

Freedom to Breathe: Are Face Masks Safe for Children?

Introduction

Their stories are becoming louder.

“My child has trouble breathing with a mask. The school board is mandating masks on all children with little to no accommodation. She has trouble riding the bus. She has become fearful and anxious. We have pleaded with the board. They don't even respond. What do I do?”

“My child had a medical issue that makes breathing difficult, they are forcing him to wear a mask. I cannot even go into the school to see how they will be caring for him. This is unacceptable. I am desperate.”

“My daughters used to be excited about school, learning, and friends. They were A students. They have since developed anxiety and depression due to masking. Their grades have dropped. What do I do?”

There is a lot of talk about “listen to the science” from people who don't take the time to understand the science.

The science behind breathing can be extremely complicated and in depth by using big words and fancy charts, but it can also be easily understood. We must all understand breathing. Breathing is essential for life.

There is a big difference between a scientist telling you something verses a scientist showing you something. This paper outlines the issues with masking children in a scientific way. This is a “show me the science” type of article. A person with a high-school level education can understand the science.

Breathing freely must be taught to every child.

Definitions

Inhale Breath – a person in a calm state will have a certain volume of air that they will comfortably breathe in without being aware that they are breathing. The inhale breath is quantified as a measure of volume (millimeters or fluid ounces).

Exhale Breath – a person in a calm state will have a certain volume of air that they will comfortably breathe out without being aware that they are breathing. It is the exact volume as the inhale breath otherwise the person will fill with air or become depleted of air.

Breathing Pause – a person in a calm state will have a certain time between the inhale and the exhale.

Breathing Rate – a person in a calm state will have a consistent time for each phase of breathing. For example, a certain adult might take a comfortable 1.5 second inhale followed by a 2 second exhale followed by a 2 second pause. This would be their normal breathing rate.

Hypothesis – a guess. When a question is asked, and a person does not know the answer, a typical response is “well, it could be this.” A hypothesis is nothing other than an educated guess.

PPE – personal protective equipment. Equipment worn to minimize exposure to hazards that cause serious workplace injuries.

OSHA – Occupational Safety and Health Administration. In 1970, the agency was created to ensure safe and healthy working conditions for workers by setting and enforcing standards.

The Scientific Method

When was your first science class? When did you first learn a scientific truth? Was it when your teacher told you the world was flat? Was it when your doctor told you it was healthy to do bloodletting? No, it was not. Those were debunked, completely false, commonly accepted beliefs that were told to the population by the leading scientists of the age. It was not science. It was bad ideas coming from bad scientists.

When evaluating any topic, it is good practice to use the scientific method. An expert opinion must be offered by an expert in the field, and the opinion must follow an accepted path of reasoning. The correct path of reasoning is known as the scientific method. The scientific method consists of the following stages:

1. Problem Definition Stage: The first stage in a correct scientific analysis is defining an unbiased question such as, "Is it safe for children to breathe through a mask?"
2. Information Gathering Stage: The second stage is to conduct an investigation by gathering all related information related to the topic. The following steps are part of this stage:
 - a. Observations
 - b. Experimental testing
 - c. Looking at existing data
 - d. Understanding the physics of the subject matter
 - e. Learning new facts
3. Hypothesis Formation Stage: An educated guess to the question must be clearly stated that has benefit. No one benefits from a "I don't know" or "maybe this might be true" answer. Anything less than a firm answer would be an incomplete study. A correct hypothesis statement would be:
 - a. Yes, there is no harm done by breathing through a mask.
 - b. No, there are significant risks in breathing through a mask.
4. Testing Stage: Each individual hypothesis must be fully tested one at a time. The proposed hypothesis must be analyzed through the information that was gathered. Sub-conclusions can be formed. A conclusion may be that additional testing is required. A hypothesis would be accepted or rejected in this stage.
 - a. If the hypothesis does not fit the scientific evidence, it is rejected. Another hypothesis must be constructed and re-run through rigorous evaluation.
 - b. If the hypothesis does fit the scientific evidence, and there are no other reasonable hypotheses to consider, the process can go on to the final stage.
5. Communication Stage: When arriving at the end of the study, the results must be communicated in an understandable way.

