 4 Mar 2023, In: Ergonomics. 66, 3, p. 406-418 13 p.

# A minimal sensor inertial measurement unit system is replicable and capable of estimating bilateral lower-limb kinematics in a stationary bodyweight squat and a countermovement jump

Fain, A. L., Hindle, B., Andersen, J., Nindl, B. C., Bird, M. B., Fuller, J. T., Wills, J. A. & Doyle, T. L. A., 1 Feb 2023, In: Journal of Applied Biomechanics. 39, 1, p. 42-53 12 p.

## Predictive utility of commercial grade technologies for assessing musculoskeletal injury risk in US Marine Corps Officer candidates

Bird, M. B., Koltun, K. J., Mi, Q., Lovalekar, M., Martin, B. J., Doyle, T. L. A. & Nindl, B. C., 17 Jan 2023, In: Frontiers in Physiology. 14, p. 1-14 14 p., 1088813.

## Head and neck characteristics as risk factors for and protective factors against mild traumatic brain injury in military and sporting populations: a systematic review

Cooney, N. J., Sowman, P., Schilaty, N., Bates, N., Hewett, T. E. & Doyle, T. L. A., Sept 2022, In: Sports Medicine. 52, 9, p. 2221-2245 25 p.

### Measures of lower-body strength associated with injuries in Australian Special Forces selection candidates Doyle, T. L. A., Fain, A. C., Wills, J. A., Cooper, D., Toonen, K. & Kamphius, B., 1 Aug 2022, In: Journal of Applied

Biomechanics. 38, 4, p. 255-262 8 p.

#### Improvements in lower-limb strength are associated with hip control during load carriage in females

Wills, J. A., Saxby, D. J., Lenton, G. K. & Doyle, T. L. A., 19 Jul 2022, 40th Conference of the International Society of Biomechanics in Sports, ISBS 2022: Conference proceedings. Robinson, M. A. (ed.). Liverpool: NMU Commons, p. 767-770 4 p. (ISBS Proceedings Archive; vol. 40, no. 1).

## Changes in acceleration load as measured by inertial measurement units manifest in the upper body after an extended running task

Glassbrook, D. J., Fuller, J. T., Alderson, J. A., Wills, J. A. & Doyle, T. L. A., 3 Jul 2022, In: Journal of Sports Sciences. 40 , 13, p. 1467-1475 9 p.

Not all physical performance tests are related to early season match running performance in professional rugby league Glassbrook, D. J., Fuller, J. T., Wade, J. A. & Doyle, T. L. A., 1 Jul 2022, In: Journal of Strength and Conditioning Research. 36, 7, p. 1944-1950 7 p.

#### The influence of speed on patellofemoral joint kinetics in recreational runners

Doyle, E., Doyle, T. L. A., Bonacci, J. & Fuller, J. T., Jul 2022, *40th Conference of the International Society of Biomechanics in Sports, ISBS 2022: Conference proceedings.* Robinson, M. A. (ed.). Liverpool: NMU Commons, p. 159-162 4 p. 38. (ISBS Proceedings Archive; vol. 40, no. 1).

### Unsupervised clustering techniques identify movement strategies in the countermovement jump associated with musculoskeletal injury risk during US Marine Corps Officer Candidates School

Bird, M. B., Mi, Q., Koltun, K. J., Lovalekar, M., Martin, B. J., Fain, A., Bannister, A., Vera Cruz, A., Doyle, T. L. A. & Nindl, B. C., 11 May 2022, In: Frontiers in Physiology. 13, p. 1-14 14 p., 868002.

Senior and junior rugby league players improve lower-body strength and power differently during a rugby league season Wade, J. A., Fuller, J. T., Devlin, P. J. & Doyle, T. L. A., 1 May 2022, In: Journal of Strength and Conditioning Research. 36, 5, p. 1367-1372 6 p.

