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Behavioral factors which may lead to Back Pain in Adolescents

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Abstract

A large number of people have complained of back pain (BP). The previous study shows that this physical ailment can lead to adulthood back pain, the prevalence of back pain increases with age and the number of people with a history of previous BP had double the rate of the new episodes compared to those who have never experienced BP in the past (Papageorgiou AC, Croft PR, Ferry S, et al., 1996). BP is a frequently found symptom of adults, while kids and teenagers rarely complain about this as children are more silent and flexible (Jones G, Macfarlane G, 2005). This study adopts the behaviors during the high school period to convey various factors that play significant roles in raising the prevalence of back pain among Thai adolescents. This research will only regard back pain caused by behavioral factors, not including back pain from diseases or birth defects. Factors attributing to BP such as gender, age, sedentary, school seating, sitting posture, body mass index, lifting heavy objects, stress, lifestyle, sports, and food, will be considered. The questionnaire included questions regarding the behaviors of teenagers in three generations which are generation X (born between 1965 and 1980), generation Y (born between 1981 and 1996), and generation Z (born between 1997 and 2012) (Michael Dimock, 2019).

Keywords: Back pain, Adolescents, behavioral factors

INTRODUCTION

Back pain (BP) is usually found as a consequence of bone and muscle diseases and is ubiquitous among people these days. 70% of Thai population has experienced low back pain at least once in a lifetime (McIntosh & Hall, 2008); meanwhile, according to Jones and Macfarlane G's research in 2005, approximately 80% of the population would complain of BP at least once in their life. The causes of the onset and course of back pain are various environmental and personal factors, studies have found back pain rate the highest in the third decade and the overall prevalence rises until the 60-to-65-year age group and then decrease gradually. (Hoy,Brooks, Blyth, & Buchbinder, 2010); moreover, the study of Waterman, Belmont and Schoenfeld (2012) found that 1.39 per 1000 American citizens have encountered low back pain.

In terms of adolescents, the World Health Organization (WHO) has specified the early adolescence as young people at the age of 10 to 14 years old and the late adolescence as 15 to 19 years. A research has shown that 587 out of 1470 have reported low back pain (Pellisé F, Balagué F, Rajmil L, Cedraschi C, Aguirre M, Fontecha C et al., 2009). In fact, back pain in adolescents has been more concerned as it is linked with chronic BP in adulthood (Hestbaek L, Leboeuf-Yde C, Kyvik K, Manniche C., 2006). These symptoms have been found to be a significant predictor of back pain in

the future (Papageorgiou AC, Croft PR, Ferry S, *et al., 1996).*

The main purpose of this research is to investigate various factors which can cause low back pain and how much these factors affect the risk of having back pain in order to build awareness of the consequences of these behaviors. In addition, this paper seeks to find out the danger of having back pain during adolescence and its consequences which leads to a more severe back pain in the future.

Literature Review

Back pain due to obesity

Body Mass Index (BMI) is a weight calculation in kilograms (kg.) divide by height in meters (m.). Body fatness can be indicated by a high BMI. (Centers for Disease Control and Prevention)

	BMI
Underweight	<18.5
Normal	18.5-22.9
Overweight	23-24.9
Obese	25-29.9
Clinical obese	>30

The overweight has a much greater risk to suffer from back spine pain, or any muscle or joint issues. The excess weight carried by people with obesity can put addition strain and pressure on the spine, this increases the potential injury to spine and back, specifically in the lumbar region (low back). Because, the excess weight in the midsection, the pelvis is pulled forwarded, straining the lower back and creating lots of pain and medical issues. (BraceAbility, 2018)

Back pain due to lifting overweight

Lift and carrying heavy backpack can contribute to back and neck pain. Carrying a heavy weight in the wrong way, the force from the weight can pull your body backward, the spine will be compressed unnaturally to bend the body forward at the hips or arch the back. This habit can cause repetitive-stress injuries, muscle strain and even chronic pain (KidsHealth Medical Experts). A study has found that the weight limit is 10% to 15% of the body weight. (Heather M Brackley, Joan M Stevenson, 2004)

Back pain due to sitting posture

Normally, sitting in the same position for a long time affects the structure of the low back, called the lumbar region of the spine and the movement characteristic of the pelvis which might lead to health problems. Health professionals are increasingly advise sitting on the floor as it helps maintain the nature curvature of the spine. Moreover, sitting on the floor helps improve strength and flexibility which help avoid lower-back pain. When sitting on the floor, the spinal structure shows an inward natural spine curvature at the lower back called lumbar lordosis. In fact, lumbar lordosis is relatively low and is closer to our natural position and posture (Nachiappan

Chockalingam, Aoife Healy, 2020). According to a study in Kaennakhon Wittayalay School, students who sit on chair without a backrest for 2 days or more a week are more likely to encounter back pain more than those who do the same for a shorter period. (Rungthip P,

Rungthip C, Chalermwut S, Petcharat K, Uraiwon C, 2014).

Back pain due to lacking of exercises

Exercises and sports can relief stress in the spine and muscles that causes back pain. Exercising can help strengthening the muscles that support the spine, removing pressure from the spinal discs and facet joints which prevent back injury. Improving mobility and circulation by exercising leads to better distribution of nutrients through the body, including the spinal discs.

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After exercising, endorphins are released and this can naturally elevate mood, relieve pain and depressive symptoms. Playing sports and exercises can minimize the frequency of backpain episodes and reduce the severity of pain when it occurs. Therefore lacking of exercise may lead to accumulation of stress in spine and muscles which can cause backpain (Jonas Gopez, MD., 2017).

