Southwest Minnesota State University

April 17-21, 2023

Celebrate Science Week

Events and Abstracts

Featured Events:

- ***Student Poster Presentations***
- ***Student Oral Presentations***

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CELEBRATE SCIENCE WEEK

Celebrate Science Week was started to highlight the work done by SMSU's undergraduate science students during the spring semester, as well as to celebrate the excitement and diversity of science. Over the years it has grown to include students from Math, Computer Science, and Agronomy. This week-long series of events includes poster presentations and talks by SMSU undergraduates, highlighting their research.

The public, including the university and Marshall community, friends, parents, alumni, prospective students, and employers are all encouraged to attend.

Please join us in acknowledging the intellectual accomplishments of our students, and help us celebrate the joy of science.

SCHEDULE OF EVENTS

Monday, April 17

TIME	EVENT	LOCATION
8:30 am – 5:00 pm	**Poster Sessions** (Posters will be up all week)	Library Plaza

2:00 PM **MacKenzie Klett** **Poster # 5**

Analysis of beach debris on San Salvador Island, Bahamas

2:15 PM **Stephen D. Zimmer** **Poster # 9**

Relationship between abiotic characteristics and species diversity in tide pools on San Salvador Island, Bahamas

2:30 PM **Alyssa Enevold** **Poster # 6**

Survey of coral health on San Salvador Island, Bahamas

2:45 PM **Jackson J. Vierstraete** **Poster # 1**

Intertidal movement of the four-toothed nerite (*Nerita versicolor*) on San Salvador Island, Bahamas

3:30 PM **Alex Hillesheim** **Poster # 4**

The role of morphological features in selecting an ACL graft

Tuesday, April 18

TIME	EVENT	LOCATION
8:30 am – 5:00 pm	**Poster Sessions**	Library Plaza

2:00 PM **Morgan A. Hughes** **Poster # 14**

Promoting the growth of beneficial bacteria using plant essential oils

3:30 PM **Rachel Fink** **Poster # 16**

Ultrasound as a treatment for brain injury

SCHEDULE OF EVENTS

Wednesday, April 19

TIME	EVENT	LOCATION
8:30 am – 5:00 pm	**Poster Sessions** (Posters will be up all week)	Library Plaza

2:00 PM **Madi Heiderscheidt** **Poster # 15**

The potential of exercise as a treatment for depression symptoms by means of lowering BDNF levels

2:00 PM **Katelynn Urness** **Poster # 5**

Analysis of beach debris on San Salvador Island, Bahamas

2:15 PM **Regan Truedson** **Poster # 6**

Survey of coral health on San Salvador Island, Bahamas

2:30 PM **Morgan A. Hughes** **Poster # 9**

Relationship between abiotic characteristics and species diversity in tide pools on San Salvador Island, Bahamas

3:30 PM **Casey Wahl** **Poster # 8**

Ocean acidification and coral reefs

TIME	EVENT	LOCATION
2:45 – 3:15 pm	**Oral Session**	CH 225

2:45 PM **TJ Tjeerdsma and Julie Walker**

Study abroad, sunburns, science words, and social media: Translating the international research experience to a broad public to maximize stakeholder benefit and viral content reach

SCHEDULE OF EVENTS

Thursday, April 20

TIME	EVENT	LOCATION
8:30 am – 5:00 pm	**Poster Sessions** (Posters will be up all week)	Library Plaza

10:00 AM **Hailey Caron and Madi Foutz** **Poster # 23**

Effect of soil type on growth and biomass of corn

10:15 AM **Molly Bull and Nijie Nauden** **Poster # 25**

The effect of soil type on the germination rate, growth rate and aboveground biomass production of sunflowers

10:30 AM **Blessing Ogbonna** **Poster # 24**

Allelopathic effect of ginger extract on seedling length of corn, peas, and beets

10:45 AM **Kaelyn DeRoche** **Poster # 26**

Coffee's allelopathic effects on germination rates and seedling growth

11:00 AM **Jace Paplow and Luke Peterson** **Poster # 23**

Effect of soil type on growth and biomass of corn

SCHEDULE OF EVENTS

Friday, April 21

TIME	EVENT	LOCATION
8:30 am – 5:00 pm	**Poster Sessions** (Posters will be up all week)	Library Plaza

8:30 AM **Kate Battaforyen** **Poster # 3**

Comparing active ankle dorsiflexion pre and post season in Division II basketball players

8:30 AM **Chase Cycenas** **Poster # 20**

The effect of cognitive loading on takeoff/landing mechanics in Division II female soccer players

9:00 AM **Alisa Bengen** **Poster # 10**

Vascular dysfunction as a cause of Alzheimer's disease

9:00 AM **Arath Martinez** **Poster # 3**

Comparing active ankle dorsiflexion pre and post season in Division II basketball players

9:00 AM **Alex Lotts** **Poster # 20**

The effect of cognitive loading on takeoff/landing mechanics in Division II female soccer players

9:30 AM **Hayleigh Young** **Poster # 20**

The effect of cognitive loading on takeoff/landing mechanics in Division II female soccer players

10:00 AM **Alisha Leber** **Poster # 17**

Difference in functional movement screening and Y-balance testing on collegiate softball athletes pre-season and mid-season

