

Specific Care Question In adolescent and teenagers with concussion does creatine supplement versus no creatine improve concussion recovery speed, improve brain healing, decrease inflammation, or decrease severity of concussion?

Recommendations Based on Current Literature (Best Evidence) Only

No recommendation can be made for or against the use of creatine supplement based on expert review of current literature by the Department of EBP. No human studies were found that answered the specific care question. When there is a lack of scientific evidence, standard work should be developed, implemented, and monitored.

Literature Summary

Background The Centers for Disease Control and Prevention (CDC) (2020) defines concussions or a mild traumatic brain injury (mTBI) as “a complex pathophysiologic process affecting the brain, induced by traumatic biomechanical forces secondary to direct or indirect forces to the head.” Concussions are a significant public health concern affecting 1.6 to 3.8 million youth annually (Gay, 2016). However, the true concussion incidence may be higher due to underreporting (McGeown et al., 2020).

An area of interest for concussion treatment and recovery is nutrition therapy and creatine supplementation (Kreider et al., 2017). Most of the evidence in this area is based on animal studies. Pre-clinical evidence of the animal studies has shown promise (Kreider et al., 2017), but the use of creatine supplementation has not been demonstrated in rigorous human studies. To date, there are no head-to-head intervention studies on the use of creatine to treat concussions or mTBI in humans.

Study Characteristics The search for suitable studies was completed on April 4, 2021. L. Edwards MEd, RD, LD, CSSD reviewed the 32 titles and/or abstracts found in the search and identified^a 11 single studies believed to answer the specific care question. After an in-depth review, no human studies were found that answered the question.

Identification of Studies

Search Strategy and Results (see Figure 1)

creatine AND ("Brain Concussion"[Mesh] OR "Post-Concussion Syndrome"[Mesh] OR concussion*) AND (youth OR adolescent OR adolescence OR "adolescent and young adult*" OR AYA[tiab] OR pediater* OR paediatr* OR child OR children)

Records identified through database searching *n* = 32

Additional records identified through other sources *n* = 0

Studies Included in this Review

Citation	Study Type
No studies identified	

Studies Not Included in this Review with Exclusion Rationale

Citation	Reason for exclusion
Alosco et al. (2020)	No Creatine intake, just blood levels
Bartnik-Olson et al. (2014)	No Creatine intake, just blood levels
Friedman et al. (2017)	No Creatine intake, just blood levels
Johnson et al. (2012)	No Creatine intake, just blood levels
Kirov et al. (2013)	No Creatine intake, just blood levels
Kreider et al. (2017)	Position paper with animal studies only
Meyer et al. (2019)	No Creatine intake, just blood levels
Pender, Smith, Finnoff, Huston, and Stuart (2020)	No Creatine intake, just blood levels
Schranz et al. (2018); Vagnozzi et al. (2010)	No Creatine intake, just blood levels
Vagnozzi et al. (2010)	No Creatine intake, just blood levels

Vagnozzi et al. (2013)

No Creatine intake, just blood levels

Methods Used for Appraisal and Synthesis

^aThe Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram depicts the process in which literature is searched, screened, and eligibility criteria is applied (Moher, Liberati, Tetzlaff, & Altman, 2009).

^aMoher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement*. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097 **For more information, visit www.prisma-statement.org.**

Question Originator

L. Edwards MEd, RD, LD, CSSD

Medical Librarian Responsible for the Search Strategy

K. Swaggart, MLIS, AHIP

EBP Team Member Responsible for Reviewing, Synthesizing, and Developing this Document