What one will typically hear from a good scientist is, "We looked at A, B, C and what we observed was E, F, G." That is a valid statement, but that is not a complete scientific evaluation. A complete scientific evaluation needs to include looking at all related information and running all reasonable hypotheses through the testing phase.

The time has long passed away of experts testifying in our court that something is true because they say so. The primary purpose of an expert witnesses is to decomplicate the problem and explain it in a way that is understandable.

This article will now dive into some of the undeniable facts regarding masking of children. The end of this article will communicate the conclusions of this investigation.

Breathing – General Discussion

Everyone must understand breathing. Before we study the issue of masking, it is vitally important to understand a few of the basics about normally breathing.

Wait? What? Why is a forensic engineer talking about breathing? An engineer is not a doctor. Engineers are problem solvers.

True, I am not a doctor, but I have lungs. I've worn PPE for years. I've been certified as a scuba driver. I used masks since 1984 and took the time to become familiar with the science behind the things I use for protection in order to take responsibility for my own safety.

In order to be safe, a worker must know the limitations of the PPE, the warnings, and the applications for when certain equipment is used or not used.

The following sections contain general information on breathing and explains the issues that arise when normal breathing is masked.

Normal Breathing

If a person is instructed:

“Stop what you are doing, concentrate on your breathing for a moment, and breath normally”

the average person will take notice of their breath and think, “what is normal breathing?” They will likely start breathing abnormally. Untrained people do not think about their breathing. Breathing happens naturally.

The best way get someone to experience normal breathing is to do the following:

1. Have them pretend they just ran a race and are out of breath.
2. Instruct them to calm their breathing down.

After this exercise, the typical person will find themselves breathing normally.

Breathing Rate

Studies have been done to determine what is a normal breathing rate. Breathing rates are faster for small children. The following table shows typical breathing rates (breaths per minute)

| | |
|------------------|----------|
| birth to 1 year: | 30 to 60 |
| 1 to 3 years: | 24 to 40 |
| 3 to 6 years: | 22 to 34 |
| 6 to 12 years: | 18 to 30 |
| 12 to 18 years: | 12 to 16 |
| Adults | 12 to 20 |

A full breath cycle is composed of three activities: an inhale, an exhale, followed by a pause.

An adult person with a breathing rate of 12 breaths per minute would take $60/12 = 5$ seconds to run through a comfortable full breath cycle. The literature shows that a typical adult takes:

- 1 to 1.5 seconds for an inhale.
- 1.5 to 2 seconds for an exhale
- 1 to 2 seconds for a pause.

Looking at the chart it is clear that younger children breathe much faster than adults. A two-year old might have a normal breathing rate of 30 breaths per minute. This would correspond to a 2 second full breath cycle. Their lungs are smaller; therefore, their depth of breathing is significantly smaller than an adult.

Tidal Volume - Defined

Tidal Volume is defined as the volume of air a person breathes in during a single inhale (Ref 3). This is the volume of air that is breathed unrestricted without needing any additional pressure to pull air through or around a mask. It is vitally important to understand Tidal Volume when discussing restricted breathing.

Tidal Volume is Based on Weight

Under free breathing conditions, without any blockage of air, the literature shows that people will generally inhale air proportional to their weight (mass). Therefore, a small child only requires a small volume of air while a larger adult would require a large volume of air. The good thing is we do not have to mentally regulate that. Our bodies do that on their own, and it changes automatically when we need more air during physical exertion.