SCHEDULE OF EVENTS

Friday, April 21, continued

TIME	EVENT	LOCATION
8:30 am – 5:00 pm	**Poster Sessions** (Posters will be up all week)	Library Plaza

10:30 AM **Paige Plumley** **Poster # 3**

Comparing active ankle dorsiflexion pre and post season in Division II basketball players

10:30 AM **Hannah Danielson, Makenzee Helser, and Ayesha Wideman** **Poster # 13**

The relationship between exercise and sleep

10:30 AM **James M. Cates, Johnny U. Nong, and Nicholas W. Schmitt** **Poster # 18**

Effect of masking on cycling performance, pulse oximetry, blood pressure, and heart rate

11:00 AM **Lydia Sussner** **Poster # 3**

Comparing active ankle dorsiflexion pre and post season in Division II basketball players

11:00 AM **Hunter Bruno and Chai Yang** **Poster # 12**

Relationship between strength, power, and speed in high school athletes

11**:00 AM** **Cody Killian and Anthony Nguyen** **Poster # 19**

The relationship between acceleration, agility, and stride rate

11:30 AM **Hanna Floistad and Kristine O'Neill** **Poster # 22**

Effects of various exercise on balance and strength in an aging population

SCHEDULE OF EVENTS

Friday, April 21, continued

TIME	EVENT	LOCATION
8:30 am – 5:00 pm	**Poster Sessions** (Posters will be up all week)	Library Plaza

11:30 AM **Molly Bull** **Poster # 17**

Difference in functional movement screening and Y-balance testing on collegiate softball athletes pre-season and mid-season

11:30 AM **Caitlyn J. Regan** **Poster # 2**

Acute effects of dynamic stretching on vertical jump flexibility in female high school gymnasts

11:30 AM **Hayley R, Sara O, and Sadia H** **Poster # 7**

Relationship between cardiovascular fitness and mental health

12:00 PM **Anthony Costello** **Poster # 11**

Effects of dynamic stretching vs. static stretching on vertical jump in Division II male basketball players

12:00 PM **Peter Villagomez** **Poster # 21**

Effects of high top vs. low top court shoes and incidence of injury

12:00 PM **Audrey G. Seifert** **Poster # 2**

Acute effects of dynamic stretching on vertical jump flexibility in female high school gymnasts

12:30 PM **Slade Irvine** **Poster # 11**

Effects of dynamic stretching vs. static stretching on vertical jump in Division II male basketball players

1:00 PM **Samantha A. Nielsen** **Poster # 2**

Acute effects of dynamic stretching on vertical jump flexibility in female high school gymnasts

SCHEDULE OF EVENTS

Friday, April 21, continued

TIME	EVENT	LOCATION
9:30 – 2:15 pm	**Virtual Cadaver Sessions**	Library Plaza
9:30 AM	**Davis Moseng** Wrist and hand	
10:00 AM	**Chase Cycenas** The upper extremity	
1:00 PM	**Lydia Sussner** The knee	
1:30 PM	**Stella Anderson** The digestive system	
2:00 PM	**Jonathan Zinniel** The heart	

TIME	EVENT	LOCATION
2:00 – 2:30 pm	**Oral Session**	CH 225
2:00 PM	**Louis Lozinski** Insect diversity surrounding marine and hypersaline ponds	

ABSTRACTS FOR POSTER SESSIONS

#1: Intertidal Movement of the Four-Toothed Nerite (*Nerita versicolor*) on San Salvador Island, Bahamas

Presented by: Jackson J. Vierstraete

Intertidal rock pools are coastal ecosystems formed from the erosion of rocky beaches. These pools serve as a home for many different invertebrates. Snails (Mollusca: Gastropoda) thrive in these habitats as herbivorous consumers. One such species, the Four-Toothed Nerite (*Nerita versicolor*), can be found in abundance in Caribbean intertidal rock pools, specifically within middle-to-high tidal zones during tide transitions. To monitor *N. versicolor* intertidal movements, mark-and-recapture of the snails was conducted at Singer Bar Point on the island of San Salvador, Bahamas. Eight pools were surveyed, divided equally between high and mid-tide zones. All snails within a pool were marked at the beginning of the study, and simultaneously the width of the operculum (opening of the shell) was measured as well. One-hundred eighty-eight *N. versicolor* specimens were marked and measured in total; snails within the high tide zone were marked blue, and mid tide snails were marked purple. Daily trips that were made to revisit these pools were coordinated to coincide with the transition between low-and-high tide, during which marked and unmarked snail counts were recorded. It was found that there was a significant difference between mid and high tide *N. versicolor* operculum width, and that there was *N. versicolor* movement between the two zones. The potential implications of this study are that larger *N. versicolor* may choose to inhabit mid-tidal zone pools, while smaller specimens will choose to primarily inhabit the high-tidal zone pools.

