

The attitude of the u.s. government to the increase of obesity in america in the ...

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Physical fitness has been amplified in mainstream media, social networks, and advertisements throughout the United States. The continuing increase in obesity since the 1980's and the rising awareness of the benefits of physical activity has been a focus of the U. S. Government. The Department of Health and Human Services recommends at least 150 minutes of moderately intense activity or 75 minutes of vigorous activity a week (36). Both walking and running have been shown to reduce cardiovascular disease up to 9% (40). Contrarily too much running can lead to serious injury and complications and injury rates increase when runners exceed 40 miles a week (9). Running provides a cheap, convenient way to burn calories, but many runners get injured throughout the year. It is estimated that between 37% to 56% will get injured at least once a year. Of those runners 50% to 75% are said to have injuries related to overuse of the same motion (22). There has been disputable evidence on both sides of the argument about the possible factors of running related injuries. These factors such as: frequency of running, warm-up and stretching exercises, muscular imbalance, restricted range of motion, running pattern stability, and footwear among other various factors (22). A study found the following injuries most common amongst runners (10): Knee (7.2-50%) Lower leg (9-32.2%) Foot (5.7-39%) Thigh (3.4-38.1%)

A study by Tendforde and Fredericson provides evidence that high-impact loading sports at a young age can augment bone geometry, as well, as increase bone mineral and composition. Activities such as gymnastics or basketball, among others, starting around the age of 10 can help provide them with future bone and health benefits (34). This information is beneficial to parents so they can allow their children to find the sport that they enjoy

with the most benefits to their health. For adults, health detriments like osteoporosis are a cause for concern. A study done at the University of Missouri produced results suggesting that resistance training in adults produces more benefits to adult bones than both running and cycling (32). Many people do not have the time or resources for a gym membership or even a bike. The National Institute of Aging recommends that to prevent osteoporosis an adult could jog, walk, or dance to keep bones healthy (27). These are quick, cheap exercises that most healthy adults are capable of doing at the leisure of their home, but injuries can still occur. A concern for runners is the amount of stress being put on the joints. This may lead people to think they should walk instead of jogging. A study done in 2017 revealed that 59% of people who did not run had osteoarthritis in their knee compared to only 53% of runners (1).

Another study said that runners reduce their risk of osteoarthritis by 15% and hip replacement by 35% due to runners' tendency to have a lower BMI (39). Though, walking has also been shown to have its own benefits. It seems that walking reduces risk of cardiovascular disease by 9% compared to only 4% of runners (40). Walking and running both have their pros and cons, but the one a person chooses will have to rely on their physical capabilities and time availability. It is also a question of the amount of risk an individual is willing to accept to continue staying healthy. There is research to suggest that our evolutionary past of barefoot running style can help prevent running related injuries (18). Liberman's study says that it seems that thousands of years of running barefoot has given the body natural ways to reduce stress

and increase strength in our feet. This would seem true at first glance, but this is a topic with inconclusive evidence.

Other research has shown barefoot running to increase calcaneus and soles muscle injuries, but decrease knee and hip injuries (2). Another research project by Murphy et al. details how there is a lack of evidence that shows barefoot running provides no extra benefits and reduction of injury risks (26). This is conflicting information that has not shown any significant results on either side of the argument. Some may think running in a more cushioned shoe will provide them with more protection from running injuries, but these studies have shown non-significant evidence (19). The underwhelming research and evidence on footwear during running seems to suggest that the best footwear for a runner is based on their own taste and feel. Running has become very popular, but more than half of long distance runner will get hurt in a given year (29). A runner's knowledge on the possible injuries they could sustain could help them prevent or reduce their risks. One reason a runner may get injured is the way in which they land their foot. Miller states that the best overall way to run is with a heel first style of running (24). Contrarily, experts have stated that a soft, front foot first style of running is the most beneficial to prevent injuries (30). This type of running allows for better shock absorbent from the constant stress that running on pavement can exhibit (30). The human body is a complex and dynamic structure allowing for people to run in their most comfortable way. There are different ways to run, but there are benefits to each style of running for that unique individual. There are, however, ways to reduce the amount of stress put on the knee

and tibia to avoid serious injuries. As mentioned earlier, forefoot first running can reduce knee stress by 27% (37).

Vanatta et al. studied 17 active women, ages 18-35, who ran from 14km to 32km per week. They were asked to run a certain distance with their normal heel first style then to switch to a forefoot first style with instructions from the researchers. They found, also, found that forefoot striking helped decrease quadricep peak force by 27% (37). Another study suggest that forefoot striking can also help limit tibial stress (41). Yong et al. took 11 men and 6 women who ran on average 10km per week. The researchers recorded foot pressure with electronic devices and estimated joint kinematics using a 29 degrees of freedom musculoskeletal model. They also measured cadence and speed. The study found that forefoot striking reduced the amount of average (38%) and peak (39%) loading rates, but transition from heel first to fore-foot first should be done gradually (41).