The literature shows that the Tidal Volume is approximately 7 ml/kg (Ref 2). The following table shows the normal tidal volumes of people with different mass.

| Age | Typical Weight | | Average Inhale | | |
|-------|----------------|-----|----------------|------|----|
| | Years | Lbs | Kg | ml | oz |
| Adult | 190 | 86 | 605 | 20.5 | |
| Adult | 180 | 82 | 573 | 19.4 | |
| Adult | 170 | 77 | 541 | 18.3 | |
| Adult | 160 | 73 | 509 | 17.3 | |
| 18 | 150 | 68 | 477 | 16.2 | |
| 17 | 142 | 65 | 452 | 15.3 | |
| 16 | 134 | 61 | 426 | 14.5 | |
| 15 | 124 | 56 | 395 | 13.4 | |
| 14 | 112 | 51 | 356 | 12.1 | |
| 13 | 100 | 45 | 318 | 10.8 | |
| 12 | 88 | 40 | 280 | 9.5 | |
| 11 | 80 | 36 | 255 | 8.6 | |
| 10 | 70 | 32 | 223 | 7.6 | |
| 9 | 63 | 29 | 200 | 6.8 | |
| 8 | 56 | 25 | 178 | 6.0 | |
| 7 | 50 | 23 | 159 | 5.4 | |
| 6 | 45 | 20 | 143 | 4.9 | |
| 5 | 40 | 18 | 127 | 4.3 | |
| 4 | 36 | 16 | 115 | 3.9 | |
| 3 | 31 | 14 | 99 | 3.3 | |
| 2 | 27 | 12 | 86 | 2.9 | |

For example, the average 10 year old would have a Tidal Volume of 7.6 oz. A 180 lb adult would have 19.4 oz.

Typical Masks

There are several types of masks available to protect a person. Some have been around for a while and are significantly tested and found to be acceptable for adults in the workplace. Such masks are discussed later in this report.

The majority of masks used by the public during this Covid crisis were cloth masks and surgical face masks.

Both have a potential for breathing through the material, but most people have resorted to breathing around the material. Breathing around a mask will create dead air. Breathing through a mask creates uncomfortable pressure to force the air through a mask.

Forced Air Breathing

There is little to no literature or research readily available on the topic of forced air breathing on children. Because of this lack of available literature, there is a major concern that the topic is not well understood.

Masks that require the air to pass through a material create a required amount of intent to overcome the resistance of air flow. Is this forced air breathing? Is this partial asphyxiation? Is it incomplete suffocation? The topic is not well defined or even identified. The following are examples of specific concerns:

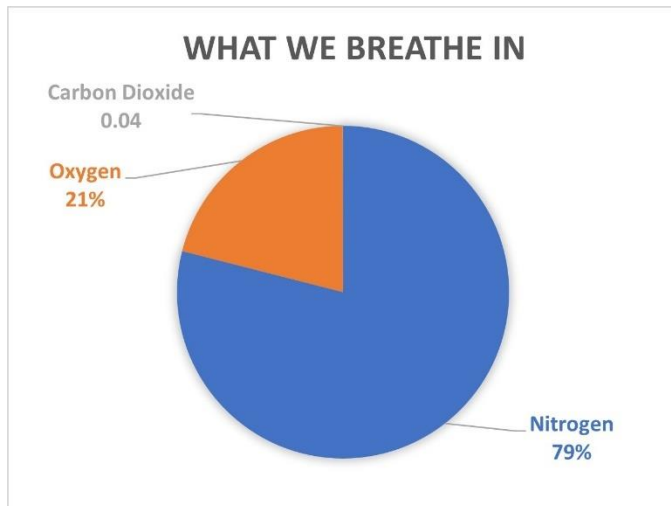
1. How much restricted air flow is okay for a sleepy 3 year old?
2. How much restricted air flow is okay for an asthmatic teenager?
3. How much restricted air flow is okay for a 10 year old child with a common cold during a 10 hour school day.
4. How much restricted air flow is okay for a football player trying to catch his breath on the sidelines.

Further research needs to be completed.

What Should We Breathe In?

