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Dr. Gill is a native of Franklinton, Louisiana, where he learned to cook gumbo and jambalaya with the best. He and his lovely wife, April, enjoy spending time together outdoors with their two active children, Hannah and Andrew.

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Dr. Mookerjee completed his undergraduate and medical degrees from Michigan State University (College of Osteopathic Medicine). After medical school, he finished his residency at the Baylor College of Medicine/University of Texas Physical Medicine Alliance at the Texas Medical Center in Houston, Texas. He then traveled back to Michigan State University to complete a fellowship in Sports Medicine and EMG. He is currently a sports medicine/EMG physician at Baylor in Dallas, Texas. Additionally, he is a Clinical Assistant Professor with the Texas A&M Health Science Center at Baylor in Dallas.

In his spare time, he enjoys exercising, being outdoors, going to comedy venues, cooking, and spending time with his friends.

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Ricardo E. Colberg, M.D., is a non-surgical sports medicine and orthopedic physician at the Andrews Sports Medicine and Orthopedics Center in Birmingham, AL. He is a Diplomate of the American Board of Physical Medicine & Rehabilitation and has a Certificate of Added Qualification in Sports Medicine. Dr. Colberg has a strong commitment to providing evidence-based medical care through a patient-centered and holistic approach. He works closely with physical therapists and other health-related disciplines in order to assist patients in their recovery process from injuries and help them reach their ultimate goal of returning to their everyday activities and sports at their optimal potential.

Dr. Colberg grew up in Puerto Rico playing tennis and enjoying water sports such as surfing and sailing. He then moved back to Puerto Rico where he graduated from the University of Puerto Rico Medical School with an M.D. degree and a Certification in Clinical Research. Dr. Colberg completed a residency in Physical Medicine and Rehabilitation at Emory University and a fellowship in Primary Care Sports Medicine at the American Sports Medicine Institute.

Dr. Colberg has a special interest in treating acute and chronic musculoskeletal injuries, including bone, joint, ligament, muscle and tendon injuries. He performs various treatment modalities in the clinic that assist the patient in their recovery from the injury, among them diagnostic musculoskeletal sonography, ultrasound-guided injections, and platelet-rich plasma therapy. His areas of expertise also include non-surgical management of fractures and dislocations, peripheral nerve injuries (e.g. carpal tunnel syndrome), sport-related spine injuries, pediatric sports injuries, biomechanical evaluation of the injured athlete, implementing sports injury prevention protocols, management of osteoarthritis and screening for potential cases that may have a better outcome by undergoing a surgical procedure.

Dr. Colberg is head team physician for Minor High School, Lawson State Community College, and Alabama Soccer Association’s Olympic Development Program (ODP). He has also worked as team physician for the U.S.A. Paralympic Team at the Lakeshore Foundation, the Chicago White Sox’s AA affiliate team - the Birmingham Barons, the Alabama Ballet, the University of Alabama at Tuscaloosa, University of West Alabama and other local high schools and colleges.

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Senior Author
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Dr. James Borchers, MD, MPH received his Bachelor’s degree in Chemistry at The Ohio State University (OSU). During his time at OSU, he was a four-year letter winner as member of the football team and was named Academic All-Big Ten four times. Dr. Borchers received his Medical Degree at Northeastern Ohio Universities College of Medicine. Following medical school he completed residency in Family Medicine at the Toledo Hospital and completed a Primary Care Sports Medicine Fellowship at the Toledo Hospital Center for Sports Medicine. He received his Master’s in Public Health with an emphasis on Clinical Investigations from The Ohio State University in 2008. Following his fellowship, Dr. Borchers joined the Ohio State University (OSU) Medical Center and Sports Medicine staff in 2004. Currently he serves as the Physician Lead for Clinical Operations for the OSU Sports Medicine Physician Practice. Dr. Borchers is an Associate Professor of Clinical Family Medicine and is the Division Director of Sports Medicine in the Department of Family Medicine. Dr. Borchers is also the Director of the OSU Primary Care Sports Medicine Fellowship. He has served as a team physician for The Ohio State University since 2004 and currently oversees the clinical operations for the OSU Athletic Department. Dr. Borchers has authored and co-authored over 50 peer reviewed articles in scientific journals, book chapters and presentations and has co-edited two books. Dr. Borchers has presented at multiple regional and national Sports Medicine conferences and has served as a reviewer for a number of Sports Medicine journals. He is a current member of Alpha Omega Alpha, the American Academy of Family Physicians, the American Medical Society of Sports Medicine and is a Fellow of the American College of Sports Medicine. Dr. Borchers is a past Associate Editor for the Clinical Journal of Sports Medicine Thematic Issue and currently serves on the Editorial Board of The Physician and Sportsmedicine.