Back pain due to computer vision syndrome

Adolescent back pain has been reported to increase dramatically due to the time taken in using computer, both for studying and games. Neck-shoulder pain (NSP) and Low back pain (LBP) have increased among adolescents during the 1990s and the early 2000s. The use of information and communication technology is a potential risk factor for this increase. A research on 14-, 16-, and 18-years old Finns in 2003 found that neck-shoulder pain (NSP) was perceived by 26% while Low back pain (LBP) by 12%. Compared to non-users, the risk of having LBP when using computer over 5 hours a day and 42 hours or more a week is 2.0 and 1.7, while the risk is 1.8 and 2.0 when using internet for 42 hours or more per week and playing digital games for over 5 hours a day, respectively. In addition, using computer exceed 2 hours/day is a threshold for NSP and exceeding 5 hours/day is a threshold of LBP. (Paula T. Hakala, Arja H. Rimpela, Lea A. Saarni, Jouko J. Salminen, 2006)

Back pain due to dietary

Structures in the spine like bones and muscles need proper nutrition in order to support the body and to perform their functions. Eating a balanced diet with the proper amount and variety of vitamins and nutrients can reduce back problems since they nourish the bones, muscles, discs and other structures in the spine. Calcium is the most prominent of bone minerals and is essential for bone health and helps maintain bone mass, especially in old age. Adequate calcium intake is important to help prevent the development of osteoporosis which is a disorder characterized by weak and brittle bones that can result in vertebral fractures in the spine. Magnesium is a key mineral in the bone structure and it helps maintaining bone density which prevent back problems. Vitamins help absorbs calcium, especially vitamin D which our bones can become thin, brittle, or misshapen without it. Vitamin C is necessary for the formation of collagen which holds the body together. It is vital for healing injured muscles and keep vertebrae strong. Proteins are components of bone and also build block for body structure while collagen proteins make up 30% of the dry weight of bone. In addition, Iron plays a role in production of collagen and the conversion of vitamin D to its active form (Kelly Andrews, DC, 1017).

Some types of food such as fried foods, sugar sweetened beverages, processed carbohydrates, and unhealthful oils may cause inflammation. A pro-inflammatory diet is a diet that lacks fruits and vegetables and contains high amounts of meat, refined grain products, and dessert foods. It is one of the contributing factors of overweight or obesity, and there is also an association between pro-inflammatory diet and bodily inflammation. Several studies have found that there are certain characteristics that comprise an anti-inflammatory diet which is low in refined carbohydrates, examples of this kind of food are white bread, pizza dough, pasta, pastries, white flour, white rice, and desserts. On the other hand, such food as fruits, seafood, and dark leafy vegetables are the anti-inflammable diet which are suggested to be high in antioxidants and can help soothe and reduce the risk of back pain flare ups (Linda Said, MS, RD, LDN, 2021).

Methodology

This study evaluated people in three generations (Generation X, Y, and Z) that have been studying in Thai high schools. The research considers people experiencing back pain due to daily activities. Exclusion criteria are cases related to other congenital diseases in terms of both side effects and abnormal bone structures. The online survey was distributed to Thai residents in the three generations to observe their back pain experiences and possible causes (obesity, lifting overweight, sitting posture, lacking of exercises, computer vision syndrome, dietary reference) during their high school period. The questionnaire contains 22 questions in three parts. The first part is the personal data, which is used to classify people with back pain by their gender, ages, weight, and height. The second part is about back pain experiences which classify people in each generation in to 3 groups which are people who have back pain due to daily life activity, back pain due to other causes and people who have never encountered back pain. In addition, this part also includes a question regarding their frequency of undergoing BP. Finally, the third part is about the life activities which might lead to back pain, these activities include the weights of their

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school bags, exercise frequency, duration and types, sitting habits (wooden chair with backrest, round stool chair without backrest, and sitting on the floor), sitting duration (4 hours, 5-8 hours, 9-12 hours, and 13-17 hours), pastime, having extra classes, time spent working on a computer, types of food normally eat, hours of sleep, bed and pillow types, milk and vitamin uptake.

Results

According to Graph 1, over 80% of Generation Z has experienced backpain which 76.74% results from daily activities. Daily activities also accounted for 29.55% in Generation X and 39.34% in Generation Y. Although daily activities are the most common causes of back pain in all generations, most Generation X and Y have never encountered back pain. This shows that back pain has become more common among adolescents in the younger generations.

With regards to Generation X and Y, the situations of these two generations are in the same pattern which people who have never experienced back pain comprise of over half and the fewest people have encountered back pain due to other causes. People who have never had back pain dominated in Generation X and Y with a proportion of 59.09% and 52.46% respectively, but less so in Generation X which only account for 18.60%. In fact, only a minuscule amount of Generation X (11.36%), Generation Y (8.20%), and Generation Z (4.65%) claimed that they have experienced back pain due to other causes.

To sum up, the younger the people are, the more their daily activities are likely to cause back pain. Whereas, the shares of people who have never experienced back pain and who has encountered back pain due to other causes tend to decrease over time.

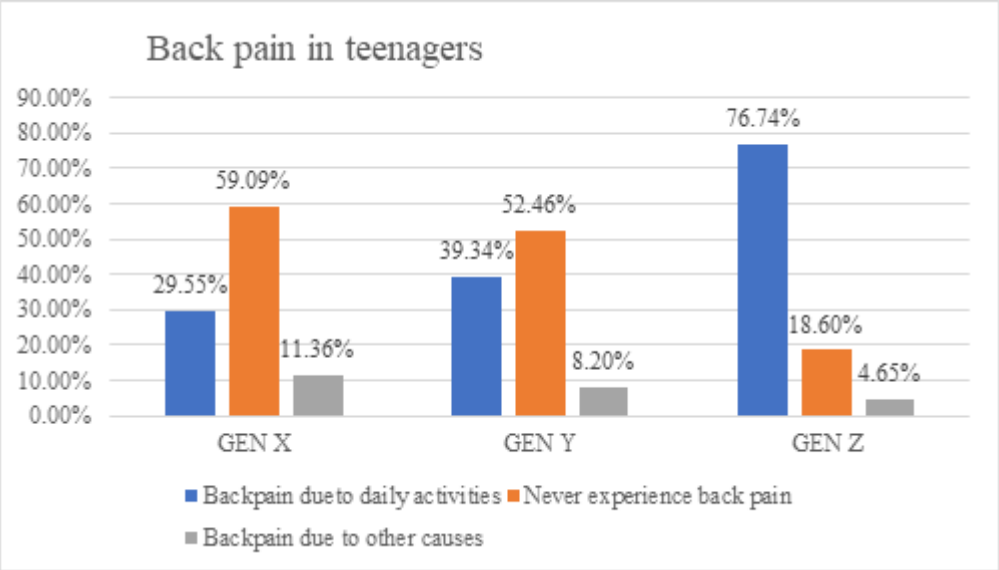

Chart 1: People in three generations' experience of having back pain.