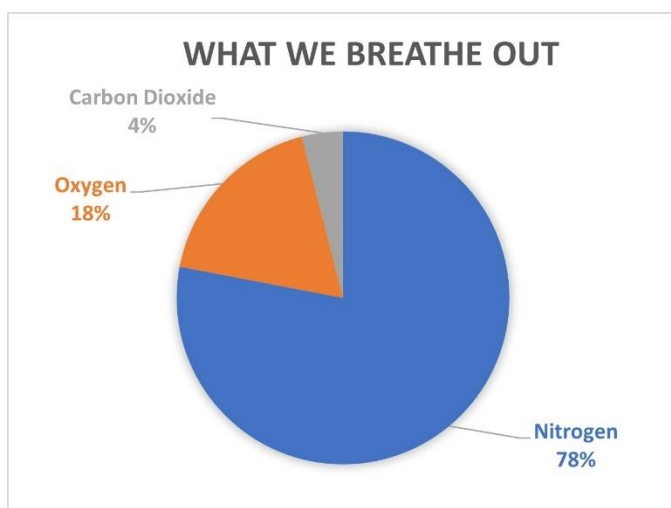
We should breathe in air that is normally found in a clean, outdoor, unpolluted environment – FRESH AIR. One doesn't have to have letters behind their name to understand that: no PhD or MD required.

The earth's atmosphere is general made up of 79% Nitrogen, 21% Oxygen, and 0.04% Carbon Dioxide. Our lungs desire this air to breathe comfortably.



What do We Breathe Out?

Our bodies need oxygen, and we need to get rid of carbon dioxide. Therefore, our lungs make this gas exchange. The good air goes in, and the bad air goes out. Under normal breathing, we breathe out approximately 78% Nitrogen, 18% Oxygen, 4% Carbon Dioxide, and a whole lot of moisture.



What is Under the Mask

When using any type of mask there is a need to fully investigate the presence of dead air. Dead air is the air that is expelled out of the mouth that is trapped in the system and is breathed back into the lungs. Under the mask is what we just breathed out – DEAD AIR.

Moisture / Fungal Growth Discussion

Fungal growth requires four conditions to thrive. When these four conditions exist, fungal growth is likely to develop.

1. Moisture
2. Food (something for them to eat)
3. The right temperature
4. Constricted air movement

The space under a child's mask has ideal conditions for the growth of all sorts of fungi, bacteria, and pathogens.

Oxygen Deficient Environment

How much Dead Air is too much dead air? We know if we breathe long enough in an enclosed space the air become stale and unfit for a human to breathe. The oxygen is depleted and the carbon dioxide is increased. Both are bad for a human. OSHA has set the limit of 19.5% oxygen level below what we must not breathe. Anything less than 19.5% oxygen would be considered an oxygen deficient environment according to OSHA. Therefore, DO NOT BEATHE IN YOUR OWN EXHALED AIR !!!

Some would say, "it is just a little bit of dead air that will not harm you." But is it? We all breath in a different amount of air. Researchers have found that the amount of air we breathe in is directly proportional to how much we weight. For a large adult working in a dusty environment, reputable companies have developed masks that are tolerable. Those masks must not be used on a child that breaths in a much smaller volume of air. It could be deadly. For this reason, it is necessary to look at the ratio of Dead Air to Tidal volume.

Snorkeling – General Discussion

A good way to describe the concept of dead air is to study what happens when breathing through a snorkel.



The dead space in this snorkel measured to be 5.3 ounces. When breathing through a snorkel, a person must significantly modify their normal breathing to deal with a significant amount of dead air. It is commonly suggested that a person should change to a method of breathing deeply.

Some have suggested counting to 4 or 8 seconds for an inhale and then counting 4 or 8 seconds for an exhale. It takes practice to master breathing through a snorkel. It is far different from normal breathing rates of 1-1.5 seconds per inhale. Breathing through a snorkel requires a person to drastically change the time they take for a breath and change their normal volume of air of each breath.

Snorkeling – Adult

We have already concluded that an adult that weighs 180 pounds might have an inhale of 19.4 ounces. When breathing through a snorkel, that adult would need to breathe in the dead air volume of 5.3 ounces to even start to breathe in the 19.4 ounces of fresh air that they need. The time required to do that has changed drastically. Therefore, breathing through the snorkel is significantly different than free breathing. In this example, a 180 lbs person using this snorkel would have a dead air to Tidal Volume ratio of $5.3/19.4 = 0.27$

Snorkeling – Child

If a child were to try to breathe through a snorkel, it would be significantly more difficult than an adult or impossible depending on the weight of the child.