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Dr. Jason L. Zaremski is an Assistant Professor in the Divisions of PM&R and Sports Medicine in the Department of Orthopaedics & Rehabilitation at the University of Florida. He is currently the Co-Medical Director of the UF Adolescent and School Outreach Sports Medicine Program. He serves as Team Supervising Physician to multiple high schools in the greater North Central Florida region. Dr. Zaremski received his medical degree from Tufts University School of Medicine. He completed his residency in Physical Medicine & Rehabilitation at Tufts Medical Center in Boston and then completed his Primary Care Sports Medicine Fellowship at the Geisinger Health System in Northeastern Pennsylvania. He is board certified in PM&R and has his Certificate of Added Qualification in Sports Medicine. Dr. Zaremski is currently active in AAPMR, AMSSM, and ACSM. His current research interests involve overuse throwing injuries.
Are Injury Prevention Strategies in Male Soccer Useful at the Collegiate Level?

Eliezer Castaneda, MD and Kory Gill

Level of Evidence: 1 (Randomized Controlled Trial)

Introduction: The Federation Internationale de Football Association (FIFA) developed injury prevention programs such as the “11” and the “FIFA 11+” in an effort to reduce soccer-related injuries. These programs have been evaluated across the spectrum of soccer athletes from recreational to professional players, primarily in female athletes. This is the first large study on male soccer athletes. The “FIFA 11+” was a product of a reconfiguration by researchers in an attempt to address deficiencies not covered in the “11” program. The restructured “FIFA 11+” program has been shown to reduce soccer-related injuries and prepare the athlete for competition. For more information regarding “FIFA 11+” please visit http://f-marc.com/11plus/home/. The aim of this research study was to implement the “FIFA 11+” program across NCAA Division I and Division II men’s collegiate soccer teams and hope to corroborate their findings with similar studies in the past 4 competitive seasons. Sixty-five teams accepted their invitation. Four Division II teams in the intervention group, due to time constraints, did not complete the study. Thirty-four were in the control group and 31 were in the intervention group (IG; 675 players). The age range was from 18 to 25 years. The FIFA 11+ injury prevention program served as the intervention and was utilized weekly. Prospective data was recorded using a secure Internet-based system entered by the team’s certified athletic trainer weekly from August to December 2012.

Results: The IG had significantly (p<.001) fewer injuries compared to the control group in male collegiate athletes. Methods: All (N=396) NCAA Division I and Division II men’s collegiate soccer teams were solicited to participate before the commencement of the fall 2012 season. The inclusion criteria included current student athletes who were participating in an NCAA Division I or Division II member institution. Those excluded were student athletes whom had participated in an injury prevention program in the past 4 competitive seasons. Sixty-five teams accepted their invitation. Four Division II teams in the IG group, due to time constraints, did not complete the study. Thirty-four were in the control group (CG; 850 players) and 31 were in the intervention group (IG; 675 players). The age range was from 18 to 25 years. The FIFA 11+ injury prevention program served as the intervention and was utilized weekly. Prospective data was recorded using a secure Internet-based system entered by the team’s certified athletic trainer weekly from August to December 2012. Data recorded included Athlete-exposures (AEs), compliance, incurred injury, and utilization of the FIFA 11+ program.

Conclusion: The FIFA 11+ program was created to prevent lower leg injuries. This study demonstrated significantly lower rates of all types of injuries, as well as less time missed in male collegiate soccer athletes.

References:


Practice Pearl: This study suggests implementing the FIFA 11+ program across soccer programs should strongly be considered to help reduce the frequency of soccer-related injuries.
Platelet-Rich Plasma or Hyaluronic Acid Intra-articular Knee Injections for Early OA, Which is Better?

Aditya Raghunandan, MD and Alberto Panero, DO

Introduction: Recent literature has supported the use of platelet-rich plasma (PRP) in clinical practice as a minimally invasive intra-articular injection option over the more commonly used hyaluronic acid (HA) for knee joint osteoarthritis (OA). PRP has been shown to have many positive effects on the joint micro-environment, however, the varying strength level of its evidence makes its use controversial. In view of this, Giuseppe Filardo et al. completed a level 1 double-blind randomized controlled trial to evaluate the effectiveness of PRP on early stages of joint degeneration and hypothesized that PRP would show a superior result compared to HA at a 12 month follow up.

