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HOW DO GENETICS, IMMUNITY, AND HABITS CONTRIBUTE TO SICKNESS FREQUENCY IN ADOLESCENTS?

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ABSTRACT

This research paper investigates the factors that influence how often adolescents fall ill, focusing on genetics, immune development, and lifestyle habits. While some teens seem to remain healthy, others frequently suffer from common illnesses. Through a review of scientific literature and an original survey conducted among 31 adolescents, the study identifies key patterns in immunity and behavior. Findings show that genetic makeup and immune maturity are crucial, but lifestyle choices—like sleep, diet, and hygiene—play the most controllable role in reducing sickness frequency. The paper highlights the need for awareness among adolescents about how their habits shape their long-term health.

KEYWORDS: Adolescent Immunity, Genetics, Lifestyle, Habits, Sickness Frequency, Sleep, Diet, Hygiene.

1. INTRODUCTION

We often observe that some people fall sick frequently, while others rarely catch even a common cold. Have you ever wondered why that is? Interestingly, the answer lies in a combination of factors beyond simple exposure to viruses or bacteria. In recent times, a growing number of adolescents appear to be falling ill more often, raising questions about whether immune strength is declining in newer generations. Yet, some adolescents remain consistently healthy despite facing the same environmental conditions. This raises a key question: **What actually determines how often someone gets sick?**

Falling sick doesn't only depend upon the interaction our body with the germ, bacteria, virus, etc. but it is a deeper concept apart from our immunity or the contact with the pathogen.

Research suggests that there are various factors affecting our immunity i.e. **sex, age, genetics, heredity, and many more**. Among these, daily routines such as **sleep, stress levels, diet, and hygiene** play a particularly important role in shaping an individual's immune strength. These factors determine will we get a cold or fall sick. In case of adolescence, as it is an important part of our life as we are growing so it is a crucial period so the odds of falling sick will be more. This is due to their age where their immunity is developing, hormones are fluctuating, and sleep cycle is being disturbed and many other physical changes taking place in their body each of these factors either make their immunity stronger or weaker.

This research paper explores the question: **"How do genetics, immunity, and habits contribute to sickness frequency in adolescents?"** Through studying scientific researches an analysis is made to uncover how does biological and behavioral factors affect the frequency of sickness in case of adolescence.

2. MATERIALS AND METHODS

This study used a survey-based, observational research design to collect data from adolescents regarding their lifestyle habits and frequency of falling ill. A total of 31 adolescents between the ages of 13 and 17 participated in the study. Participants were selected using convenience sampling and responded voluntarily.

A structured questionnaire was developed, covering topics such as sleep duration, dietary habits, hygiene practices, and the number of times they fall sick in a year. The survey was conducted digitally via Google Forms and ensured full anonymity of responses.

Data were collected and analyzed using basic percentage distribution to identify common patterns. The findings were compared with existing literature to draw conclusions about how lifestyle and behavior may influence sickness frequency among adolescents.

Review of Literature

1. Institut Pasteur. (2023)

The factors that most affect our immune system: All the people don't have the same ability to deal with a pathogen. This ability depends on our age, sex, infection history and genetics. So a group of 30 scientists had conducted an experiment in France on a large scale with a thousand French population so as to have tailored medicines for people. From this experiment they found out that '*immune variation is largely due to differences in sex and age*', this

variation is especially critical during adolescence, a time when hormonal and developmental changes can significantly alter immune function. They found hundreds of genetic variations that change the expression of molecules that play a key role in immune responses.

Institut Pasteur. (2023). The factors that most affect our immune system. Retrieved from: https://www.pasteur.fr/en/research-journal/news/factors-most- affect-our-immune-system

2. University of Oklahoma (2021)

Why do some people get sick while others feel fine?: Covid-19 revealed, the same pathogen can have widely varying outcomes. The key rule that determine how bad a disease can be is the body part that is affected. In this paper they tried to uncover the fundamental rules that govern the location of disease. They said that rather than looking at the pathogen side things they looked on how each different organs in your body responds to infection on a chemical level. It's a new idea to focus on how the body responds to a pathogen rather than focusing more directly on a pathogen itself. For adolescents, whose organs and immune systems are still developing, this response can vary widely, contributing to differing sickness frequencies. In short, this research allows for a boarder picture of infectious disease that makes room for the many variable that could influence outcomes and how organs recover.