In terms of Backpain Due to obesity, most people had normal weight in all generations while only a minuscule amount of around 5% from all generations had clinical obesity. Most people with normal weight and who are underweight were generation Z while for overweight, most were generation Y.

With regards to people with normal weight, the majority are from generation Z with a proportion of 58.14% followed by generation X (56.82%) and generation Y (54.10%). Likewise, the pattern is similar for the underweight which generation X, Y, and Z accounted for 25%, 21.31%, and 27.91% respectively.

In terms of people who are overweight, 13.11% of the overweight were from generation Y which is most significant compared to generation X (4.55%) and generation Z (2.33%). With regard to obesity, 9.09% were generation X, 8.20% were generation Y and 4.65% were generation Z.

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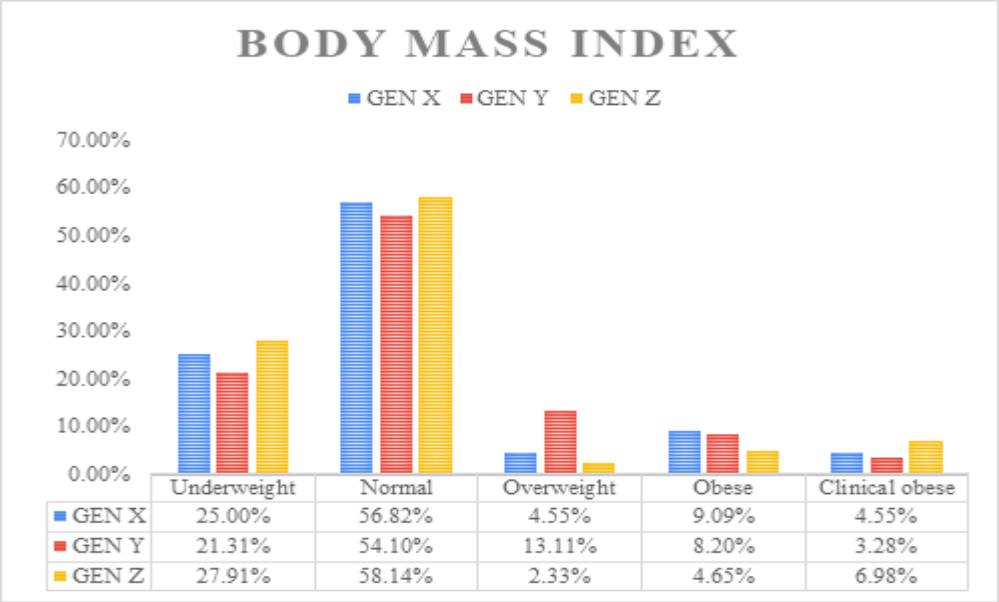
Finally, for clinical obesity, 6.98% were generation Z, 4.55% were generation X and 3.28% were generation Y.



	Underweight	Normal	Overweight	Obese	Clinical obese
GEN X	25.00%	56.82%	4.55%	9.09%	4.55%
GEN Y	21.31%	54.10%	13.11%	8.20%	3.28%
GEN Z	27.91%	58.14%	2.33%	4.65%	6.98%

Chart 2: Body mass index of people in the three generations.

Since heavy luggage has been a major issue for Thai high school students, we sought to find the connection between back pain and the weight of luggage students have to carry regularly.

The bar chart depicts the proportion of people in the three generations who usually carry luggage heavier than 10% of their weights.

In terms of Generation X, only 25% carry luggage which weigh more than 10% of their body weight while the number of Generation Z reached a height of 30.23% which is the most of all generations.

On the other hand, only 19.05% of Generation Y carry luggage which are heavier than 10% of their weights.

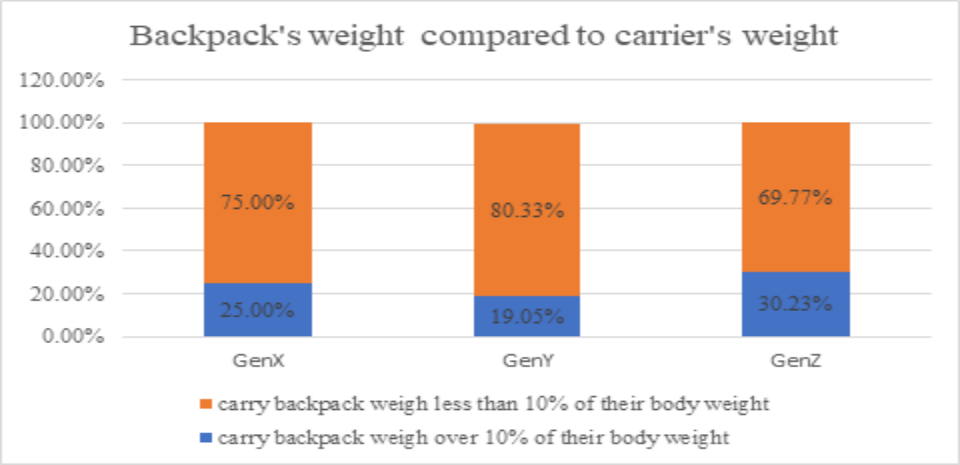


Chart 3: Weight of luggage compared to the weight of carrier in each generation.