Methods: A total of 443 patients were screened, of them 192 were enrolled and evenly divided into two groups of 96 patients allocated to receive either PRP or HA injections; analysis was ultimately performed on 94 patients in the PRP group and 89 in the HA group, with patients dropped due to noncompliance, loss to follow-up or adverse events. Patients with chronic, unilateral, symptomatic knee pain and swelling, that demonstrated imaging findings of cartilage degeneration were included and randomized into the two groups. The study group received 3 weekly double spin, 5mL injection, leukocyte 1.1 ± 0.5 times with respect to the normal blood value, frozen then thawed, calcium chloride activated, without RBC, PRP injections that had a platelet concentration of ~4.6 times physiologic levels. The control group was given 3 weekly, 2cc viscosupplementation injections of high-molecular weight (>1500 KDa), Hyalurix. Exclusion criteria included age greater than 80 years, Kellgren-Lawrence (KL) score more than 3, major axial deviation, focal chondral or osteochondral lesion, presence of concomitant knee lesion causing pain or swelling and other significant co-morbid diseases. Evaluation was performed at baseline, 2 months, 6 months and 12 months post last injection; range of motion, transpatellar circumference of index knee and contralateral knee, patient satisfaction and adverse events were measured.

Results: The study randomized 192 patients over a 4-year period, with 96 patients in each group. Nine patients (7 injected with HA and 2 with PRP) were not included due to lack of complete data at final evaluation. Although both groups showed statistically significant improvements in knee functional status and symptom reduction, the authors were unable to show any benefit of PRP over HA injections for treatment of knee chondropathy and early OA.

Strengths: This was a well designed, level 1, double-blinded, randomized, controlled trial that provided data using the largest available cohort of patients along with the longest follow up, exceeding their power analysis. It addressed and provided a literature review on current controversies in the use of PRP in the setting of osteoarthritis.

Weaknesses: One of the main reasons for this study was to investigate if PRP was efficacious in patients with early OA, interestingly the study included patients with KL scores of 3, which is not early OA. Furthermore, the leukocyte rich PRP preparation used in this study has been previously shown to have potential deleterious effects, which may have decreased the proposed benefits of PRP by the authors. Previous studies demonstrating superiority of PRP to viscosupplementation used a leukocyte poor PRP preparation. Additionally, the PRP preparation was frozen then thawed which may have affected its biological integrity. Finally, the use of viscosupplementation in osteoarthritis is not currently supported by the Osteoarthritis Research Society International Guidelines due to its debatable scientific evidence; consequently, comparing PRP to a control that may or may not work comes with its own inherent pitfalls.

Conclusion: Overall, the study provides level 1 evidence, with a strong power and follow up that PRP injections are not superior to viscosupplementation injections in the setting of knee chondropathy or early OA. Although the authors disproved their hypothesis, the methods and statistics used were appropriate and the conclusions reflect the results of the study.

Practice Pearl: In practice, the clinician should maintain an acute level of cognizance with regard to the different available PRP preparations and how their differences may affect clinical outcomes. This study did not show superiority of PRP vs viscosupplementation injections in the setting of knee OA.

References:
Turf Wars: Natural Grass vs. Synthetic Surfaces

Sheena Bhuva and Jit Mookerjee

Level of Evidence: 1 (Systematic review)

Introduction: The recent FIFA Women’s World Cup shed light onto the athletes’ anecdotes of the quality of synthetic surfaces compared to natural grass in soccer. Many players and medical staff included in their argument that injury incidence, especially related to ankles and knees, were higher on artificial turf. Balazas et al. attempted to complete a level 1 systematic review of the literature on the risk of anterior cruciate ligament (ACL) injury on natural grass versus artificial turf. It was hypothesized that the risk of ACL injury on synthetic surfaces would not be higher when compared to injuries on natural grass surfaces.

