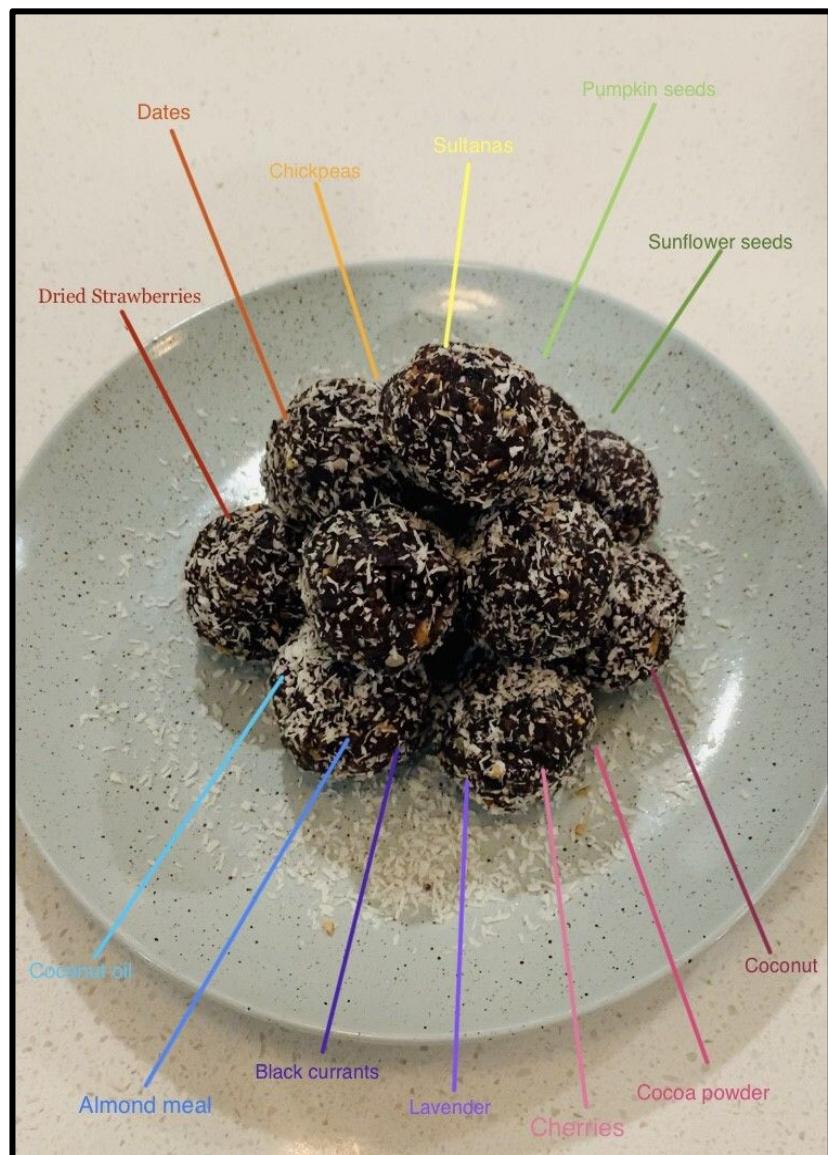




**YOUR
BIG IDEA**



Summarise your idea using our 'fill in the blanks' template below and a visual which reflects your project.



MY INNOVATION IS CALLED Relax-A-Balls

MY NAME / TEAM NAME IS Mila & Holly

I / WE GO TO SCHOOL AT Aquinas College, Tauranga

MY / OUR BIG IDEA IS To create a snack that helps to reduce stress and is suitable for people with diabetes to eat between main meals.

AND IT HELPS Anybody who is experiencing stress, especially due to COVID19.

BY SOLVING THE PROBLEM OF Increased stress due to the current COVID19 pandemic, specifically for people who have diabetes mellitus.

 **INNOVATION NAME**
Relax-A-Balls

Instep Programme
Priority 1

 **WOODS**
BRAND INNOVATION

 **bluelab**

CUCUMBER
Tomorrow.Today 

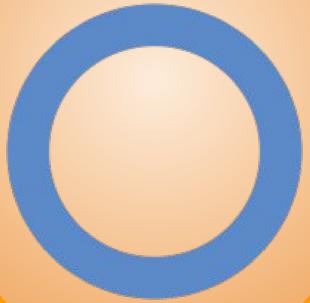
WWW.YiA.CO.NZ



THE PROBLEM

Communicate the problem you are trying to solve, how big it is, who it affects and why it matters.

The blue circle is the universal symbol for diabetes:



What is diabetes mellitus?