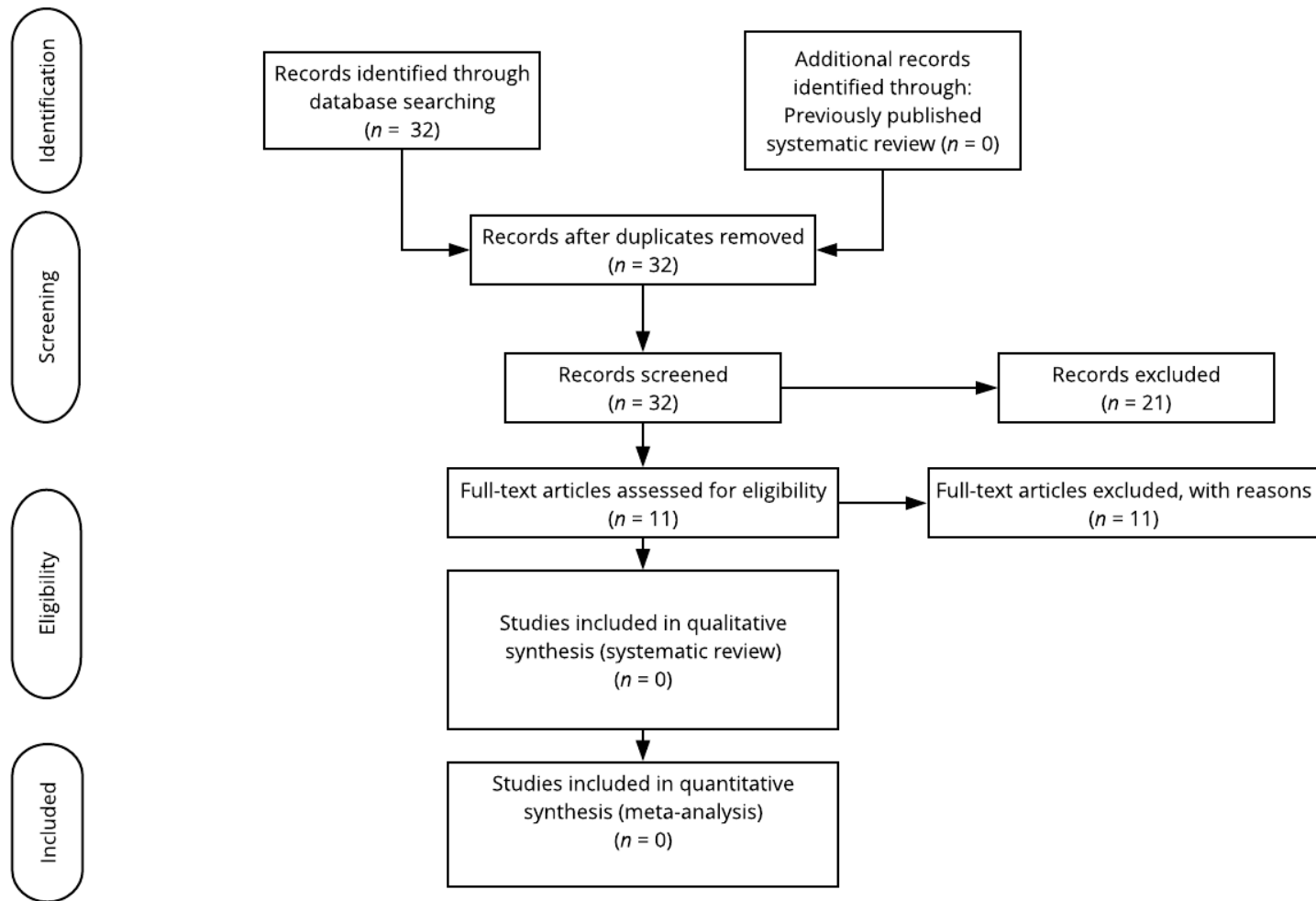
J. Dusin, MS, RD, LD, CPHQ

Acronyms Used in this Document

Acronym	Explanation
AGREE II	Appraisal of Guidelines Research and Evaluation II
CAT	Critically Appraised Topic
CDC	Centers for Disease Control and Prevention
EBP	Evidence Based Practice
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
mTBI	Traumatic brain injury