Methods: A literature search was performed covering studies from January 1966 to January 2014. 366 studies were identified and then screened for inclusion criteria. Ten studies (all level two evidence), which had 963 ACL injuries amongst soccer and football athletes, were used in the synthesis. The majority of these studies (eight) included comparisons of natural grass to 3rd-generation turf (synthetic turf with rubber infill). Two studies compared natural grass to 1st-generation turf (Astroturf). Data extraction from these ten studies included athlete demographics, quality of surfaces and ACL injury incidence. Unfortunately, aggregate risk ratios could not be calculated and a meta-analysis was not performed because the studies measured injury incidence differently (injuries per player hours, game, etc), which did not allow conversion between units.

Results: Results showed increased rates of ACL injury on artificial turf in football cohorts. Three studies (700 ACL injuries) were statistically significant. The rate ratios for these studies were 1.4, 1.68 and 1.92. None of the soccer cohorts showed significant difference in ACL injury rates. One study of a small cohort of high school football athletes (15 ACL injuries) showed a significant decreased risk of ACL injury. Of the 8 studies comparing 3rd-generation turf to natural grass (788 ACL injuries), 2 showed a significantly increased risk of ACL injury on turf, 1 showed a significantly decreased risk on turf and the remaining did not have a significant result. As mentioned above, aggregate risk ratio and a meta-analysis were not performed.

Strengths: The authors performed a thorough literature review which encompassed data for 963 ACL injuries. The large sample size contributed to the statistical power. The authors recognize that the data extrapolated does not allow for a definitive conclusion of the relationship between playing surfaces and risk of ACL injury; however, the data does strongly suggest an increased risk of ACL injury for football players competing on artificial turf.

Weaknesses: An obvious weakness to the study was that because of the difference in injury reporting methods among the ten studies, the conclusions were limited to a narrative analysis rather than a true meta-analysis. Additionally, there was source for bias since injury reports are usually filed by athletic trainers employed by the team. Furthermore, while the number of ACL injuries was high, this included both contact and non-contact injuries which may have skewed the data, especially in the football cohorts. Potential studies were not included in the review because knee outcomes were reported without specifically stating if ACL injury occurred.

Conclusion: This study was appropriate since the question being asked is timely and often discussed in the media. The study strongly suggests that among football players, there is an increased risk for ACL injury on artificial turf. Definite weaknesses exist; however, the authors were able to find significant results and fairly discussed their limitations. Valid conclusions were only made when appropriate and the discussion was judiciously written.

Practice Pearl: Not only individuals but also organizations should take note about the results from this systemic review. While artificial turf may be financially viable, this study does show thatACL injury incidence is increased on artificial turf. ACL injuries can be costly and devastating towards a player’s career. Athletes should be counseled on modifiable factors that may decrease injury such as strength & conditioning programs and even footwear and field temperature. More studies need to be performed that look at these and other variables such as time of season, time in game and prior injury. Organizations should have a universal system of reporting injury incidence to allow better data extrapolation amongst cohorts.

References:

Is There An Alternative To Eccentric Training for Treatment of Achilles Tendinopathy?

Alexander Nourse, Ricardo Colberg

Level of Evidence: 1 (Randomized Control Trial)

Introduction: Nonsurgical treatment of Achilles tendinopathy has traditionally relied on eccentric training programs (ECC) as the standard of care. Beyer et al. conducted a level 1 prospective randomized single-blind control trial to assess the efficacy of heavy slow resistance training (HSR) as an alternative loading-based therapy in the conservative treatment of Achilles tendinopathy. The authors hypothesized that HSR would outperform ECC as a therapeutic modality and demonstrate superior clinical results.

Methods: A total of 58 patients diagnosed with chronic mid-portion Achilles tendinopathy were randomly assigned to ECC and HSR treatment groups. ECC and HSR exercise regimens were designed similarly, differing only in tendon loading time and training session length. Patients were supplemented with instruction manuals to control for compliance. The effectiveness of each intervention was evaluated at 0, 12, and 52 weeks. This included evaluation of clinical symptomatology and function, and tendon pain during activity levels as measured by the Victorian Institute of Sports Assessment-Achilles (VISA-A) and Visual Analog Scale (VAS) questionnaires. Ultrasound and Color Doppler techniques were also used to assess tendon anterior-posterior (A-P) thickness and neovascularization.