Diabetes mellitus, commonly known as diabetes, is a metabolic disease which can cause high blood glucose (hyperglycaemia). Insulin is a hormone which helps to lower blood glucose by moving glucose from the blood into body cells for energy. People with diabetes either have defects in insulin secretion, insulin action or both. This means that the glucose in their blood is not transferred effectively into cells for energy resulting in sustained (long-lasting) hyperglycaemia.

There are several types of diabetes, two main types include:

- Type 1 diabetes
- Type 2 diabetes

- » Type 1 diabetes is an autoimmune condition in which the immune system **destroys** the beta cells in the pancreas which produce insulin.
- » Type 2 diabetes is a metabolic condition in which the body progressively **fails to produce** adequate insulin for the body's needs and/or the body's cells resist insulin action.

How does Stress affect people with diabetes?

Stress causes the release of stress hormones. These hormones can cause increases in blood pressure, pulse and breathing rate, as well as increasing the release of stored glucose (glycogen) from the liver into the blood.

This increased release of glucose into the blood in those with diabetes can cause sustained **hyperglycaemia**, which in time can lead to short-term and long-term complications. One short-term complication is infection due to a **lowering of immunity**.

Lowered immunity occurs because of defects in the immune defence such as reduced chemotaxis and phagocytosis in immune cells. A well functioning immune system is important to fight off COVID19 infection in those with diabetes therefore our aim is to help reduce stress for these people.

Our Problem:

Stress is a big problem in our world today. Currently, the **COVID19** pandemic is causing **increased** stress levels for our families, communities and wider world.

Stress is a significant problem for most people but may particularly affect those with **diabetes**, as it may cause **hyperglycaemia**. This can then result in **lowered immunity**, making people with diabetes more vulnerable to **COVID19**.

What causes our problem?:

Stress is caused by many things which affect different people. COVID19 has changed so many things in our everyday lives and stress levels are increasing because of this.

Oxidants in our body cause stress, such as free radicals which are unpaired electrons. Electrons like to be in pairs. Free radicals scavenge the body to seek out other free radicals to create an electron pair. This causes damage to cells, proteins (such as insulin), DNA causing stress throughout the body!

When you get stressed your brain signals your body to release **stress hormones**. The hypothalamus, pituitary, and adrenals are a combination of glands which are often referred to as the HPA axis. The HPA axis is the body's central stress response system. The hypothalamus and the pituitary gland are located above the brainstem, while the adrenal glands are found on top of the kidneys.

We studied many stress hormones and found that the main hormones associated with stress were **cortisol**, **adrenaline (epinephrine)** and **noradrenaline (norepinephrine)**.

Main Stress Hormones:

Cortisol is your body's main stress hormone. It is made in the adrenal glands. Cortisol works with certain parts of your brain to control your mood, motivation and fear. This stress hormone plays many important roles in your body, such as:

- Keeping inflammation down.
- Regulating blood pressure.
- **Increases blood sugar (glucose).**
- Controlling sleep/wake cycle.
- Boosts energy so the body can handle stress and **then** restores balance afterward.
- Manages how the body uses carbohydrates, fats and proteins.

Cortisol receptors - which are in most body cells - receive and use hormones in different ways. Cortisol can alter and shut own functions that get in the way when the body is under stress. These might include the digestive or reproductive systems, the immune system, or even the growth processes. After the 'danger' has passed, the cortisol level should calm down, but if the body is **constantly** under stress, the cortisol levels will stay **elevated** and the body won't be able to function properly.

Adrenaline (Epinephrine) is a stress hormone secreted by the medulla of the adrenal glands. Strong emotions such as fear, anger or stress cause adrenaline to be released into the bloodstream, resulting in **increased**:

- Heart rate.
- Muscle strength.
- Blood pressure.
- **Sugar metabolism.**

Experiencing stress is normal, but when the body is **constantly** under stress, persistent surges of adrenaline can damage the blood vessels, increase the blood pressure and elevate the body's risk of heart attack and stroke. It can also result in anxiety, weight gain, headaches and sleeping complications.

Noradrenaline (Norepinephrine) is produced by the adrenal glands. It acts as both a stress hormone and a neurotransmitter (a substance that sends signals between nerve cells).

Noradrenaline affects the way the brain pays attention and responds to events. It can also do the following:

- Increase heart rate
- **Trigger the release of glucose in the blood**
- Increase blood flow to muscles

YOUR RESEARCH

Communicate who your innovation is for, what they need, who you spoke to when carrying out your research and what technology or science you might use to make your innovation work.



***Please note:** We identified many foods that contained these stress relieving vitamins and minerals, but we have only listed the foods that could potentially be put in our **Relax-A-Balls**.

We interviewed **Anna Dykzeul** who is an experienced **diabetes nurse** and works in **Tauranga hospital**. We asked her what would make our Relax-A-Balls suitable for people with diabetes to eat:

For someone with diabetes, what is their goal throughout the day, as far as their blood glucose is concerned?