With regards to sitting postures, the respondents were asked about the amount of time they spend per day sitting on each type of chair and sitting on the floor. The three different sitting postures included in the questionnaire are sitting on wooden chair with backrest, on stool, and on the floor as these sitting

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postures can lead to back pain. According to the tables, people mostly sit on wooden chair with backrest for 5 to 8 hours while sit on stool and on the floor for 4 hours or less.

People tend to sit on the floor for a shorter time over generations. In Generation X, 68.89% sit on the floor for 4 hours or less while 13.33%,4.45%, and 13.33% sit on the floor for 5-8 hours, 9 to 12 hours, and 13 to 17 hours subsequently. For Generation Y, 64.53% spend up to 4 hours sitting on the floor while 19.35% spend 5 to 8 hours and the same proportion of 8.06% spend 9 to 12 hours and 13 to 17 hours sitting on the floor per day. 79.54% of Generation Z spend 4 hours or less a day and 13.64% spend from 5 to 8 hours a day sitting on the floor. Only a small number of 4.55% and 2.27% sit on the floor for 9 to 12 hours and 13 to 17 hours per day, respectively.

People sit on stool for 13 to 17 hours the least in Generation X (6.67%), Generation Y (4.48%), and Generation Z (2.28%) compared to other time lengths. With regards to stool, most people sit only up to 4 hours on it and it has an increasing trend over generations, which is 66.67% in Generation X, 72.58% in Generation Y, and 77.27% in Generation Z. The same percentage of 13.33% of Generation X sit on it for 5 to 8 hours and 9 to 12 hours. Meanwhile, these time lengths also account for the same proportion in Generation Y which is 11.29%. For Generation Z, 13.63% spend between 5 to 8 hours and 6.82% spend 9 to 12 hours. In terms of wooden chair with backrest, most Generation X (73.32%) spend between 5 and 5 hours sitting on it while 17.78% spend up to 4 hours and 6.67% spend between 9 to 8 hours. Only 2.23% spend 13 to 17 hours a day sitting on this type of chair. Likewise, most Generation Y (72.58%) spend 5 to 8 hours a day sitting on it. In fact, the number of people sitting on this kind of chair up to 4 hours and between 13 to 17 hours decrease to 12.90% and 1.61% respectively. However, the proportion of people sitting on it for 9 to 12 hours double that of Generation X to 12.90%. A half of Generation Z spend 5 to 8 hours on wooden chair with backrest and one-fourth spend 9 to 12 hours on it. 18.18% spend 4 hours or less while 6.82% spend between 13 to 17 hours which is a great number when compared to other generations.

Generation X	Wooden chair with backrest	Stool	Floor
Less than 4 hours a day	**17.78%**	**66.67%**	**68.89%**
5-8 hours a day	**73.32%**	**13.33%**	**13.33%**
9-12 hours a day	**6.67%**	**13.33%**	**4.45%**
13-17 hours a day	**2.23%**	**6.67%**	**13.33%**

Generation Y	Wooden chair with backrest	Stool	Floor
Less than 4 hours a day	**12.90%**	**72.58%**	**64.53%**
5-8 hours a day	**72.58%**	**11.29%**	**19.35%**
9-12 hours a day	**12.90%**	**11.29%**	**8.06%**
13-17 hours a day	**1.61%**	**4.84%**	**8.06%**

Chart 4: Sitting habits and duration of Generation X

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Chart 5: Sitting habits and duration of Generation Y

Generation Z	Wooden chair with backrest	Stool	Floor
Less than 4 hours a day	**18.18%**	**77.27%**	**79.54%**
5-8 hours a day	**50%**	**13.63%**	**13.64%**
9-12 hours a day	**25%**	**6.82%**	**4.55%**
13-17 hours a day	**6.82%**	**2.28%**	**2.27%**

Chart 6: Sitting habits and duration of Generation Z

According to Chart 7,8, and 9, most people in Generation X and Y have never attend extra classes with a proportion of 77.27% and 68.85% subsequently; moreover, it has a decreasing trend which reaches a low of 25.58% in Generation Z. On the other hand, the number of people who have had extra classes after school and on weekends has increased dramatically from 22.7% in Generation X to 31.15% in Generation Y and reaches 74.42% in Generation Z. The data shows that in the younger generations, more people attend extra classes especially in generation Z which has a huge difference in terms of people attending extra classes compared to the former generations.

With regards to people attending extra classes only after school, the percentages are almost similar in all generations which is 9.09% in Generation X, 13.11% in Generation Y and 11.63% in Generation Z. Likewise, for people attending classes only on weekends, the percentages are the same at around 4% in Generation X (4.55%) and Generation Y (4.92%). However, in Generation Z, none of the respondents attends extra classes only on weekends.

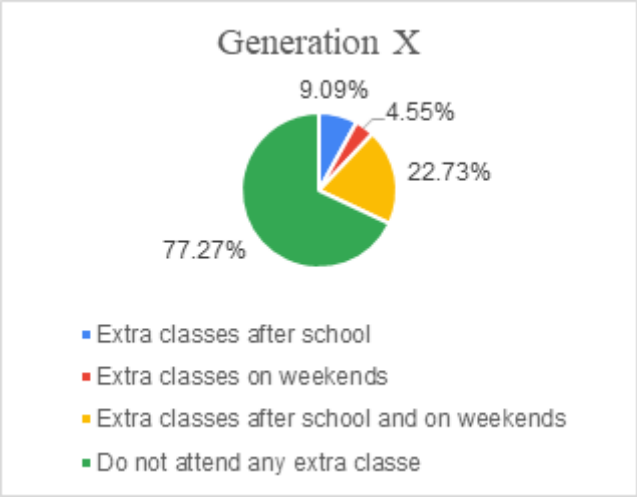

Chart 7: Extra class routine of people in Generation X during their high school period.