Results: Both ECC and HSR groups yielded statistically significant and similar improvements for VISA-A (P < 0.00001), VAS during heel raises and running (P < 0.00001), and activity level (P < 0.05) with respect to time. ECC and HSR significantly decreased tendon A-P thickness (P < .00001) and Color Doppler area (P < 0.005) with respect to time. Training session compliance was significantly different between groups (P < 0.005) as ECC and HSR groups showed rates of 78% and 92%, respectively. Researchers concluded that Achilles tendinopathy responds positively to both ECC and HSR without significant difference between treatment interventions. However, there was greater patient satisfaction after 12 weeks with HSR (100%) vs. ECC (80%) but not after 52 weeks (HSR 96% vs. ECC 76%).

Strengths: The authors effectively designed a level 1 study and controlled for bias and confounding variables. Their use of various modalities for data collection and statistical analysis were appropriate and well thought out. Utilization of evidence-based clinical assessment and imaging technology allowed the authors to collect data from multiple facets, contributing to greater strength in their findings. Furthermore, patient and treatment satisfaction are important clinical outcomes and noteworthy strengths of this study.

Weaknesses: The study did not present major limitations. However, drawing definitive conclusions from treatment compliance results may not be appropriate as ECC required nearly three times more training session time compared to HSR. In addition, the use of ultrasound Doppler for the detection of neovascularization has been questioned on its reliability and correlation with patients’ symptoms. The variable extent to which patients continued the training program after 12 weeks of intervention is also a relevant weakness.

Conclusion: The study was successful in addressing the topic of alternative loading-based treatment regimens for Achilles tendinopathy. The authors implemented well-evidenced methods and diagnostic tools in data collection while adhering to precise statistical measures in data reporting. They suggest that HSR is an effective therapy for Achilles tendinopathy with potential compliance advantages and greater patient satisfaction compared to ECC. The study showed that both ECC and HSR are effective in the treatment of chronic mid-portion Achilles tendinopathy, irrespective of exercise strength mode.

Practice Pearl: HSR offers another nonsurgical treatment option for chronic mid-portion Achilles tendinopathy, showing the same clinical improvement of ECC with a decreased investment of time and earlier patient satisfaction. Patients now have one more conservative treatment option that has been shown to result in satisfactory clinical outcomes in the management of Achilles tendinopathy.

References:
Muscular Fatigue Patterns in Softball Pitching

Usker Naqvi1,2, Jason Zaremski3

Level of Evidence: 2 (Descriptive laboratory observational study)

Introduction: This descriptive laboratory observational study, level 2 evidence, sought to elucidate fatigue patterns in muscle groups after pitching a softball game. Understanding these fatigue patterns can help develop strategies for training and injury prevention in fastpitch softball pitchers.

Methods: Nineteen (mean age 15.2 +/- 1.2 years) softball pitchers were included in the study. They underwent strength testing via dynamometry of various muscle groups 24 to 48 hours prior to a softball game. Forearm, shoulder, scapular, and hip muscle groups were tested on both dominant and non-dominant sides. Range of motion (ROM) for internal and external shoulder rotation was measured via goniometry. The subjects were then allowed to pitch their games, while pitch counts and velocity were recorded. They then underwent the same strength and ROM testing within seven minutes of game completion. Fatigue was determined significant if muscle strength was reduced (p < 0.05) between pre- and post-testing. For each muscle group tested, fatigue patterns were compared between dominant and non-dominant sides.

Results: Overall muscular strength was significantly reduced after the softball game in all muscle groups tested (p<0.05). Shoulder testing revealed bilateral asymmetric fatigue pattern, with the dominant side significantly more fatigued than non-dominant. The forearm muscle group did not show a consistent fatigue pattern but instead varied by individual muscles. Hip and scapulae muscles showed bilateral fatigue that was equal on both sides. ROM was significantly increased in the dominant side compared to pre-testing but not compared to non-dominant. Fatigue did not correlate with age, number of pitches thrown, innings pitched, or pitch velocity. The authors concluded that muscular fatigue in softball is not symmetric fatigue pattern but instead varied by individual muscles. Hip and scapulae muscles showed bilateral fatigue that was equal on both sides. ROM was significantly increased in the dominant side compared to pre-testing but not compared to non-dominant. Fatigue did not correlate with age, number of pitches thrown, innings pitched, or pitch velocity. The authors concluded that muscular fatigue in softball is not limited to just the pitching shoulder but also involves forearm, scapular, and hip musculature often on the non-dominant side.

Strengths: The study of youth softball pitchers assessed in-game fatigue of different muscle groups. The subjects were trained pitchers participating in a real game, not a laboratory simulation. Dynamometry and goniometry were used for strength and ROM measurements, respectively, and are validated for these purposes. The authors also completed a power analysis to determine the appropriate sample size based upon 80% power to detect an 11% difference in fatigue between dominant and non-dominant sides.