Figure 1

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)^a



Reference

- Alosco, M. L., Tripodis, Y., Rowland, B., Chua, A. S., Liao, H., Martin, B., . . . Lin, A. (2020). A magnetic resonance spectroscopy investigation in symptomatic former NFL players. *Brain Imaging Behav*, *14*(5), 1419-1429. doi:10.1007/s11682-019-00060-4
- Bartnik-Olson, B. L., Holshouser, B., Wang, H., Grube, M., Tong, K., Wong, V., & Ashwal, S. (2014). Impaired neurovascular unit function contributes to persistent symptoms after concussion: a pilot study. *J Neurotrauma*, *31*(17), 1497-1506. doi:10.1089/neu.2013.3213
- Centers for Disease Control and Prevention (2020). National Center for Injury Prevention and Control. Heads up to healthcare providers. Available at <https://www.cdc.gov/headsup/providers/index.html>
- Friedman, S. D., Poliakov, A. V., Budech, C., Shaw, D. W. W., Breiger, D., Jinguji, T., . . . Ojemann, J. G. (2017). GABA alterations in pediatric sport concussion. *Neurology*, *89*(21), 2151-2156. doi:10.1212/wnl.0000000000004666
- Gay, M. (2016, Sep). Treatment Perspectives Based on Our Current Understanding of Concussion. *Sports Med Arthrosc Rev*, *24*(3), 134-141. <https://doi.org/10.1097/jsa.0000000000000124>
- Johnson, B., Gay, M., Zhang, K., Neuberger, T., Horovitz, S. G., Hallett, M., . . . Slobounov, S. (2012). The use of magnetic resonance spectroscopy in the subacute evaluation of athletes recovering from single and multiple mild traumatic brain injury. *J Neurotrauma*, *29*(13), 2297-2304. doi:10.1089/neu.2011.2294
- Kirov, II, Tal, A., Babb, J. S., Reaume, J., Bushnik, T., Ashman, T. A., . . . Gonen, O. (2013). Proton MR spectroscopy correlates diffuse axonal abnormalities with post-concussive symptoms in mild traumatic brain injury. *J Neurotrauma*, *30*(13), 1200-1204. doi:10.1089/neu.2012.2696
- Kreider, R. B., Kalman, D. S., Antonio, J., Ziegenfuss, T. N., Wildman, R., Collins, R., . . . Lopez, H. L. (2017). International Society of Sports Nutrition position stand: safety and efficacy of creatine supplementation in exercise, sport, and medicine. *J Int Soc Sports Nutr*, *14*, 18. doi:10.1186/s12970-017-0173-z
- McGeown, J. P., Hume, P. A., Theadom, A., Quarrie, K. L., & Borotkanics, R. (2020, Oct 26). Nutritional interventions to improve neurophysiological impairments following traumatic brain injury: A systematic review. *J Neurosci Res*. <https://doi.org/10.1002/jnr.24746>
- Meyer, E. J., Stout, J. N., Chung, A. W., Grant, P. E., Mannix, R., & Gagoski, B. (2019). Longitudinal Changes in Magnetic Resonance Spectroscopy in Pediatric Concussion: A Pilot Study. *Front Neurol*, *10*, 556. doi:10.3389/fneur.2019.00556
- Pender, S. C., Smith, A. M., Finnoff, J. T., Huston, J., 3rd, & Stuart, M. J. (2020). Concussions in Ice Hockey - Moving Toward Objective Diagnoses and Point-of-care Treatment: A Review. *Curr Sports Med Rep*, *19*(9), 380-386. doi:10.1249/jsr.0000000000000752
- Schranz, A. L., Manning, K. Y., Dekaban, G. A., Fischer, L., Jevremovic, T., Blackney, K., . . . Bartha, R. (2018). Reduced brain glutamine in female varsity rugby athletes after concussion and in non-concussed athletes after a season of play. *Hum Brain Mapp*, *39*(4), 1489-1499. doi:10.1002/hbm.23919
- Vagnozzi, R., Signoretti, S., Cristofori, L., Alessandrini, F., Floris, R., Isgrò, E., . . . Lazzarino, G. (2010). Assessment of metabolic brain damage and recovery following mild traumatic brain injury: a multicentre, proton magnetic resonance spectroscopic study in concussed patients. *Brain*, *133*(11), 3232-3242. doi:10.1093/brain/awq200
- Vagnozzi, R., Signoretti, S., Floris, R., Marziali, S., Manara, M., Amorini, A. M., . . . Tavazzi, B. (2013). Decrease in N-acetylaspartate following concussion may be coupled to decrease in creatine. *J Head Trauma Rehabil*, *28*(4), 284-292. doi:10.1097/HTR.0b013e3182795045