A 70 lbs child would have a dead air to Tidal Volume ratio of $5.3/7.6 = 0.7$. Therefore, it would be almost 3 times more difficult for a child to master snorkeling than an adult. The child needs to breathe in the same 5.3 ounces of dead air to reach the 7.6 ounces of fresh air that they need. Again, the time required to do that has changed drastically. The child that is used to breathing 18 to 30 breath cycles a minute would have to slow that breathing way down to breathe deeply.

Children have historically rejected snorkels. Why? Because they have constantly found that they cannot breathe comfortably through them. In fact, no matter how much they want to breathe through a snorkel or how hard they try to breathe through a snorkel, some children can't.

When they find they can't breathe freely, many take them off and never use them again. Is this a mental determination? Or is this a physical body limitation? There is no amount of positive reinforcement or punishment to overcome the human desire to breathe freely. Their bodies tell them to stop restricting their breathing.

What is Under a Mask

1. Decreased oxygen (16% to 18%)
2. Increased carbon dioxide (4%)
3. Pathogens from inadequate care
4. Chemicals from laundry detergents

School Boards are forcing young children to breathe dead air into their lungs? No wonder there is an increase in respiratory sicknesses.

Daycare providers are experts in the care of children as they are serving ages birth to 5. They understand the issues. Why are we not listening to them?

N95 Mask

DO NOT USE UNLESS TRAINED.



The dead air space measured to be approximately 2.2 ounces. This is a significant hazard for a child.

These masks had once been called dust masks. They have since been named N95 respirators. They are primarily used to prevent relatively large particle from entering the lungs. They cover the mouth and nose tightly and are reported as filtering 95% of non-oily particles.

They are reported as reducing a person's exposure, but not eliminating it according to 3M. There is leakage around the edges. How can they stop an extremely small air borne particles such as Covid, when they can not stop 5% of the large particles?

These masks are typically difficult to breathe through because of the force needed to move the air through the material. Air must pass through the material both on the inhale and the exhale.

N95 masks have been produced and regulated for a long time. N95 Masks are heavily regulated, time tested, protective masks with significant warnings and limitations. They rely on a tight perimeter seal. Some packages list a warning that they are ineffective against viruses.

N95 with Exhale Valves

DO NOT USE UNLESS TRAINED.



Due to obvious problems with not being able to comfortably wear N95 masks, many workers complained about having difficulty with breathing. Companies listened to the complaints, and N95 masks were modified to improve breathing. A valve was added to relieve the strain of exhaling. This helped with overall breathing and many have found this to make the difference in being able where a N95 mask.

The following comments are taken from certain warning labels of N95 masks:

1. WARNING Misuse may result in sickness or death.
2. Do not use beyond listed expiration dates.
3. Masks are 95 % efficient against solid and liquid aerosols.
4. Masks are for dust, pollen, and mold.
5. Masks are not to be used for gasses or vapors.
6. The mask will not eliminate the risk of disease, illness, or death.
7. Masks are not to be used by children.
8. Masks are not to be used by people with a medical condition such as asthma, emphysema, or heart disease.
9. Masks will not protect against viruses.
10. Proper use includes having a fit test.
11. Masks are not to be reused.
12. Masks should be carefully stored and handled.

P100 Masks

DO NOT USE UNLESS TRAINED.

For smaller particle sizes such as fumes, the filtration of a N95 was found to be ineffective. P100 masks were developed to protect workers from smaller particles including organic vapor such as paint fumes. The fitting of the mask was improved to prevent escape around the edges. The invention of the respirator with replaceable cartridge were created.



The P100 masks have more stringent warnings than N95 masks. The masks still rely on filtration.