## The effectiveness of gait retraining on running kinematics, kinetics, performance, pain, and injury in distance runners: a systematic review with meta-analysis

Doyle, E., Doyle, T. L. A., Bonacci, J. & Fuller, J. T., 1 Apr 2022, In: Journal of Orthopaedic and Sports Physical Therapy. 52, 4, p. 192-206+A5 20 p.

#### Examining the intra- and inter-day reliability of the VALD HumanTrak for range of motion of the shoulder in fixed- and freerange conditions

Mccarthy, A., Wills, J., Lenton, G., Andersen, J. & Doyle, T. L. A., 2022, 40th Conference of the International Society of Biomechanics in Sports, ISBS 2022: Conference proceedings. Robinson, M. A. (ed.). Liverpool: NMU Commons, p. 427-430 4 p. 102. (ISBS Proceedings Archive; vol. 40, no. 1).

#### Transferability of a previously validated IMU system for lower extremity kinematics

Fain, A., Hindle, B., Andersen, J., Nindl, B. C., Bird, M. B., Wills, J. & Doyle, T. L. A., 2022, *40th Conference of the International Society of Biomechanics in Sports, ISBS 2022: Conference proceedings.* Robinson, M. A. (ed.). Liverpool: NMU Commons, p. 183-186 4 p. 44. (ISBS Proceedings Archive; vol. 40, no. 1).

Tibial accelerations estimate instantaneous vertical loading rate and peak patellofemoral joint stress during running Doyle, E., Doyle, T. L. A., Bonacci, J. & Fuller, J. T., Dec 2021, *12th Australasian Biomechanics Conference (ABC12): Online Conference Program.* Australia: Australian and New Zealand Society of Biomechanics, p. 52 1 p.

Lower limb biomechanical responses during a standardized load carriage task are sex specific Wills, J. A., Saxby, D. J., Lenton, G. K. & Doyle, T. L. A., 2 Nov 2021, In: Military Medicine. 186, 11-12, p. 1157-1168 12 p.

### The effects of running gait retraining on biomechanics, performance, pain and injury: a systematic review and metaanalysis

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#### Neuromuscular performance and hormonal responses to military operational stress in men and women

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#### Time of season and game segment is not related to likelihood of lower-limb injuries: a meta-analysis Doyle, T. L. A., Schilaty, N. D., Webster, K. E. & Hewett, T. E., 1 May 2021, In: Clinical Journal of Sport Medicine. 31, 3, p. 304-312 9 p.

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Wills, J. A., Drain, J., Fuller, J. T. & Doyle, T. L. A., 1 Aug 2020, In: Medicine and Science in Sports and Exercise. 52, 8, p. 1763-1769 7 p.

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**Biomechanical responses during a standardised load carriage task are sex-specific** Wills, J., Saxby, D., Lenton, G. & Doyle, T., 11 Feb 2020.

Males and females respond differently over a 5 km loaded march and after 10 weeks of training Doyle, T., Wills, J., Glassbrook, D. & Saxby, D., 11 Feb 2020.

Foot accelerations are larger than tibia accelerations during sprinting when measured with inertial measurement units Glassbrook, D. J., Fuller, J. T., Alderson, J. A. & Doyle, T. L. A., 1 Feb 2020, In: Journal of Sports Sciences. 38, 3, p. 248-255 8 p.

Ankle and knee moment and power adaptations are elicited through load carriage conditioning in males Wills, J. A., Saxby, D. J., Lenton, G. K. & Doyle, T. L. A., 3 Dec 2019, In: Journal of Biomechanics. 97, p. 1-7 7 p., 109341.

Load-carriage conditioning elicits task-specific physical and psychophysical improvements in males Wills, J. A., Saxby, D. J., Glassbrook, D. J. & Doyle, T. L. A., 1 Sept 2019, In: Journal of Strength and Conditioning Research. 33, 9, p. 2338-2343 6 p.

**CBP marine interdiction agent Occupational Safety and Health study** Doyle, T. & Spendiff, G., 22 Aug 2019.

A new technique to quantify positional differences in external mechanical load during professional rugby league Glassbrook, D. J., Fuller, J. T., Alderson, J. A. & Doyle, T. L. A., 31 Jul 2019, p. 376. 1 p.