#2: Acute Effects of Dynamic Stretching on Vertical Jump Flexibility in Female High School Gymnasts

Presented by: Samantha A. Nielsen, Audrey G. Seifert, and Caitlyn J. Regan

Faculty Advisors: Kris M. Cleveland, Taner A. Erdogan

PURPOSE: The purpose of this study was to investigate the effects of three protocols; warm-up (WA), dynamic stretching (DS), and warm-up and dynamic stretching (WADS) on a vertical jump (VJ), sit and reach (SR), and shoulder mobility (SM) test. **METHODS:** A total of twelve female high school gymnasts (age=13±1.5 yr.; body mass= 55±5 kg, height:162.58±3.83 cm) participated in three sessions on consecutive days. A within-subject design protocol with the participants being separated into three groups. During each session, each group rotated to a different warm-up protocol. Following their warmup, they did all three measurement tests, which were ordered differently for each session. Homogeneity-of-variance-of-differences (or sphericity) assumption was met for all comparisons. A repeated-measures ANOVA and dependent-samples t-test was used. The probability level was set to $p<0.05$. **RESULTS:** The results of the repeated-measures ANOVA showed that there were no significant differences in mean scores for SR ($F(2, 22) = 1.83$, $p = .196$), VJ ($F(2, 22) = 2.17$, $p = .139$), SM Left ($F(2, 22) = 2.24$, $p = .130$), and SM Right ($F(2, 22) = 1.64$, $p = .217$) across WA, DS, and WADS conditions. A dependent-samples t-test was run to determine if there was a difference between pre and post VJ, SR, and SM values with the application of WA, DS and WADS. The results showed that there were significant differences between pre VJ (45.72 ± 7.34 cm) and post VJ measurement after WA (48.89 ± 8.25 cm, $t(11) = -5.0$, $p < .001$), DS (49.95 ± 7.52 cm, $t(11) = -4.69$, $p < .001$) and WADS (51.01 ± 5.87 cm, $t(11) = -5.28$, $p < .001$) performed. **CONCLUSION:** The results of this study suggest that implementing WA, DS, or WADS protocols can lead to significant improvements in lower body power and explosiveness which is a useful measure in young female gymnasts and can provide valuable information regarding their athletic performance and progress.

ABSTRACTS FOR POSTER SESSIONS

#3: Comparing Active Ankle Dorsiflexion Pre and Post Season in Division II Basketball Players

Presented by: Kate Battaforyen, Arath Martinez, Paige Plumley, and Lydia Sussner

Faculty advisor: Kris Cleveland

Ankle injuries are a disruption to the basketball season. Injuries to the ankle are likely to recur following an initial injury. Limited dorsiflexion in the ankle also makes athletes more apt to injuries to other parts of the leg. The purpose of this study was to determine if ankle dorsiflexion changed from the beginning to the end of the Division II basketball season. Eighteen total male and female basketball players completed active ankle dorsiflexion testing: wall clearing test and goniometric testing. Results indicated that there was not a significant difference between pre- and post-season in right and left wall clearing test ($p > 0.05$) and in right and left goniometric testing ($p > 0.05$). It is important to note, many subjects started with limited dorsiflexion, but improved from pre-season values. Future research should be conducted with periodic testing at intervals throughout the basketball season.

#4: The role of morphological features in selecting an ACL graft

Presented by: Alex Hillesheim

Anterior cruciate ligament (ACL) reconstruction is one of the most common orthopedic procedures in the United States. The graft selection for this procedure has long been controversial between the patellar, hamstring, and quadriceps tendons. Certain biological features of these tendons contribute to the healing process of the tissue. I reviewed two studies that examined the different tendons as a potential graft for ACL reconstruction based on their morphological arrangement. Hadjicostas et al. (2008) showed that the hamstring tendon graft, composed of the semitendinosus and gracilis tendons, contained the highest density of fibroblasts and blood vessels. Hadjicostas et al. (2007) demonstrated that the fibril/interstitium was highest in the hamstring tendons. The thickness of collagen fibers was also the largest in the two hamstring tendons. The results from these two studies offer a potential advantage for the selection of the hamstring tendon graft for the use of ACL reconstruction.

#5: Analysis of Beach Debris on San Salvador Island, Bahamas

Presented by: MacKenzie Klett and Katelynn Urness

Beach debris (plastics, fishing gear, glass, etc.) commonly affects coastal communities and the organisms that live in them, and often does not originate from the area in which it was found. Here, marine debris was examined on five beaches facing different directions on San Salvador Island, Bahamas. Three five-meter transects were placed at random along the high tide line on the beaches, and sand samples were sieved at one-meter intervals, resulting in a total of 18 samples per beach. Pieces of debris found within sieved sand were kept and later measured for length. The average size of debris found across all samples was 2.39cm and plastic was the most abundant type. East Beach yielded the highest quantity, with 81 pieces, which was significantly higher than the other beaches ($p = 0.027$). Additionally, a semi-random survey of debris on East Beach was conducted following a volunteer beach cleanup. Again, plastics outnumbered all other types of debris. Given that plastic usage is increasing worldwide, more macro and microplastics are being introduced into the environment. This study emphasizes how abundant and widespread beach debris is, specifically pointing out the prevalence of plastics, even on sparsely populated islands such as San Salvador.

