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Despite the numerous physical, mental and social benefits of participating in sport, one of the more negative and arguably inevitable consequences that can have wide-ranging effects, is injury. One important factor that has been linked to injury is stress, however research in the sports sciences has addressed the stress-injury relationship from a somewhat narrow perspective. The sub-disciplines of psychology, physiology and biomechanics have focused on factors specific to their respective fields, often using a single wave of measurement that may not capture the dynamic nature of the stress-injury relationship. To address these issues, this study adopts an interdisciplinary approach and repeated measure design to investigate the relationships between measures of psychological stress (major life events) and physiological stress-related markers (muscle stiffness, heart rate variability and balance) to capture the multifaceted and dynamic nature of stress and sports injury. The study found that the probability of injury was greatest when there was a combination of high muscle stiffness *and* poor balance. Additionally, *increases* in negative life event stress and muscle stiffness over time were found to further increase the probability of injury. These findings demonstrate the importance of using an interdisciplinary approach and repeated measure design to increase our understanding of the complex relationship between stress and injury.