University of Oklahoma. (2021). Why do some people get sick while others feel fine? Retrieved from: **https://www.ou.edu/insideou/articles/2021/june/why-do-some-people-get-sick-while-others-feel-fine**

3. Discover Magazine. (2020)

***Why do some people get sick all the time while others stay in freakishly good health?*:** In this paper they say that, whenever a pathogen, virus or bacteria enters your cells, your body rolls out a choreographed defense strategy, the architects of this process is a set of HLA genes. HLA helps in immune response and the WBCs destroy the foreign bacterium, virus, etc. HLA is effective but some viruses are new to them, hence HLA isn't immune to it, this also explains why do you we get every single going on cold flu but haven't gotten a stomach bug in decades. There are also a lot of other factors affecting our immunity such as mentioned in this paper such as our sleep, lifestyle, food, germ exposure history, etc. Teenagers, who often face irregular sleep patterns and dietary habits, may be particularly affected by these external contributors to immune strength.

Discover Magazine. (2020). Why do some people get sick all the time while others stay in freakishly good health? Retrieved from: https://www.discovermagazine.com/health/why-do-

some-people-get-sick- all-the-time-while-others-stay-in-freakishly

The studies reviewed highlight that immunity is influenced by a complex interplay of genetic, biological, and lifestyle-related factors. These findings provide a solid foundation for analyzing how these variables specifically affect adolescents—a group undergoing significant developmental changes. Building upon this literature, the following section discusses the main contributing factors—**genetics, adolescence-specific biological changes, and lifestyle habits**—in detail, supported by both existing research and data collected through a survey.

3. RESULTS AND DISCUSSION

3.1 Genetic influence on immunity

Genetic makeup influences how often a person falls sick. Each individual inherits unique genes that determine how their immune system reacts to pathogens. A vital set of genes called HLA (Human Leukocyte Antigen) helps identify and fight infections. Like fingerprints, every person has a unique HLA combination, which influences their immune system's effectiveness. Some people may have a natural resistance to common colds but be more vulnerable to stomach bugs, and vice versa.

HLA genes are more effective against pathogens that have existed for generations. New viruses, like COVID-19, can catch the immune system off-guard. Over time, with exposure or vaccination, immunity builds and the frequency of illness drops.

Environmental exposure also matters. Adolescents raised on farms are less likely to get sick due to early contact with microbes, while those in sanitized urban settings may develop weaker immune systems.

3.2 Immune system development in adolescents

Adolescence involves rapid growth and hormonal changes, affecting immune response. Hormones like estrogen and testosterone rise, altering how the body fights infection.

Teenagers often fall sick because their immune systems are still developing. This vulnerability is temporary and improves as their bodies mature.

Institut Pasteur (2023) notes immunity depends on age, sex, and infection history. Since adolescents are still gaining immune memory, they are more prone to illness.

The University of Oklahoma (2021) emphasized how organs like the lungs and gut, still maturing during adolescence, react differently to infections. These organs are vital parts of the immune system and their immaturity adds to sickness vulnerability.

3.3 Lifestyle and Behavioral Factors

Lifestyle is the most controllable factor affecting immunity. For adolescents, choices around sleep, diet, hygiene, and stress significantly impact how often they get sick.

Sleep is often neglected. Most teenagers do not get the recommended 8 hours due to academic stress and screen time. Sleep deprivation weakens the immune system.

Diet is equally important. Many adolescents prefer fast food over balanced meals. Poor nutrition leads to weak immunity and stunted physical development. Vitamins, proteins, and other nutrients are crucial for immune health.