Hip and knee joint moment and power adaptations are elicited through load-carriage conditioning in males Wills, J. A., Saxby, D. J., Lenton, G. K. & Doyle, T. L. A., 31 Jul 2019, p. 1102. 1 p.

Hip joint contact forces increase in response to greater body-borne loads and faster walking speeds Lenton, G. K., Doyle, T. L. A., Lloyd, D. G., Pizzolato, C. & Saxby, D. J., 31 Jul 2019, p. 1047. 1 p.

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Male and female muscular and physical adaptations to load carriage conditioning are sex specific Doyle, T. L. A., Wills, J. A., Lenton, G. K., Glassbrook, D. & Saxby, D. J., 31 Jul 2019, p. 2126. 1 p.

The demands of professional rugby league match-play: a meta-analysis Glassbrook, D. J., Doyle, T. L. A., Alderson, J. A. & Fuller, J. T., 11 Jun 2019, In: Sports Medicine - Open. 5, 1, p. 1-20 20 p., 24.

Primarily hip-borne load carriage does not alter biomechanical risk factors for overuse injuries in soldiers Lenton, G. K., Saxby, D. J., Lloyd, D. G., Billing, D., Higgs, J. & Doyle, T. L. A., Feb 2019, In: Journal of Science and Medicine in Sport. 22, 2, p. 158-163 6 p. Lower-limb joint work and power are modulated during load carriage based on load configuration and walking speed Lenton, G. K., Doyle, T. L. A., Lloyd, D. G., Higgs, J., Billing, D. & Saxby, D. J., 23 Jan 2019, In: Journal of Biomechanics. 83, p. 174-180 7 p.

Inter- and intra-day reliability of common injury screening measures in rugby league is variable Doyle, T. L. A., Devlin, P., Wade, J., Farrah, E., Cramer, M. & Ollerton, L., 3 Dec 2018. 1 p.

#### Lower limb impact accelerations vary with sensor placement

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#### Time-course changes of lower limb kinematics during military load-carriage

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## Tibiofemoral joint contact forces increase with load magnitude and walking speed but remain almost unchanged with different types of carried load

Lenton, G. K., Bishop, P. J., Saxby, D. J., Doyle, T. L. A., Pizzolato, C., Billing, D. & Lloyd, D. G., 5 Nov 2018, In: PLoS ONE. 13, 11, p. 1-14 14 p., e0206859.

#### Prolonged running increases knee moments in sidestepping and cutting manoeuvres in sport

Savage, R. J., Lay, B. S., Wills, J. A., Lloyd, D. G. & Doyle, T. L. A., May 2018, In: Journal of Science and Medicine in Sport. 21, 5, p. 508-512 5 p.

#### Increasing performance on tactical aerobic endurance tasks

Cooper, D. & Doyle, T., Jan 2018, In: TSAC Report. 48, p. 10-14 5 p.

#### A targeted load-carriage training program elicits positive adaptations after 10-weeks

Wills, J. A., Saxby, D. J., Glassbrook, D. J. & Doyle, T. L. A., 2018, In: International Society of Biomechanics in Sports Proceedings Archive. 36, 1, p. 294-297 4 p.

### Integrating a hip belt with body armour reduces the magnitude and changes the location of shoulder pressure and perceived discomfort in soldiers

Lenton, G. K., Doyle, T. L. A., Saxby, D. J., Billing, D., Higgs, J. & Lloyd, D. G., 2018, In: Ergonomics. 61, 4, p. 566-575 10 p.

#### Meta-analysis: fatigue does not increase lower-limb injury risk

Doyle, T. L. A., Schilaty, N. D., Webster, K. E. & Hewett, T. E., 2018, In: International Society of Biomechanics in Sports Proceedings Archive. 36, 1, p. 646-649 4 p.