ABSTRACTS FOR POSTER SESSIONS

#6: Survey of Coral Health on San Salvador Island, Bahamas

Presented by: Alyssa Enevold and Regan Truedson

Human activities have negatively impacted ocean ecosystems including coral reefs. Consequences of human activities have caused mass coral bleaching, disease, and death in reefs around the world affecting not only coral, but the suite of organisms that live within reef ecosystems. This study aims to observe coral patch reefs in two different areas on San Salvador Island, Bahamas and compare coral health and incidence of disease in each area. To do this, three dominant species of corals were assessed at Lindsay's Reef and French Bay by snorkeling above the reefs. Prevalence of healthy and diseased individuals were tallied for each of the three species. Diseased individuals were characterized by white band disease, bleaching, or overgrowth of algae. Across all species, 31.4% and 51.5% of coral examined were diseased at French Bay and Lindsay Reef, respectively. A chi-squared test of independence was then used to measure the difference between coral species and their resistance against disease. At Lindsay's reef statistically significant results were found, suggesting that there was a difference between coral species and their resistance against disease whereas French Bay showed no significant difference. This will be beneficial in showing how much of the reefs are being impacted and how high mortality is. This study highlights that coral disease is a detrimental problem that affects large portions of reef ecosystems.

#7: Relationship between Cardiovascular Fitness and Mental Health

Presented by: Sadia Hills-Squire, Sara Olson, and Hayley Raze

Faculty advisor: Morgan Betker

Introduction: There is a positive relationship between cardiovascular fitness mental health and quality of life. **Purpose:** The purpose of this study was to determine whether participants who had higher cardiorespiratory fitness would express lower mental health scores (PHQ-9) and higher quality of life scores (QOLS). **Methods:** Participants were college students and professors recruited from Anoka Ramsey Community College. The PHQ-9 and Quality of Life Scale (QOLS) were all taken in the fitness center at Anoka Ramsey Community College prior to performing the Queen's College Step Test. **Results:** College students and professors completed the Queens College Step test and the PHQ-9 form (p-value=0.15, R-value=-0.24). In relation to Queens College Step test and the QOLS (p-value=0.49, R-value=0.12). **Conclusion:** In conclusion, this study showed that there was no significant correlation between PHQ-9 and VO_{2max} and QOLS and VO_{2max}. The R-value of –0.24 shows a very weak correlation between depression and cardiorespiratory fitness scores. The R-value of 0.12 shows a weak correlation between quality of life and cardiorespiratory fitness scores.

#8: Ocean Acidification and Coral Reefs

Presented by: Casey Wahl

Ocean Acidification (OA) is caused by the change in seawater CO^2 ions. This impacts coral reef communities and is not going to stop anytime soon. A previous study showed the annual skeletal growth of six corals collected showing how skeletal density was affected by the changed seawater. The density of these corals was calculated by the density of aragonite and the radi of the calyx. (Mollica et al. 2017). While corals are being destroyed, restoring them has also been studied. 12 coral restoration case studies were collected which described techniques used to restore coral reefs after OA. This study resulted in barriers to coral reef restoration as already being solved which in turn makes it beneficial for coral reef restoration practitioners to share and put in their best effort to restore coral reefs (Bayraktarov et al. 2020). Assessing the effects of ocean acidification on coral reefs can shed a light on how coral reefs aren't always gone for good.

ABSTRACTS FOR POSTER SESSIONS

#9: Relationship Between Abiotic Characteristics and Species Diversity in Tide Pools on San Salvador Island, Bahamas

Presented by: Morgan A. Hughes and Stephen D. Zimmer

Tide pools are home to thousands of marine species such as hermit crabs, chiton, and snails. The diversity and distribution of these species is dependent upon physical parameters unique to specific pools. Tide pools vary greatly in water temperatures, salinity, pH, and dissolved oxygen levels, dependent on their size, depth, and the frequency of tidal flooding. In addition, species composition may vary based on shoreline landscape. We conducted research at Singer Bar Point, North Point, and Fernandez Bay on San Salvador Island, Bahamas to determine whether abiotic factors and location effect species diversity within the tide pools. Six tide pools were surveyed per location, for a total of eighteen tide pools. Water quality parameters, including dissolved oxygen, pH, salinity, and temperature were assessed. The species within each tide pool were also identified, counted, and recorded. Species diversity within each tide pool was calculated and further analyzed via ANOVA, multiple regression, and ordination. We found a significant difference in species diversity between locations; however, abiotic factors within a location did not appear to significantly affect diversity. These findings are significant as they emphasize that habitat change could affect tidepool community composition.

#10: Vascular dysfunction as a cause of Alzheimer's disease

Presented by: Alisa Bengen

Alzheimer's disease is a debilitating disease characterized by the presence of neurofibrillary tangles. These tangles form by accumulation of the tau protein. Disease progression is also associated with several vascular risk factors. Therefore, a link can be suggested between vascular dysfunction and Alzheimer's disease. Two studies are presented that provide evidence for this pathway. In the first study, a mouse model and immunofluorescence analysis showed that dysfunctional vascular smooth muscle cells led to increased tau levels and neuroinflammation, both of which are characteristics of the disease (Aguilar-Pineda et al., 2021). In the second study, neurons of Alzheimer disease brains were compared to normal neurons to show that neurons with neurofibrillary tangles resemble cellular senescence, and a mouse model showed that neurofibrillary tangle formation led to increased tau levels, brain atrophy, and cellular death (Musi et al., 2016). Overall, the research indicates vascular dysfunction may cause Alzheimer's disease.