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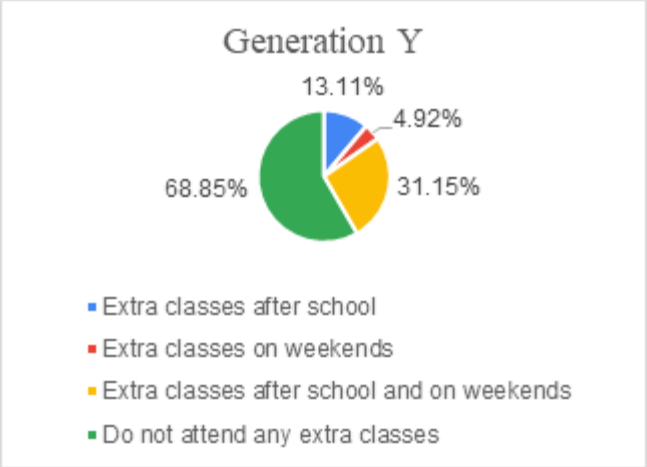

Chart 8: Extra class routine of people in Generation Y during their high school period.

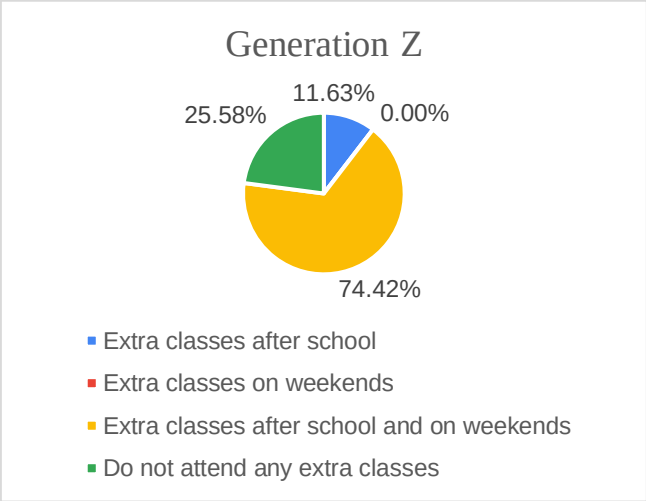

Chart 9: Extra class routine of people in Generation Z during their high school period.

With regards to exercising, most people of all generations exercise less than 3 times a week and only a small proportion has never exercised. Generation X tends to exercise the most often among all three generations, 40.91% exercise more than 3 times a week and 52.27% exercise less than 3 times a week; whereas, only 6.82% has never exercised.

During their high school lives, Generation Y exercised the second most often, 37.70% over 3 times a week and 52.46% exercised under 3 times a week while 9.84% had never exercise. On the other hand, Generation Z exercised the least which only 30.23% exercised more regular than 3 times per week and 51.16% exercised less than 3 times a week. The number of people who have never exercised was 18.60% which is over twice that of Generation X.

To sum up, people tend to exercise less over the generations which Generation X exercised most regularly, followed by Generation Y and Z. The difference of the exercise rates between Generation X and Y is so little while for Generation Z compared to the other two generations, the difference is more pronounced.

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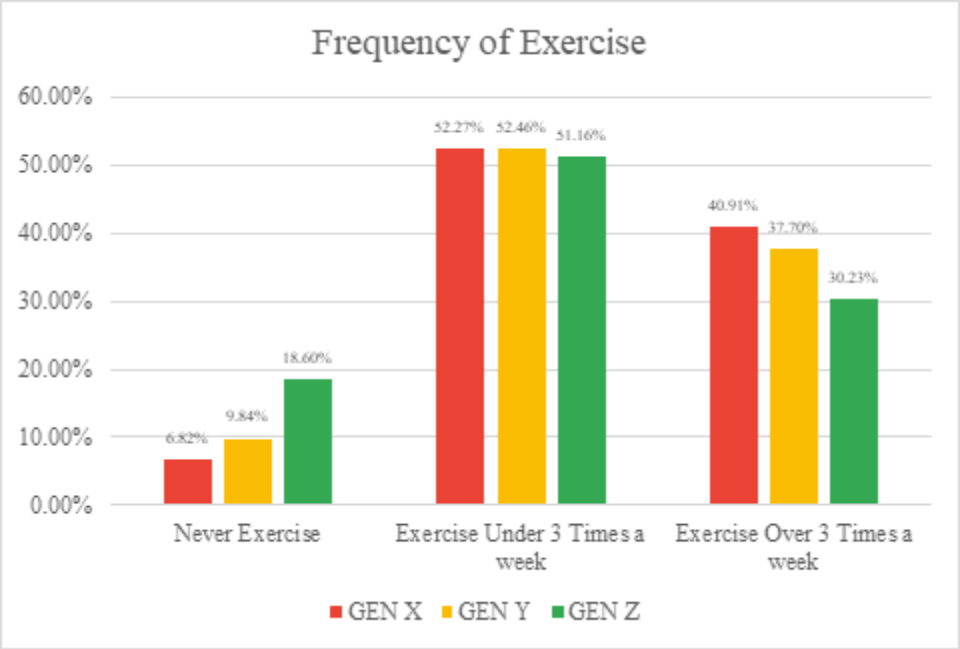

Chart 10: Exercise frequency of people in three generations.

According to chart 11, the majority spend 0 to 10 hours on computer which accounts for over half of Generation X (75%) and Y (57.38%). However, the proportion of this has decreased over generations to 37.21% in Generation Z.

In terms of people spending as high as 31 to 40 hours on computer a week, they account for 6.82%, 14.75%, and 13.95% in Generation X, Y and Z. Most people spending this much time on computer are from Generation Y. On the other hand, only 1.64% of Generation Y spent 21 to 30 hours on computer while it accounts for 4.55% and 13.95% in Generation X and Z.

The number of people spending 11 to 20 hours a week has increased from 6.82% in Generation X to 26.23% in Generation Y and has levelled off to 27.91% in Generation Z.