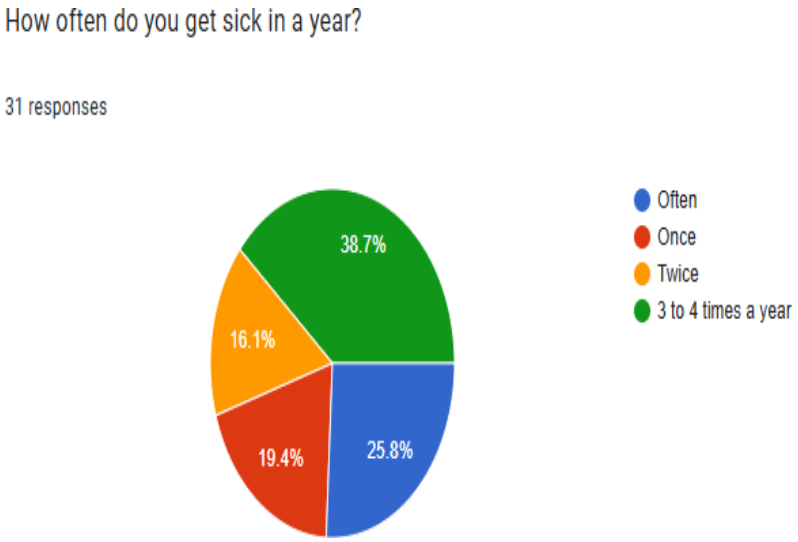
The "hygiene hypothesis" suggests that some germ exposure strengthens the immune system. Adolescents in over-sanitized environments may have underdeveloped immunity.

Among all the factors discussed, lifestyle and habits are under our control. Good sleep, a nutritious diet, manageable stress, and reasonable germ exposure can significantly reduce how often adolescents fall sick.

3.4 Survey Results and Analysis frequency of falling sick

A total of 31 adolescents participated in the survey

- 38.7% fall sick 3–4 times a year
- 25.8% reported falling sick often
- 19.4% fall sick only once a year
- 16.1% fall sick twice a year

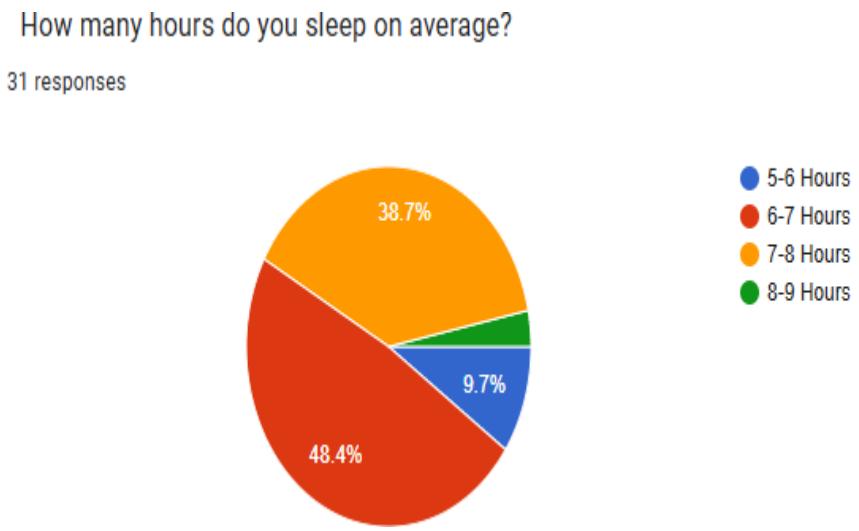


This data is a proof showing that majority of teenagers fall ill multiple times in a year. Majority falling into the "3 to 4 times" and "often" category indicating that adolescent immunity may be relatively weak or still developing. This supports earlier research stating that factors like age, hormonal changes, and lifestyle habits impact how frequently adolescents fall ill.

Sleep Patterns and Immunity

When asked about average sleep duration, a total of 31 adolescents responded:

- 48.4% sleep 6–7 hours on average,
- 38.7% get 7–8 hours of sleep,
- 9.7% sleep for only 5–6 hours, and
- A very small percentage, just 3.2%, get the ideal 8–9 hours of rest.