#11: Effects of Dynamic Stretching vs. Static Stretching on Vertical Jump in Division II Male Basketball Players

Presented by: Slade Irvine and Anthony Costello

Faculty advisor: Kris Cleveland

Warming up is a crucial aspect of every sport, but there are many different protocols used to warm up. The purpose of this study was to determine the effects of dynamic stretching (DS) and static stretching (SS) on vertical jump (VJ) when using a Vertec®. The vertec is a vertical displacement measuring device used to measure a subject's vertical jump. Ten Division II male basketball players (age 20.10±1.37yr; height 1.95±0.09m; mass 86.44±6.44kg) participated in this study. Data collection lasted two nonconsecutive days, with participants split into two groups. One group conducted SS then testing followed by DS then testing, while the second group conducted their tests in opposing order. The roles were reversed on the second day of testing. There was a significant difference between mean-max SS and DS values ($p<0.05$). In conclusion, when participating in explosive movements, it is better to warm up using DS rather than SS.

ABSTRACTS FOR POSTER SESSIONS

#12: Relationship between Strength, Power, and Speed in High School Athletes

Presented by: Hunter Bruno and Chai Yang

Faculty advisor: Morgan Betker

Introduction: Resistance training, particularly the deadlift, has a positive relationship to athletic performance. **Purpose:** The purpose of this study was to examine the relationship between a 3-rep max deadlift and vertical jump (VJ), broad jump (BJ), and sprinting in high school athletes. **Methods:** Participants (n=13) were recruited from Twin Cities area high schools. **Results:** Results showed that there was a weak, non-significant correlation between measurements of deadlift and vertical jump ($r= -0.10$, $p= 0.37$), broad jump ($r= -0.35$, $p= 0.12$), 10-yard sprint ($r= 0.21$, $p= 0.25$), and 20-yard sprint ($r= 0.14$, $p= 0.32$), respectively. Other findings include strong, significant correlations between the 10-yd sprint and VJ ($r= -0.69$, $p<0.01$) and BJ ($r= -0.80$, $p= 0.001$), respectively. Further, strong, significant correlations between 20-yd sprint and VJ ($r= -0.84$, $p<0.001$) and BJ ($r= -0.83$, $p<0.001$), respectively. **Conclusion:** Though we did not find statistically significant correlations between strength and power or speed measures, there were strong and significant relationships between sprint speeds and power scores, indicating that power and speed were more closely related than strength to either power or speed.

#13: The Relationship Between Exercise and Sleep

Presented by: Hannah Danielson, Makenzee Helser, and Ayesha Wideman

Faculty advisor: Morgan Betker

Introduction: Regular exercise can promote healthy sleep habits and improve sleep quality. **Purpose:** The purpose of this study was to determine if there was a relationship between the amount of exercise an individual does and the quality of their sleep. **Methods:** Participants were recruited around the Twin Cities area via fliers or word of mouth. Participants were fully consented prior to completing the Pittsburgh Sleep Quality Index (PSQI), and answering questions about exercise habits. Participants were then stratified into either the exercise group (>90 minutes/week) or non-exercise group (<90 minutes/week). Independent T-tests were performed between both groups for each of the seven components and the global score of the PSQI. **Results:** Between groups, on average exercisers scored lower than non-exercisers for Sleep Quality ($t= -1.33$, $p= 0.22$), Sleep Duration ($t= -0.87$, $p= 0.41$), Sleep Efficiency ($t= -1.56$, $p= 0.16$), Sleep Disturbance ($t= -0.10$, $p= 0.92$), Daytime Dysfunction ($t= -0.48$, $p= 0.64$), and Global Scores ($t= -0.98$, $p= 0.35$), but higher in Sleep Latency ($t= 0.21$, $p= 0.84$), and Use of Sleep Medication ($t= 0.09$, $p= 0.93$), though not significantly in any of the sleep scores between groups. **Conclusion:** In conclusion, this study shows that individuals who exercise more than 90-minutes each week have slightly better sleep quality than those who exercise less than 90-minutes each week, though it was not statistically significant.

ABSTRACTS FOR POSTER SESSIONS

#14: Promoting the growth of beneficial bacteria using plant essential oils

Presented by: Morgan A. Hughes and Tony Greenfield

Prebiotics are selectively fermentable substrates that promote the growth or activity of beneficial probiotic bacteria. Traditionally, prebiotics have been associated with plant wall polysaccharides or resistant starches. However, not all probiotic bacteria species are capable of fermenting these polysaccharides, and some pathogenic bacterial strains can metabolize these same substrates. Therefore, there is a need for alternative novel prebiotics. Plant essential oils and extracts have long been studied for their antimicrobial activities. However, recent evidence suggests that some essential oils containing polyphenols and terpenes can promote the growth of probiotic bacteria. Thirty plant oils/extracts were screened for the ability to promote the growth of probiotic bacteria *in vitro*. Three plant extracts, *Viola tricolor*, *Centella asiatica*, and *Taraxacum officinale*, were shown to increase the growth of *Lactococcus* and *Bifidobacterium* species in a dose-dependent manner. Furthermore, the same concentrations of these extracts limited the growth of a pathogenic strain of *E. coli*.