#### The demands of professional rugby league match-play: a meta-analysis

Glassbrook, D. J., Doyle, T. L. A., Alderson, J. A. & Fuller, J. T., 2018, In: Journal of Australian Strength and Conditioning. 26, 6, p. 36 1 p.

The symmetry angle identifies less clinically relevant inter-limb asymmetries than the symmetry index in healthy adults Glassbrook, D. J., Fuller, J. T., Alderson, J. A., Wills, J. A. & Doyle, T. L. A., 2018, In: International Society of Biomechanics in Sports Proceedings Archive. 36, 1, p. 622-625 4 p., 141.

Lower-limb joint work and power are modulated differently during load carriage based on speed and load configuration Lenton, G., Doyle, T., Lloyd, D., Billing, D. & Saxby, D., 1 Nov 2017, In: Journal of Science and Medicine in Sport. 20, Supplement 2, p. S106 1 p., 179.

The effects of load configuration, mass, and movement speed on biomechanical risk factors for musculoskeletal injuries Lenton, G., Saxby, D., Lloyd, D., Billing, D. C. & Doyle, T., 1 Nov 2017, In: Journal of Science and Medicine in Sport. 20, Supplement 2, p. S174 1 p., 301.

An alternative whole-body marker set to accurately and reliably quantify joint kinematics during load carriage Lenton, G. K., Doyle, T. L. A., Saxby, D. J. & Lloyd, D. G., May 2017, In: Gait and Posture. 54, p. 318-324 7 p.

Jerry can carriage is an effective predictor of stretcher carry performance Beck, B., Carstairs, G. L., Caldwell Odgers, J. N., Doyle, T. L. A. & Middleton, K. J., 2 Jun 2016, In: Ergonomics. 59, 6, p. 813-820 8 p.

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The reach and adoption of a coach-led exercise training programme in community football Finch, C. F., Diamantopoulou, K., Twomey, D. M., Doyle, T. L. A., Lloyd, D. G., Young, W. & Elliott, B. C., Apr 2014, In: British Journal of Sports Medicine. 48, 8, p. 718-723 6 p.

What do community football players think about different exercise-training programmes? Implications for the delivery of lower limb injury prevention programmes Finch, C. F., Doyle, T. L. A., Dempsey, A. R., Elliott, B. C., Twomey, D. M., White, P. E., Diamantopoulou, K., Young, W. & Lloyd, D. G., Apr 2014, In: British Journal of Sports Medicine. 48, 8, p. 702-707 6 p.

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Training affects knee kinematics and kinetics in cutting maneuvers in sport Cochrane, J. L., Lloyd, D. G., Besier, T. F., Elliott, B. C., Doyle, T. L. A. & Ackland, T. R., Aug 2010, In: Medicine and Science in Sports and Exercise. 42, 8, p. 1535-1544 10 p.

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Reliability of measures obtained during single and repeated countermovement jumps Cormack, S. J., Newton, R. U., McGulgan, M. R. & Doyle, T. L. A., Jun 2008, In: International Journal of Sports Physiology and Performance. 3, 2, p. 131-144 14 p.

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A methodological and performance comparision of smith-machine and free weight jump squats Sheppard, J. M., Doyle, T. L. A. & Taylor, K-L., 2008, In: Journal of Australian Strength and Conditioning. 16, 2, p. 5-9 5 p.

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Humphries, B., Dugan, E. L. & Doyle, T. L. A., 2006, *ACSM's resource manual for guidelines for exercise testing and prescription.* 5th ed. Philadelphia: Lippincott Williams & Wilkins, p. 206-224 19 p.

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### Press/Media

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Here's how your kids can avoid injury this footy season Tim Doyle 26/04/18 1 Media contribution

How far can we push the human body till it's reached its limit? Tim Doyle 14/10/19 1 Media contribution

**Is there a limit to human endurance?** Tim Doyle 12/04/18 1 Media contribution

#### Scientists agree Raiders' Josh Papalii is a force of nature

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