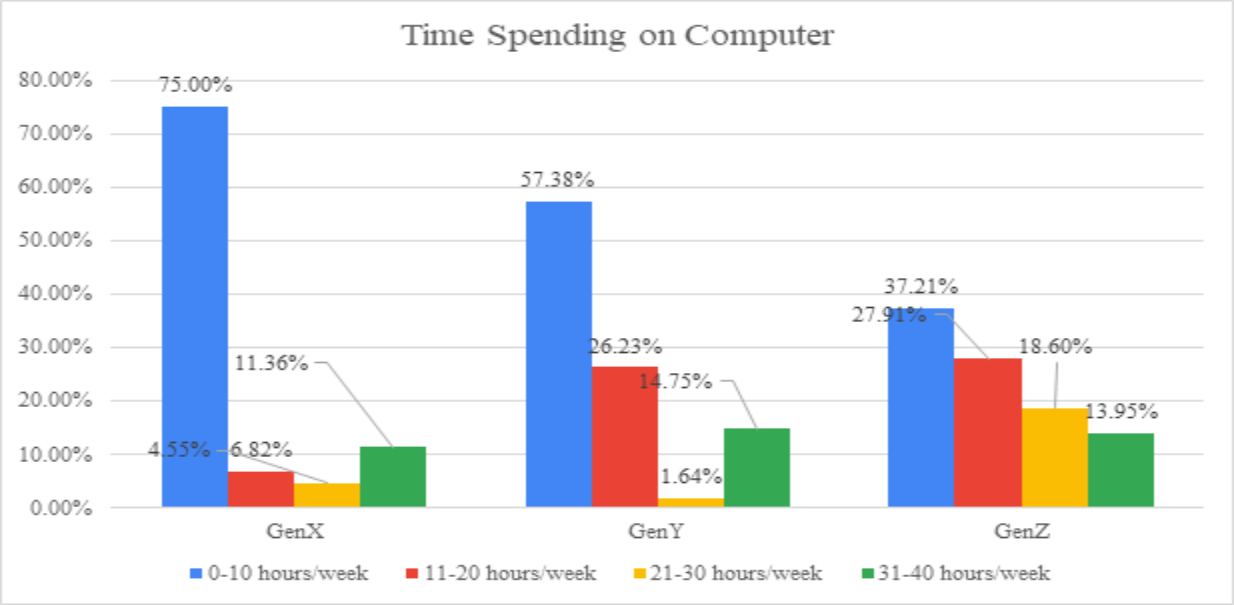

Chart 11: Number of hours per week each generation spend on computer.

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With regards to different types of foods (junk food, soda, snack, meat, milk and egg, fruit and vegetable, and rice) frequently eaten by people in three generations, most Generation X (36.36%) and Z (51.16%) eat meat the most, while for Generation Y, it is junk food, soda, and snack (37.70%). Whereas, 34.43% of Generation Y eat meat which is the second most frequently eaten food of this Generation. When it comes to least frequently eaten food, 9.09% of Generation X picked fruit and vegetable; however, only 4.92% of Generation Y picked milk and egg, and 4.65% of Generation Z picked rice.

In terms of generation X, 11.36% picked rice as their most frequently eaten food. 15.91% picked milk and egg while 27.27% eat junk food the most often. For generation Y, 8.20% picked fruit and vegetable while 14.75% picked rice. On the other hand, the same percentage of 9.30% picked fruit and vegetable as well as milk and egg while 25.58% picked junk food, Soda, and Snack.

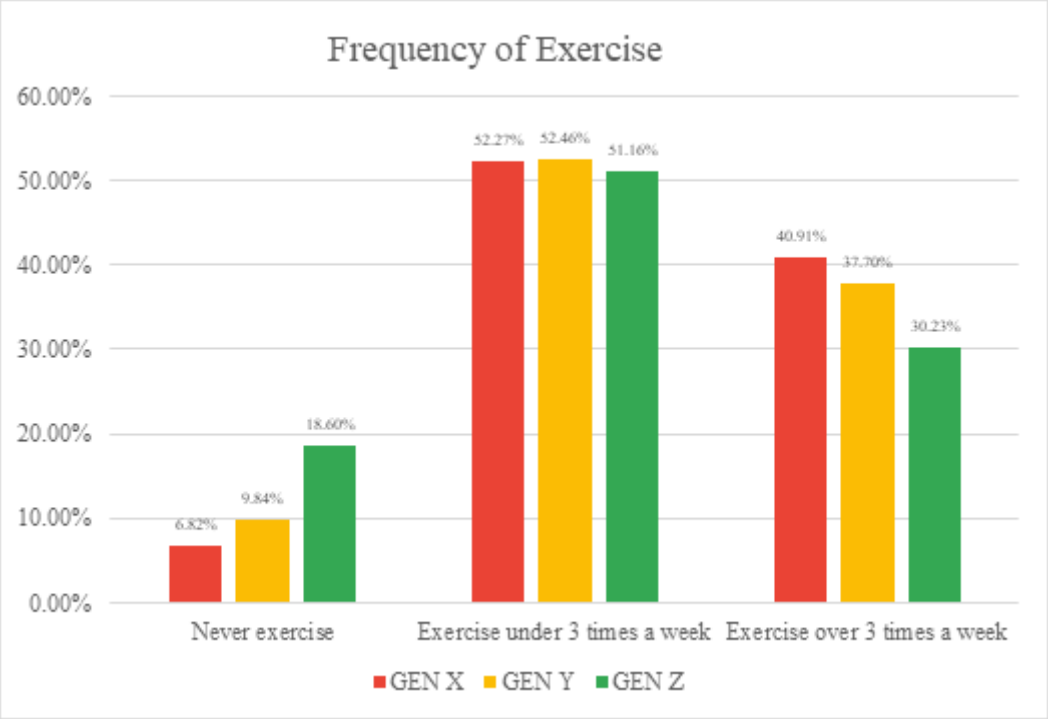

Chart 12: Types of food each generation frequently eat.

The data shows that the most common pastime among Generation X was shopping (38.64%) while 18.18%, 13.64%, and 15.91% picked travelling, sports, and other activities subsequently.