#15: The potential of exercise as a treatment for depression symptoms by means of lowering BDNF levels

Presented by: Madi Heiderscheidt

Depression is a common and serious medical illness that negatively affects how one feels, thinks, and acts. Increasing evidence has shown beneficial effects of exercise on symptoms of depression, with research primarily surrounding brain-derived neurotrophic factor. Two research articles surrounding depression, exercise, and BDNF were studied. Szuhany and Otto (2020) examined whether increased exercise was associated with enhanced BDNF response in depressed patients through a 16-week exercise regimen. Data concluded BDNF increased significantly across all assessment points ($p < 0.001$, $d = 0.83$). Bastioli et al. (2022) researched wheel-running exercise in wild-type and BDNF+/- mice. Findings support a necessary and sufficient role for BDNF/TrkB signaling in exercise-enhanced DA release, and findings suggest a role for enhanced DA release in the alleviation of symptoms in depression. The science and literature surrounding BDNF as a potential biomarker for depression and exercise as a new treatment pathway yields copious amounts of potential as research is beginning to emerge.

#16: Ultrasound as a treatment for brain injury

Presented by: Rachel Fink

Traumatic brain injury (TBI) is a major cause of death and disability by inducing apoptosis in neurons. Low-intensity pulsed ultrasound (LIPUS) has therapeutic effects for TBI and can promote brain-derived neurotrophic factor (BDNF). BDNF increases neuronal cell survival and decreases apoptosis. Yang *et al.,* (2015) applied LIPUS to rat heads to induce the production of BDNF. The study found an increase in BDNF. Su *et al.,* (2017) used LIPUS on mice to examine amounts of p-TrkB, total TrkB, and cCaspase-3, which are involved with the binding of BDNF. This study found that when BDNF was blocked, TrkB decreased. Additionally, cCaspase-3 increased when BDNF was blocked, leading to apoptosis. These studies both demonstrate a correlation between LIPUS and increased BDNF expression. Therefore, LIPUS could be an effective treatment to decrease apoptosis after TBI.

ABSTRACTS FOR POSTER SESSIONS

#17: Difference in Functional Movement Screening and Y-Balance Testing on Collegiate Softball Athletes Pre-Season and Mid-Season

Presented by: Molly Bull and Alisha Leber

Faculty advisor: Kris Cleveland

With an increased need for injury prevention, a new focus has been placed on the functional movements of athletes. The tests in this study were done to identify athlete functional imbalances based on position and time of year. Within a softball team, there are three definitive groups that can be compared based on functional movement. Infielders, outfielders and the pitching staff of a Division 2 Collegiate Softball team were put through a Functional Movement Screening and a Y-Balance test. These tests were repeated before the competition season and once again in the middle of the competition. It was found that the outfield group scored the highest on FMS during both pre and post testing ($p<0.05$). The infield group scored the highest on the Y-Balance test during both pre and post testing ($p<0.05$). The results of this study slightly supported our hypothesis in regards to positional group FMS and Y-Balance scores.

#18: Effect of Masking on Cycling Performance, Pulse Oximetry, Blood Pressure, and Heart Rate

Presented by: James M. Cates, Johnny U. Nong, and Nicholas W. Schmitt

Faculty advisor: Morgan Betker

Introduction: Exercising while wearing a 3-ply face mask can slow the spread of respiratory illness in a gym environment, but may physiological and performance decrements. **Purpose**: The purpose of this study was to compare heart rate (HR), blood pressure (BP), oxygen saturation (O2), and rating of perceived exertion (RPE) while exercising with and without a 3-ply face mask. **Methods**: Participants performed two fifteen-minute cycle tests during masked or unmasked conditions, one week apart. **Results**: There were no statistically significant differences between masked and unmasked conditions for HR at 6-min ($t= 0.22$, $p= 0.83$), 12-min ($t= 0.98$, $p= 0.36$), or 15-min ($t= 0.61$, $p= 0.56$); BP at 3-min (systolic: $t= 1.02$, $p= 0.33$; diastolic: $t= 1.38$, $p= 0.19$), 9-min (systolic: $t= 0.80$, $p= 0.44$; diastolic: $t= 1.85$, $p= 0.09$), or 15-min (systolic: $t= 1.51$, $p= 0.15$; diastolic: 0.76, $p= 0.46$); O2 at 6-min ($t= 1.32$, $p= 0.22$), 12-min ($t= 0.99$, $p= 0.36$), or 15-min ($t= 0.96$, $p= 0.37$); RPE at 6-min ($t= 0.28$, $p= 0.78$), 9-min ($t= 0.63$, $p= 0.54$), 12-min ($t=0.67$, $p= 0.52$), or 15-min ($t= 0.75$, $p= 0.48$); nor distance achieved ($t= 1.63$, $p= 0.15$). **Conclusion**: Results suggesting it is safe to exercise while masking with no decreases in performance.