Weaknesses: Pitchers were only evaluated immediately after a game, when fatigue is expected to be highest. However, no follow-up testing was done and therefore it cannot be determined whether the fatigue is immediate or long lasting, or whether pitching on subsequent days or in consecutive games would worsen it. Longer follow-up would also help to elucidate a link between fatigue and injury risk or to determine if a change in performance measures such as ball/strike ratio occurs with fatigue. Core strength musculature was not evaluated. Finally, it would be interesting to note if there were differences in fatigue patterns in games pitched at the beginning, middle, and end of seasons.

Conclusion: This study demonstrates that softball pitching exerts a whole-body muscular demand not limited to just the dominant shoulder, and softball pitching fatigue differs from previous findings in baseball pitchers. The results emphasize the importance of proximal muscle strength (hips, scapulae) with fastpitch softball pitching. The methods used to measure strength and ROM were appropriate and valid. These conclusions are supported by the authors’ data and statistics.

Practice Pearl: Softball pitchers should be advised to perform total body training regimens to adequately strengthen and condition all muscle groups involved. This is in accordance with previous literature that shows that lower limb musculature along the kinetic chain transmits power to the upper extremity while also reducing stress. Training should not be limited to just the dominant side. Further, physicians should consider that overuse injury can occur in muscles outside of the throwing shoulder and that early fatigue in these muscles may lead to decreased performance and increased risk of injury in the dominant shoulder.

References:

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Snowboarders Listening to a Personal Music Player Have Lower Injury Rates, but Increased Severity

Kelly Estes MD, James Borchers MD

Level of Evidence: 3 (case-control study)

Introduction: Snowboarding is a popular winter sport with many known risk factors for injury. Russell et al. performed a case-control study to see if listening to music via a personal music device was associated with injury among snowboarders at a terrain park.

Methods: Data was collected throughout two winter seasons at a terrain park in Alberta, Canada. There were 333 injured cases identified from accident report forms, and emergency department medical records. Further data was obtained via telephone interviews completed 1-2 weeks after the time of the incident. The control group was made up of 1261 non-injured snowboarders who were interviewed when exiting the terrain park. Variables gathered were age, gender, injured body region, injury type, environmental conditions, years of snowboarding, listening to music, wrist guards, previous snowboarding injuries, and the specific feature being used.

Results: The authors found that snowboarders were significantly more likely to be listening to music if they had an advanced skill level, more experience, a previous snowboarding injury, and if the temperature was greater than ten degrees Celsius. Snowboarders were less likely to be injured if they were listening to music (OR 0.68; 95% CI 0.48 to 0.98). There was no change in the calculated odds ratios after independently adjusting for confounding variables. After adjusting for a previous snowboard injury, snowboarders listening to music had significantly higher odds or presenting to the emergency department (OR 2.09; 95% CI 1.07 to 4.05).

Strengths: This study adds to existing data studying the relationship between music and sport. More importantly, it is the first study to look at the relationship between snowboarding, listening to music, and injury. These preliminary findings show no increased odds of injury for snowboarders who are listening to a personal music player.

Weaknesses: Selection bias likely resulted from injured snowboarders who did not report to ski patrol or a nearby hospital. This underestimates the true number of cases. The study design makes it difficult to generalize results into practical implications—an association between listening to music and injuries were found, but we can’t conclude that listening to music causes fewer injuries based on this study. There is a possibility of misclassification of snowboarders based on music status as well as injury severity. The music status of snowboarders who did not consent to the telephone interview is not known. There also may have been many other factors outside of injury severity that results in presentation to a local emergency department such as socioeconomic status, time of day, or parental concern. In this study, the severity of injury was measured based on presentation to the local emergency department, not the actual diagnosis that was made, which is misleading.

Conclusions: The case-control design of this study introduces a variety of potential confounders, such as volume, tempo of music, and participant fatigue. However, the overall conclusion that listening to music is associated with fewer injuries in snowboarders seems appropriate. Further more rigorous studies would be needed to expand this conclusion to change practice guidelines and terrain park policies.

Practice Pearl: Listening to a personal music player may have a protective role in injury of snowboarders at terrain parks. However, if injury does occur in this group, ski patrol and local emergency department staff should be prepared for potentially more severe injuries.

References:


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