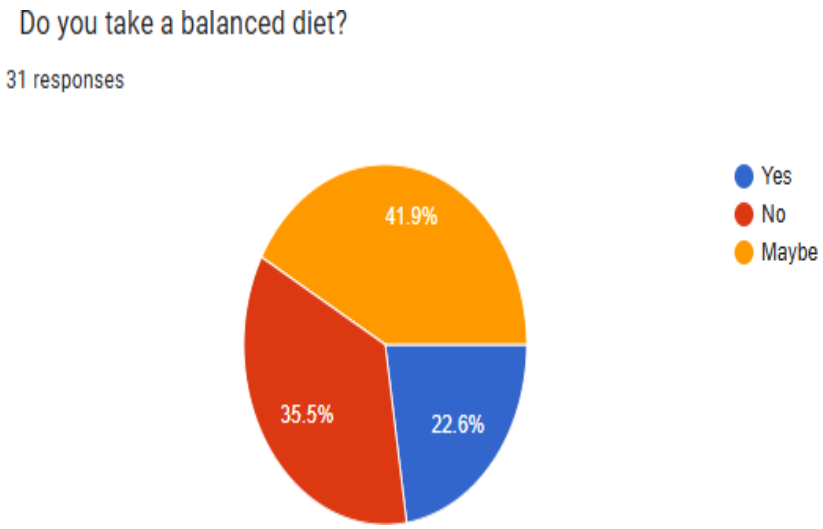


A normal adolescence need about 8 hours of sleep to have a healthy life. This survey shows that majority of teenager sleep of 6-7 hours which will affect their health aversely. Along with their physical and mental health the health of their immunity is also affected due to low sleeping hours. Some teenagers have 7-8 hours of sleep, which is ideal for them. Few having an extremely bad lifestyle and habits have only 5-6 hours of sleep, however the percentage is low but is an indication that the trend of having low hours of sleep affecting their productivity throughout the day.

Diet and nutrition

When adolescence were asked "Do you have a balanced diet?" they responded:

- 41.9% are not sure but maybe have a balanced diet.
- 35.5% don't have a balanced diet.
- 22.6% have a balanced diet.



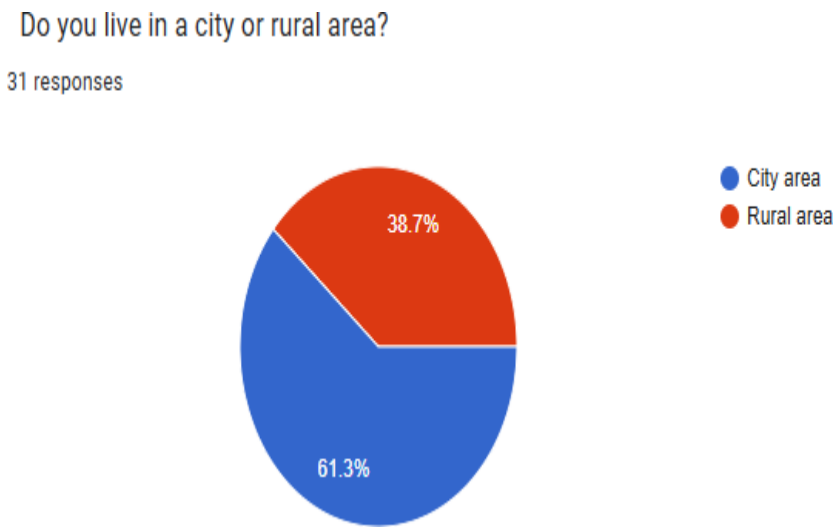
We see from the above survey that majority of them don't even know if they are having a balanced diet. Especially in case of teenagers they don't like the home made food and prefer the fast food chains. They are just slow poison for their body. This question indicates that many of the teenagers are not even aware that if they are having a balanced diet. 35.5% know that they don't have a balanced diet. Very few of teenagers are having a balanced diet. This is an indicator that the cautiousness of having a good diet should be inculcated deep down the society.

Diet being the pillar on which our immunity depends upon has a great importance.