#19:

Presented by: Cody Killian and Anthony Nguyen

Faculty advisor: Morgan Betker

Introduction: High force generation and increased stride frequency are required for the ability to accelerate at a quick rate. **Purpose**: The purpose of this study is to find the correlation between stride rate, agility, and acceleration. **Methods**: Participants were recruited from a gym facility in Anoka County and tested their athletic abilities through a T-test for agility, and a 20-yard dash for acceleration while recording Stride Rate. **Results**: The correlations were not found to be significant in this test. The correlation of best Agility and best Acceleration times ($r=0.71$, $p<0.001$), highest number of Strides and best Acceleration time ($r=0.57$, $p=0.007$), and best Agility time and highest number of Strides ($r=0.39$, $p=0.083$). **Conclusion**: In conclusion, an increased stride rate leads to increased acceleration and agility times. Therefore coaches and athletes should look at improving stride frequency to enhance the performance of acceleration and agility related sports.

ABSTRACTS FOR POSTER SESSIONS

#20: The Effect of Cognitive Loading on Takeoff/Landing Mechanics in Division II Female Soccer Players

Presented by: Chase Cycenas, Alex Lotts, and Hayleigh Young
Faculty advisor: Mostafa A. Hegazy

A common methodology used to study landing mechanics following a soccer header includes using a suspended ball. The purpose of the study was to compare landing kinetics following a heading motion when a ball is suspended to when a ball is projected. Twelve Division II women soccer players (Age: 20.33±1.3 years; Mass: 66.3±10.3 kg; Height: 162±3.9 cm) completed 4 jumps, three times each. These included a vertical jump (VJ), jump header stationary (JHS), jump header throw (JHT), and jump air header (JAH). Participants showed a significantly lower landing height for the JHT condition compared to all others. Participants also showed significantly greater nGRF and LR on the dominant side for the VHS and JAH conditions ($p<0.05$) compared to VJ and JHT. Performing a jumping and heading motion (with and without a ball) should not be used to substitute in performing a jump and heading motion following a real throw-in.

#21: Effects of High top vs. low top court shoes and incidence of injury

Presented by: Peter Villagomez
Faculty advisor: Morgan Betker

Introduction: Lower extremity injuries account for the most time missed in court sports. Shoe design strategies are important to decrease incidence of injury. **Purpose**: This research aims to determine the effect of high-top shoes versus low-top shoes in court sports and incidence of lower extremity injuries. **Methods**: Recruitment Participants were be recruited from local Twin Cities area high school and college campuses. Relationships between types of shoes worn (high-top or low-top) and injury statistics for basketball athletes were analyzed. **Results:** A total of 99 athletes were assessed in this research. Eight athletes were injured during the 2022-23 Basketball season accounting for approximately 8% of athletes. Out of these eight athletes, four athletes were injured in high-top shoes and four were injured in low-top shoes, splitting injury statistics 50/50. **Conclusion:** This study of data collection shows that lower extremity injuries occurred in high-top shoes equally as much as low-top shoes.

#22: Effects of Various Exercise on Balance and Strength in an Aging Population

Presented by: Hanna Floistad and Kristine O'Neill
Faculty advisor: Morgan Betker

Introduction: Long-term participation of strengthening and balance can reduce the risk of falls in aging population. **Purpose:** The purpose of this study was to determine whether regular exercise positively impacts balance, strength, and reduced risks of falls in individuals aged 60 to 90 years old. **Methods:** Participants were recruited from Twin Cities assisted living facilities and a local fitness center. Participants were assessed through The Mini Mental State Examination to determine if they were sound of mind. Participants completed the Berg Balance Scale and 30 Second Stand Chair Test (30 SSCT). **Results:** Compared with participants who exercised <90 minutes each week, participants who exercised >90 minutes demonstrated a significantly higher Berg Balance Assessment (average score 53/58 compared to 42.7/58; $t= 5.36$, $p<0.001$) and a significantly increased 30 SSCT (avg score 17.3 compared to 9.9; $t= 5.98$, $p <0.001$). **Conclusion:** This study showed that older adults who participate in >90 minutes of exercise per week have greater lower extremity leg strength and reduced the risk of falls.

ABSTRACTS FOR POSTER SESSIONS

#23: Effect of Soil Type on Growth and Biomass of Corn
Presented by: Madi Foutz, Jace Paplow, Luke Peterson, and Hailey Caron

Corn (*Zea mays*) is one of the most important agronomic crops grown all over the world. Like all other plants, how well it can grow will vary due to the soil conditions. Different soil types have different characteristics that affect plant growth. Corn was grown in four sterilized soils: sandy clay loam, loamy sand, and two loam soils, one being potting soil. There were five replicates per soil group, each having one seed per 4" diameter pot (20 pots total). The experiment took place in a greenhouse with ambient lighting, humidity, and temperature. We hypothesized that corn grown in potting soil would have more growth and biomass than other soil types. Our hypothesis was supported for corn biomass, which was statistically different among soil types, but not for plant height.