In fact, the same proportion of 6.82% picked playing musical instruments and dancing, and using online media.

Almost all Generation Y (96.72%) spent time playing sports on their free times, while a mere of 3.28% picked other activities which are not referred to. Interestingly, when it comes to Generation Z, there is a huge drop in the number of people playing sports on their spare times which is only 2.33%. However, the most popular pastime is using online media which comprises of 74.42%. Moreover, 6.98% of Generation Z plays musical instruments and dance as on their spare times while 4.65% picked other activities and 11.63% goes shopping on their free times.

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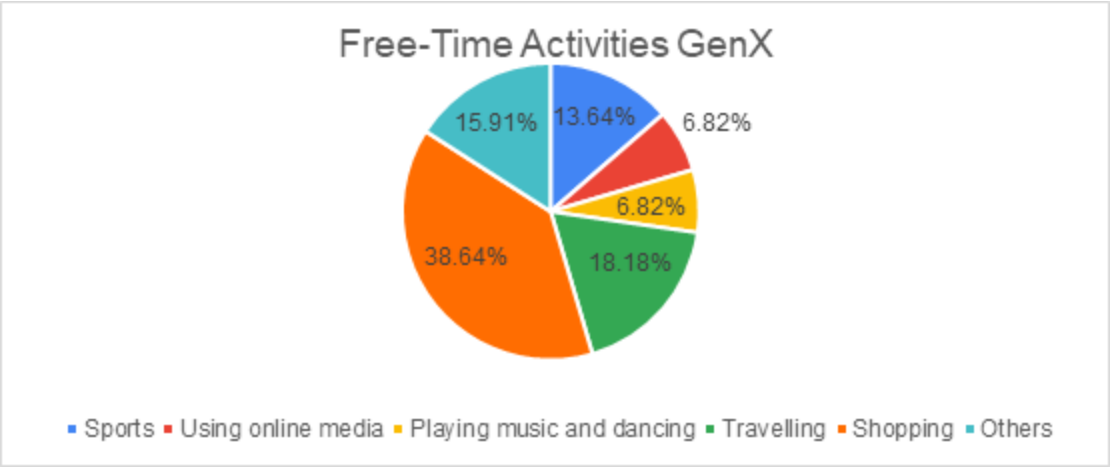

Chart 13: Activities done by Generation X during their free time.

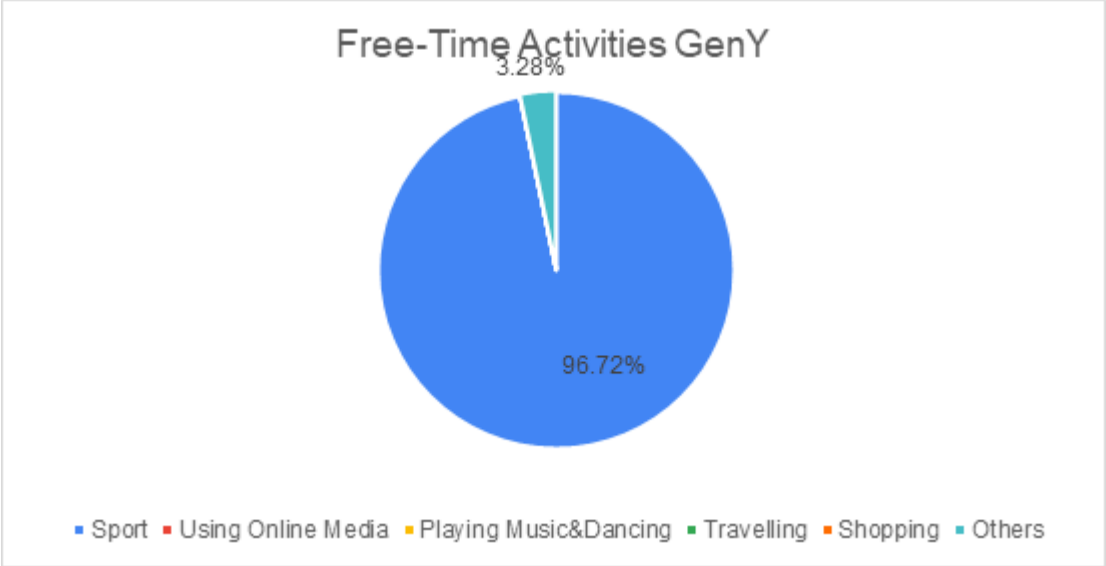

Chart 14: Activities done by Generation Y during their free time.

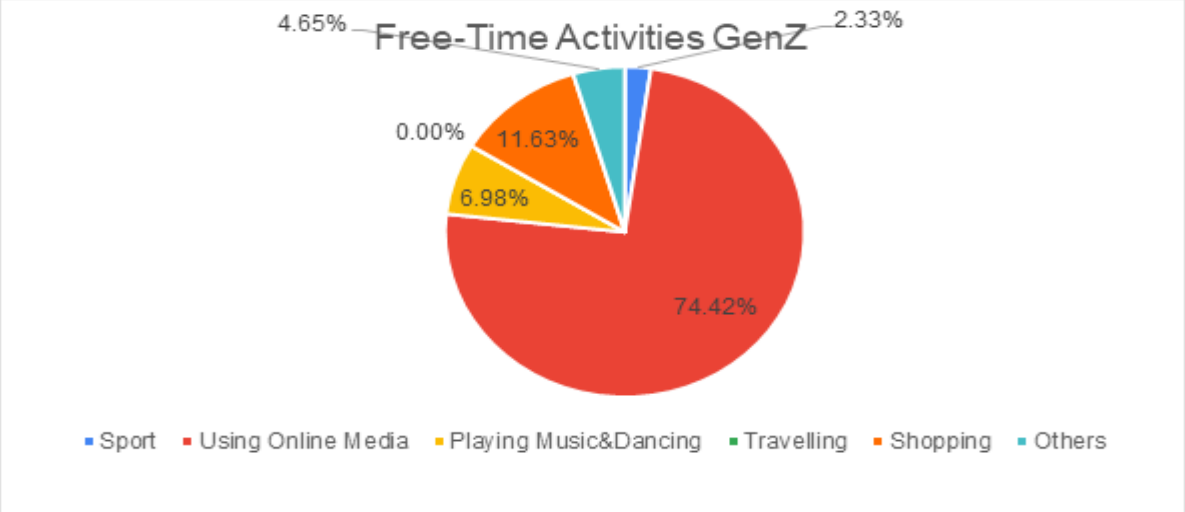

Chart 15: Activities done by each Generation Z during their free times.