Filtering vs Fresh Air Delivery

Testing the air within and immediately around face masks indicates a reduction in oxygen. This is no surprise. We must not breathe in what we exhale. Breathing dead air can be harmful.

The atmosphere generally has 20.9 percent oxygen by volume. The OSHA Respiratory Protection Standard 29 CFR 1910.134) uses 19.5 percent oxygen as the level below which an oxygen-deficient atmosphere exists and requires, generally, that all oxygen-deficient atmospheres be considered immediately dangerous to life or health.

SCBA Gear

DO NOT USE UNLESS TRAINED AND CERTIFIED.

To prevent these serious health effects from occurring when employees are exposed to oxygen-deficient atmospheres, the OSHA Standard requires employers to provide employees with either a self-contained breathing apparatus (SCBA) or a combination full-facepiece pressure-demand supplied-air respirator (SAR) with an auxiliary self-contained air supply.



At some point it becomes impossible to filter out contaminants or breathe in oxygen deficient atmospheres. For this reason, OSHA had stipulated that SCBA be used if oxygen level is below 19.5.

SCUBA (SCBA underwater) has been perfected in water diving. It has been studied and significantly regulated by the Professional Association of Diving Instructors (PADI).

A typical SCUBA system supplies forced air to the diver at near atmospheric pressure by use of a regulator. The exhaled air is exited through the mouthpiece with the smallest possible dead air cavity just beyond the mouthpiece. There are check valves to prevent back flow air and to prevent water from entering the system. Inhale and exhale pressures are comfortable. Instructions when using a SCUBA include to breathe calmly. The forces needed to breathe are minimized.

Non-Medical Face Mask

DO NOT USE ON CHILDREN!!

These masks are not regulated by any US agency.

Surgical masks were first developed to protect adults from liquids encountered in surgery. The masks fit loosely allowing the inhaled and exhaled air to enter and exit around the edges



The dead air space was estimated to be approximately 2 ounces. This is a significant hazard for a child.

It is nearly impossible to breathe through the fabric. They are not designed as a filtering mask. The breath is escaping and entering the lungs without any filtration. Therefore, there is no protection from air borne particles of any size.

Various masks were purchased from two big box stores. The following items were listed on the packages:

1. Not to be used under conditions of poor breathing.
2. People with asthma or other respiratory disease should use with caution.
3. Do not modify or improperly use.
4. Not to be used on people who cannot remove it.
5. If discomfort or adverse reactions occur during wearing, it is recommended to stop the use.
6. Recommended service time is 4 hours.
7. Not for children under three.
8. Made in China

Cloth Masks, Scarfs, or other Masks

DO NOT USE ON CHILDREN!!

These masks are not regulated by any US agency.

Cloth face masks have pretty colors and emblems that are enticing to wear. Some have used dirt bike masks or other cut up materials. These masks seemed to have appeared as a more socially acceptable mask alternative to non-medical face masks. Simple testing on children reveal they are more restrictive in breathing compared to non-surgical face masks. Unlike surgical masks that direct air flow to and from the perimeter of the mask, cloth masks also force air through the material.



The dead air space was estimated to be approximately 2 ounces. This is a significant hazard for a child.

Various masks were purchased from a two big box store. The following items were listed on the packages:

1. Use under adult supervision.
2. Not for children under 4 years of age.
3. Not to be used as PPE.
4. Not to be used on people having trouble breathing.
5. Made in China

There are very limited instructions, if any, on the packages. Looking back on the past year, there seems to be a significant lack of care in keeping these masks clean especially among young people. Problems with clean masks exist with wearing them and storing them. A lack of clean mask may lead to further health issues.

Additional Observations

Back to the topic of the scientific method. Up until this point in this article, we have only scratched the surface of what some of the issues are with masks. Based on observed evidence the following observations were made.

1. Children are crying out to their parents for help.

This would be the top reason to question if masks are potentially harmful to children. Why are so many children crying out to their parents that they don't want masks? Could it be that their bodies are telling them they don't want them anymore? Our body and mind is equipped with countless defense mechanisms. If something is hot, we don't touch it. If we are cold, we seek warmth. If we are hungry, we eat. If we are thirsty, we drink. If we can't breathe, we take the mask off or get out of the environment. Why are we not listening to the children?