#24: Allelopathic Effect of Ginger Extract on Seedling Length of Corn, Peas, and Beets
Presented by: Blessing Ogbonna

Ginger (*Zingiber officinale*) is an herb widely used as a spice and in traditional medicine, native to Southeast Asia and cultivated for 5,000 years. The aim of this study is to investigate the allelopathic effect of ginger on the seedling length of three species: pea (*Pisum sativum*), maize (*Zea mays*) and beet (*Beta vulgaris*). Ginger extract was prepared with distilled water and divided into three extracts, control group (water), low concentration (12.5 g/L) and high concentration (25 g/L). The results showed that ginger significantly shortened the length of corn and beet seedlings compared to the control group. The inhibitory effect was stronger in beet, followed by corn, and peas. These findings suggest that ginger may have allelochemical effects on certain plant species. Further research is needed to identify the allelochemicals responsible for the effects and determine how this affects plant growth. Overall, this study provides insight into the allelopathic effects of ginger on plant species and calls for further research in this area.

#25: The Effect of Soil Type on the Germination Rate, Growth Rate and Above-ground Biomass Production on Sunflowers
Presented by: Molly Bull and Nijie Nauden

Sunflowers contribute to soil improvement and support pollinators, beneficial insects, and other species via their deep taproots. It's a great crop for rotation and can boost profits for farmers that specialize in niche markets. To support Sunflower production, it is important to understand the impact of soil type on Sunflower growth. For this experiment we had a total of 10 pots, 5 for commercial soil and 5 for sandy soil. Each pot had 3 sunflower seeds planted 3.8 cm below the surface. While in the germination phase we measured the rate of growth on an average of 2-3 times a week along with watering them with 250ml of water on top and from the bottom. We hypothesized that the Sunflowers would have the greatest germination rates and growth rates within the sandy soil. Subsequently, the commercial soil had higher germination rates, leaving our hypothesis unsupported.

#26: Coffee's allelopathic effects on germination rates and seedling growth
Presented by: Kaelyn DeRoche

The coffee industry produces millions of tons of coffee wastewater each year, when it is not contained it can contaminate surface water and crops. To determine the allelopathic effects that coffee wastewater has on crops, I tested four different concentrations of coffee in wastewater and observed the effects each solution had on germination and growth of corn (*Zea mays*) seeds. I created four coffee wastewater solutions with concentrations of 0.025 g/mL, 0.050 g/mL, 0.075 g/mL, and 0.100 g/mL, and one control solution (distilled water). The solutions were distributed into petri dishes containing five corn seeds each. After a week of growth, it was determined that the coffee solutions had no effect on germination rates but were able to significantly reduce the growth rate. The different concentrations were determined to have no significant effect from one another.

ABSTRACTS FOR ORAL SESSIONS:

Study-Abroad Oral Presentations

Wednesday, 2:45 PM **CH 225**

Study Abroad, Sunburns, Science Words, and Social Media: Translating the International Research Experience to a Broad Public to Maximize Stakeholder Benefit and Viral Content Reach

Presented by: TJ Tjeerdsma and Julie Walker

Effective science communication is imperative to maximize the impact of research outcomes and requires pre-planning to successfully distribute results to key stakeholders. In this project, communication professionals developed a comprehensive plan to distribute the experiences of undergraduate students on an ecology-based study abroad trip to the island of San Salvador within the Bahamian archipelago. Study abroad trips impact students, but multiple stakeholders such as admissions administrators, international education leaders, prospective students, and family members are invested in the successes and experiences of the trip. Through the identification and survey of relevant stakeholders (as well as a close evaluation of available resources), the communication team developed and executed a plan to document and distribute student cultural and research experiences. Distribution occurred in planned, strategic ways via multiple social media accounts (targeted toward relevant publics), negotiated content sharing, and the production of a documentary; unplanned methods of distribution included an invited radio interview and a forthcoming guest piece in the upcoming alumni magazine. Content emphasized key information stakeholders requested, such as balancing athletic and academic commitments, helping first generation students see themselves studying abroad, and demonstrating the value of hands-on, experiential learning. Ultimately, stakeholders found the communication well-planned, highly effective, and garnering multiple levels of interaction from relevant stakeholders within and outside the organization. Outcomes of this planned communication campaign include highlighting the significance of field-based student research, documenting the impact of experiential learning outside the classroom, and strengthening the study abroad culture among faculty and students.

Friday, 2:00 PM **CH 225**

Insect Diversity Surrounding Marine and Hypersaline Ponds

Presented by: Louis Lozinski

The health of ecosystems can be measured through the use of the insect community due to the level of niche partitioning among the community. Insect surveys were completed in the nearby terrestrial habitats of the marine, and hypersaline Osprey, Reckley-Hill, and Oyster Ponds. The insects were collected over a 4-day period through pitfall traps and sweep netting the surrounding vegetation. The collected data will then be analyzed to measure insect community diversity and evenness. From this, we should get an improved understanding of the differences among the insect community in the varying microhabitats. Shannon's Diversity was calculated for each pond. Osprey, Reckley-Hill, and Oyster had diversity of 1.82, 1.72, and 1.89 Respectively. Osprey, Reckley-Hill, and Oyster had an evenness of 0.35, 0.75, and 0.50 respectively. There was a similar level of diversity at each pond, but the evenness had notable differences. While the ponds appear to be similar in diversity, further work may provide better insight into a more comprehensive understanding of the differences between the ponds.

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