Another study by Kulmala et al. indicates that forefoot strikes have a reduced stress to their knees. The knee is the most common injury amongst long distance runners (15). One study showed being male long distance running athlete increases injury risks to the knee and other joints (10), and another study showed recreational running women were at risk for injury (23). The risks assumed when exercising to stay healthy can be a cause for concern. Many recreational runners ignore the hazards and continue to run despite the bodily harm they could do their body. An ACL tear can happen to both amateur runners and professional athletes. For example, NBA player Shaun Livingston sustained an ACL injury when landing awkwardly after a

routine layup (14). That is just one example of the multiple knee and ACL injuries athletes have endured through the years. It is, then, safe to say if professional athletes can get injured so can recreational athletes. The mechanics a person has while running can indicate why a runner has pain in the knee joint (16).

Liao et al stated that the amount of external rotation was indicative of how much knee pain the subject had experienced. The vulnerability of the tendons and muscular strength of the knee flexors seem to play a role on knee pain as well. These articles reveal that each individual's unique technique, tendons, and muscular strength are variable to the amount of pain and/or damage they could sustain. The ACL is essential for stability of the knee, but there is a difference, however, in how men and women use their leg muscles; Men initially contract their hamstrings first when running while women contract quadriceps first (8). The problem with using quadriceps is that it will cause more stress on the ACL because quadriceps are not as successful preventing against anterior displacement of the tibia (8). If a runner is made aware of these possibilities they can be active about the situation and try to strengthen their hamstrings to prevent stress on their ACL. Women who compete in high level sports have been shown to have a four to six times higher risk than men of rupturing their ACL (13).

The data collected by Hewett et al. gives a glimpse into the biomechanical variables of the knee (Fig. 3. 13). Another study Demorat et al. reiterated that quadricep tension during a slight knee flex can cause stress on the tibia and ACL injuries (6). According to Hewett et al. the difference in the ACL

injury group to the non injured group was their posture and impact loading (knee abduction 8 degrees more than non-injured group). The overwhelming evidence suggests that women have a predetermined detriment when it comes to knee injuries and high impact loading, but as stated earlier other studies have suggested long distance men have a higher risk of knee damage (10). With the contradicting information it may be difficult to interpret what would be the best scenario for the optimal health for a gender. It is interesting to see such discrepancies among the various topics regarding running and lower limb damage (Fig. 2 20). Figure 3. Dynamic valgus was defined as the position or motion, measured in 3 dimensions, of the distal femur toward and distal tibia away from the midline of the body. Dynamic valgus may have included the indicated motions and moments

Another serious concern in runners is the tibial stress endured in physically active individuals. Studies indicate from 4% to 35% of athletes and military personnel suffer from shin splints or medial tibial stress syndrome(MTSS) (25). The same research acknowledges that there is a discrepancy in the wording of the subject and the community lacks any uniformity on it (25). For recreational runners the rate of MTSS is at 19.7% (31). The lack of cohesion in the scientific community raises questions about the best approach to dealing with MTSS. It is unclear if MTSS is a cause of more serious injury and there are no known therapies that are better than the other (25). A study in 2017 showed the ineffectiveness of kinesio tape on active individuals with MTSS (33). There are a multitude of risk factors for MTSS including: range of motion, muscular strength, plantar pressure and kinematics (3). The

conflicting evidence does not provide runners with the adequate information on how to deal with reducing MTSS risk factors or treatments. It is, then, up to the individual to recognize any signs of shin splints and to take precautions to reduce the risk of MTSS. Runners run for enjoyment or health reasons, but may not know they are at risk for injury (21). Sports medicine reports that stress fractures are 20% of the injuries they treat each year

Meardon et al. demonstrated that runners with tibial stress fractures had more anterior tension and more posterior compression of the tibia. Also, the research suggests geometric make-up of subjects' bones raised stress on the tibia (21). There are ways to reduce the risk of injury. It would be counter intuitive to get injured doing recreational activities for health reasons.

Research by Crowell and Davis has shown that tibial stress and impact loading can be reduced by gait training. Crowell and Davis were able to get instant data on the tibial and provide subjects with feedback on specifics such as to try to land their feet softer. The study suggests that subjects were able to maintain their retrained gait for one month after, though, further follow-ups are still recommended(5) .

The Department of Health and Human Services recommends that adults looking for the greatest benefits to running should do at least 150 minutes a week of jogging or running in at least 10 minute intervals. It is also recommend to start slow and to build one's way up to avoid any unnecessary injury as, well, as to avoid any activities that may be too intense for the person's fitness level. The risks and benefits of running has to be weighed out by each individual's schedule, fitness level, and financial means. Each

individual has their own limits, but both walking and running have been shown to improve health drastically. The best exercise for an individual will be the one that they continue to do and to slowly increase the intensity of the workout (38). The state of sedentary in the United States and the amount of technology able to distract a person has taken its toll on Americans.

Countless studies have been advocating for a healthier lifestyle and to focus specifically on increasing cardiovascular health and decreasing mortality rates. According to a study by Owen et al. Americans are at an all time high with the amount of time spent watching television and driving their cars (28). The study says that adults spend 70% of their usual walking time sitting down and that the sedentary lifestyle can lead to cardiovascular problems later in life (28). Running has been shown to decrease cardiovascular death by 45% and all causes of death by 30% with an increase of 3 years to life compared to non-runners (17). This information provides people with the knowledge and information necessary to maintain a healthy lifestyle and to improve life as they get older.