2. Many parents are very concerned

This would be the second leading reason to question if masks are potentially harmful to children. The parent is the primary caregiver. The fact that so many have come forward must not be ignored. Parents are concerned about the safety and wellbeing of their children.

3. Doctors are warning of the dangers of masks.

There are a growing number of doctors that are discovering links to immune deficiency and mask wearing. Why are doctors being ignored? There is a wide division in the medical community on the harm done to a child while wearing a mask. This article did not address all the additional medical concerns that doctors are presenting.

4. The idea of forced air breathing is appalling.

We should not be discussing terms such as partial asphyxiation or incomplete suffocation when evaluating a mask on a child. These terms should not be associated with a child's right to breathe.

5. The ratio of dead air vs Tidal Volume is alarmingly.

A parent or principal that mandates, "Put your mask on. Look, I can do it. If I can do it, you can do it" has no concept of the difference in Tidal Volume or breathing rate versus the size of a person.

6. The leading scientist flip-flopped on masks

At the start of the pandemic, the leading scientist at the NIH first stated masking was ineffective. Then after a while, he changed his view and stated masks were effective. Science does not change. Statements by scientists change.

7. Our own adult bodies are telling us not to mask.

Many adults are sick of masking. Many adults are choosing to unmask. Many have chosen to quit work solely due to masking mandates. They had the option to comply or leave.

8. Testing is lacking.

Cloth and surgical face coverings are not regulated or tested. Many are not produced by American companies.

9. There are no masks on the market that indicate use beyond 4 hours.

The packaging of unregulated masks are lacking adequate warning labels and directions. Some that do list warnings, specifically state that the mask must not be worn if discomfort or adverse reactions occur.

10. There are no tests regarding how much inhalation of dead air is okay for various children

Is inhaling any amount of dead air on a regular basis harmful to a child? Is there a way to test rats by making them breath in their own exhaled air followed by fresh air? Without testing, mandating mask wearing on all children becomes the test. Should children be the subject of testing? What are the long-term effects?

Conclusions / Comments

From an engineering standpoint, the facts must be stated in an unbiased way. Engineers are licensed to safeguard the general population. The following conclusions and comments were drawn from this study:

1. The people making demands that children mask have given inconsistent replies for their position. If a person in a place of authority is demanding (forcing) a population of people to do something, they must either fully understand it because they have fully experienced it or they have done an exhaustive study and can have full support of the people and technical community. This has not been achieved. Mask mandates are clearly being issued by people who do not understand the science but are only being told it is okay. This is not science.
2. Typical masks that are being worn reduce the free flow of breathing in the following two ways:
 - a. Force is needed to move air around or through the material.
 - b. Dead air space is created causing children to breath in their own exhaled air.
3. Oxygen is reduced when wearing a mask. The amount of reduction has not been adequately studied.
4. Carbon Dioxide is increased. The amount of carbon dioxide poisoning has not been fully studied.
5. Dead air is breathed in and recirculated under a mask. Dead air space is a known problem for masks.
6. The volume of dead air that must be inhaled compared to a person's natural intake breath (Tidal Volume) is extremely disproportionate based on weight. Children are at risk disproportionately compared to adults wearing the same masks. Comparing mask wearing of a child with that of an adult is not an apple to apple comparison.
7. Those making the decisions to mandate masks have a much different dead air to Tidal Volume ratio compared to those they are forcing to comply.
8. Children are unrepresented in this debate.
9. Children are the victims of unsubstantiated unscientific statements that are contrary to the science of air flow and human breathing.
10. Our Right to Life as clearly stated in our nation's Declaration of Independence includes the freedom to breathe fresh air the way we want to breathe it. This includes children that have been silenced. Children have the right to breathe unrestricted. School authorities are taking that right away.
11. Masks have warning to not place on a child without fully knowing all the details. It may result in sickness, future problems, or death.
12. Typical masks on the market have no testing, warnings, or regulations.
13. It is not a parent's job to prove that masks are harmful. It is the school board's job to make sure our children are safe. CDC and other Departments of Public Health have no published data to support a claim that mask mandates are safe or tested.
14. Literature, testing, and science show there are significant risks with masking.
15. There are other major topics regarding masks that are not addresses in this article such as
 - a. Stunting a child's social development.
 - b. The ineffectiveness of mask to stop Covid.
 - c. Growth of sicknesses within masks
16. Do not mask children.
17. Do not tell a child to mask.