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Conclusion

This study points out that having backpain during adolescence can leads to a more severe backpain in the future, and also covey different habits which can cause backpain. This study observed various activities done by people in 3 different generations during their high school lives, which may lead to backpain. Based on responses from 150 respondants, Generation Z seem to encounter backpain the most during their adolescence, followed by Generation Y and Generation X subsequently. This generation also attended extra classes, carry luggage heavier than 10% of their weights and spend time on computer the most, compared to other generations; however, they exercise the least. In addition, a vast majority of people in this generation chose meat as the most frequently eat food and the proportion is the highest among the generations.

That being said, Generation Z has the most proportion of people who frequently eat fruit and vegetable. Moreover, this generation has the most people with ideal weight and also spend time sitting on chair without backrest the least among the three generations.

Reference

1. Pellisé F, Balagué F, Rajmil L, Cedraschi C, Aguirre M, Fontecha C et al. (2009). Prevalence of Low Back Pain and Its Effect on Health-Related Quality of Life in Adolescents. Archives of Pediatrics & Adolescent Medicine. [Online]. Available at: https://pubmed.ncbi.nlm.nih.gov/19124706/
2. Michael Dimock. (2019). Defining generations: Where Millennials end and Generation Z begins. [Online]. Available at:
3. https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/
4. Papageorgiou AC, Croft PR, Ferry S, et al. (1996). Influence of previous pain experience on the episode incidence of low back pain: results from the South Manchester Back Pain Study. [Online]. Available at:
5. https://pubmed.ncbi.nlm.nih.gov/8880839/
6. Hestbaek L, Leboeuf-Yde C, Kyvik K, Manniche C. (2006). The Course of Low Back Pain From Adolescence to Adulthood. Spine. [Online]. Available at: https://pubmed.ncbi.nlm.nih.gov/16481960/
7. Jones G, Macfarlane G. (2005). Epidemiology of low back pain in children and adolescents. Arch Dis Childh. [Online]. Available at: https://pubmed.ncbi.nlm.nih.gov/15723927/
8. Jonas Gopez, MD. (2017). Exercise and Back Pain.[Online]. Available at: https://www.spine-health.com/wellness/exercise/exercise-and-back-pain
9. Greg McIntosh, Hamilton Hall. (2008). Low back pain (acute). BMJ Clin Evid. [Online]. Available at: https://pubmed.ncbi.nlm.nih.gov/19445792/
10. D Hoy, P Brooks, F Blyth, R Buchbinder. (2010). The Epidemiology of low back pain. Best Pract Res Clin Rheumatol. [Online]. Available at: https://pubmed.ncbi.nlm.nih.gov/21665125/
11. Brian R Waterman, Philip J Belmont Jr, Andrew J Schoenfeld. (2012).cLow back pain in the United states: incidence and risk factors for presentation in the emergency setting. Spine J. [Online]. Available at: https://pubmed.ncbi.nlm.nih.gov/21978519/
12. World Health Organization (WHO). (n.d.). Adolescent health in the South-East Asia Region. [Online]. Available at: https://www.who.int/southeastasia/health-topics/adolescent-health
13. Heather M Brackley, Joan M Stevenson. (2004). Are children's backpack weight limits enough? A critical review of the relevant literature. Spine (Phila Pa 1976). [Online]. Available at: https://pubmed.ncbi.nlm.nih.gov/15454714/
14. KidsHealth Medical Experts. (n.d.). Backpack Basics. [Online]. Available at: https://pubmed.ncbi.nlm.nih.gov/15454714/
15. Centers for Disease Control and Prevention. (n.d.). Defining Adult Overweight & Obesity. [Online]. Available at: https://www.cdc.gov/obesity/adult/defining.html

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16. BraceAbility. (2018). Back Pain Caused by Obesity. Health Risks & Treatments. [Online]. Available at: https://www.braceability.com/blogs/info/obesity-back-pain

17. Rungthip P, Rungthip C, Chalermwut S, Petcharat K, Uraiwon C. (2014). Prevalence and associated behavioral factors of low back pain in high school students: Case study in Kaennakhon Wittayalay School. [Online]. Available at: https://he01.tci-thaijo.org/index.php/ams/article/view/66364

18. Nachiappan Chockalingam, Aoife Healy. (2020). Sitting on the floor vs sitting on a chair-which is better for you?. [Online]. Available at: https://theconversation.com/sitting-on-the-floor-vs-sitting-on-a-chair-which-is-better-for-you-141164

19. Paula T. Hakala, Arja H. Rimpela, Lea A. Saarni, Jouko J. Salminen. (2006). Frequent computer-related activities increase the risk of neck-shoulder and low back pain in adolescents. [Online]. Available at: https://academic.oup.com/eurpub/article/16/5/536/590429

20. Kelly Andrews, DC. (2017). Food for thought: Diet and nutrition for a Healthy Back. [Online]. Available at: https://www.spine-health.com/wellness/nutrition-diet-weight-loss/food-thought-diet-and-nutrition-a-healthy-back

21. Linda Said, MS, RD, LDN. (2021). Is an Anti-Inflammatory Diet Good for Back Pain?. [Online]. Available at: https://www.goodpath.com/learn/is-an-anti-inflammatory-diet-good-for-back-pain.

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