Urban vs Rural Living

The adolescence were asked "Do you live in a city or a rural area?" they responded:

- Majority of teenagers i.e. 61.3% are residing in a city.
- 38.7% live in rural area.



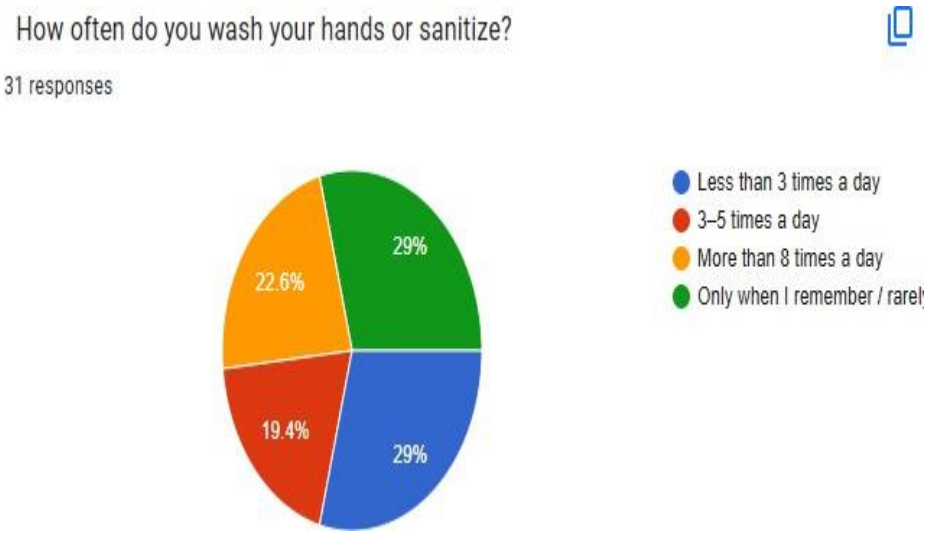
We see that majority of adolescence are residing in cities, they have a surrounding which is extremely sanitized. These kids have never been exposed to any kind of pathogen or virus, due to this their immunity when faces viruses or pathogen it doesn't know how to react to it and these kids fall ill often. This distinction is important, as environmental exposure plays a role in developing immunity.

Adolescents living in rural environments may have more natural exposure to microbes, which, according to the hygiene hypothesis, can help train and strengthen the immune system. This distribution of urban versus rural respondents helps contextualize the results on sickness frequency and lifestyle habits.

Hand Washing and Sanitizing Habits

When asked about "How many times in a day do you wash your hands?" they responded:

- 29% wash their hands rarely or when they remember to do so.
- 29% wash their hands less than 3 times a day.
- 19.4% wash their hands 3-5 times a day
- 22.6% wash their hands more than 8 times a day.



When asked about their handwashing or sanitizing habits, responses were quite evenly distributed. These results suggest that a significant portion of adolescents may not be practicing proper hand hygiene. Washing hands is a habit that is directly related to the frequency of teenagers falling ill. It highlights the need for better awareness and education about hygiene in this age group.

4. CONCLUSION

In conclusion, the frequency of us falling ill is depended on various factors such as genetics, genetic makeup, immune strength, and most significantly, lifestyle and daily habits. While genetic factors and age are the factors which are not under our control however the factors such as habits and lifestyle are variables which are under our control.

The findings from the survey support this. A large portion of the participants reported sleeping only 6–7 hours a night, and very few got the recommended 8–9 hours — a key factor in immunity. Similarly, a considerable number of adolescents reported irregular or minimal hand hygiene, which can increase exposure to illness-causing microbes.

Moreover, those living in city environments — who are typically more exposed to pollution and stress — made up the majority of participants, suggesting a possible link between urban living and sickness frequency.

The research shows that even though we cannot change our genes, we can definitely build a stronger immune system through conscious lifestyle decisions. For adolescents, this means making healthier choices every day — like getting proper sleep, eating balanced meals,

staying active, and managing hygiene — to reduce how often they fall sick.

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