By Richard T. Abbott, PE, SE
Abbott Consulting Forensics and Design
www.abbottforensics.com

References:

YOU DO NOT HAVE TO BE A SCIENTIST TO UNDERSTAND BREATHING.

The science behind breathing is not complicated. Everyone must understand breathing for themselves.

The literature that is available to the general public is changing rapidly. There seems to be an effort to silence information that is opposing to one side of view such as articles that had significant information have been retracted. The following is a list of references that were active at the time of this posting.

1. NSPE – National society of Professional Engineers Code of Conduct – Engineers are required to warn the appropriate authority when ignored.
<https://www.nspe.org/sites/default/files/resources/pdfs/Ethics/CodeofEthics/NSPECodeofEthicsforEngineers.pdf>
2. OSHA – 19.5 percent oxygen has been the standard by which OSHA defines an oxygen deficient environment -
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134>
3. New American: Experts such as at the University of MN concluding that masks were ineffective
<https://thenewamerican.com/university-infectious-disease-expert-fauci-wrong-on-double-masking/>
4. Masking is Child abuse
<https://thenewamerican.com/parents-investigation-finds-that-kids-face-masks-are-full-of-dangerous-pathogens/>
5. An article from the 45 year old Association of American Physicians and Surgeons but excellent citation of numerous studies of different types of masks from around the world over many years. Read their short paragraph of final thoughts at the conclusion if you don't have time for the rest. You may find some info here useful to incorporate into the paper.
<https://aapsonline.org/mask-facts/>
6. Medscape Family Medicine Large scale test with roughly 340,000 people in Bangladesh shows 9% fewer symptomatic cases with those that wore masks
https://www.medscape.com/viewarticle/958204?uac=291195FJ&faf=1&sso=true&impID=3614686&src=mkm_covid_update_210903_MSCPED_IT
7. Stanford Medicine News Center - Large scale Bangladesh study (ref 6)
<https://med.stanford.edu/news/all-news/2021/09/surgical-masks-covid-19.html>
8. theBMJ Important potential side effects of wearing face masks
<https://www.bmj.com/content/369/bmj.m2003>
9. Yahoo life -
<https://www.yahoo.com/lifestyle/type-mask-wont-protect-covid-113449639.html>
10. Nursing Times - Every breath you take: the process of breathing explained -
<https://www.nursingtimes.net/clinical-archive/respiratory-clinical-archive/every-breath-you-take-the-process-of-breathing-explained-08-01-2018/>
11. What Gases Do Humans Exhale? -
<https://www.reference.com/science/gases-humans-exhale-2e229a37e5894295>
12. Facts on Face Mask
<https://www.mercola.com/face-masks-facts.htm>
13. Email from CDC addressing question if they have any data to prove masks on children is safe and/or tested.
<https://secureservercdn.net/45.40.150.47/65e.a56.myftpupload.com/wp-content/uploads/2021/09/2021-09-21-CDC-Answer-to-is-there-science-to-support-the-conclusion-that-masks-are-safe-for-children.pdf>
14. As of 9-24-2021 - Minnesota Department of Health has no information to prove or disprove that mask mandates are safe for children.
<https://www.health.state.mn.us/>
15. A well put together technical article from Switzerland
<https://secureservercdn.net/45.40.150.47/65e.a56.myftpupload.com/wp-content/uploads/2021/09/Is-a-mask-free-of-undesirable-side-effects.pdf>

Appendix