"For anyone with diabetes, they try to maintain 'normoglycemia' - blood glucose levels as close to normal as possible. This means less lows and peaks, and more of a flat blood glucose profile."

How do they maintain this goal?

"To do this, it is ideal to eat three main meals (containing carbs/fats/proteins) and low-carbohydrate snacks in between (no more than 15 grams carbohydrate per snack). Any more than 15g may cause a peak in blood glucose, anything less than 15 grams may lead to the person feeling 'unsatisfied' or requiring more food towards the end of the day as they haven't fulfilled their carbohydrate intake throughout the day."

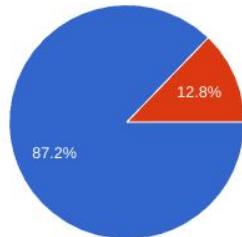
Why is our product better than any other snack?

"You are providing a snack with a specific carbohydrate content and essential nutrients known to reduce stress, reducing cravings and excessive food consumption later in the day which prevents peaks in blood glucose levels away from normoglycemia. This maintains optimal immunity by enabling a glycaemic profile as close to normal as possible, exactly what a snack should offer."

We tested our innovation by creating the final mixture and editing the recipe after each test so that our Relax-A-Balls had the correct **shape, size, consistency, carbohydrate content and taste.**



We sent a survey to more than 75 adults and asked each of them how they have been affected by COVID19:

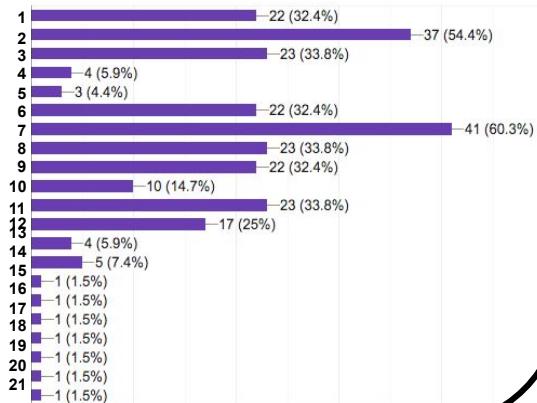


Has the worldwide COVID19 epidemic caused any kind of stress for you (physical/mental/emotional stress)?

« 87.2% people answered with "Yes"
« 12.8% people answered "No"

If "Yes" what has been causing stress for you? (The people surveyed could tick multiple answers on this question)

- 1 - Fear of catching the virus
- 2 - Fear of family members catching the virus
- 3 - Loss of income
- 4 - Being laid off of your job
- 5 - Business going into bankruptcy
- 6 - Being stuck at home
- 7 - Not being able to see family or friends
- 8 - Homeschooling for children
- 9 - New Zealand economy in trouble
- 10 - Investments losing value
- 11 - Holiday and travel plans disrupted
- 12 - Events being cancelled (weddings, parties, funerals etc.)
- 13 - Becoming physically or mentally unwell
- 14 - Fear of an already existing illness becoming worse
- 15 - 21 = Other: _____



Vitamin and minerals that relieve stress:

Active ingredient:	*Foods rich in our active ingredients:
<p>The B Complex Vitamins refer to all of the known water-soluble (can dissolve in water) vitamins, except vitamin C:</p> <ul style="list-style-type: none"> • Thiamine (B1) • riboflavin (B2) • niacin (B3) • pantothenic acid (B5) • pyridoxine (B6) • Biotin (B7) • Folic acid (synthetic) / Folate (B9) • Cobalamin (B12). <p>B vitamins are important for cell growth, reproduction, structure maintenance and response to environmental change. Research also shows that B complex vitamins relieve stress and put the body in a good mood.</p>	<ul style="list-style-type: none"> • Legumes: Contain: High folate (B9) content Edamame (green soybeans), lentils, roasted soy nuts, pinto beans, chickpeas (garbanzo beans), black beans, kidney beans, green peas. • Vegetables: Leafy greens: Contain: High folate (B9) content Spinach (raw/cooked), collard greens (cooked), turnip greens (cooked), romaine lettuce (raw). • Seeds: Sunflower seeds: (Apparently one of the best plant sources of pantothenic acid) Contains: Pantothenic acid (B5), folate (B9), pyridoxine (B6), Niacin (B3).
<p>Vitamin C is an antioxidant, meaning it protects the body cells from oxidants such as free radicals. If the vitamin C levels in the body are low there will be an uneven balance between the antioxidants and oxidants, which can cause stress levels to increase. If the body is getting the correct amount of vitamin C it can protect the cells from free radicals and other oxidants that increase stress levels.</p>	<p>Fruit: Kakadu plum, acerola cherries, rose hip, guava, blackcurrants, kiwifruit, lemon, lychee, persimmon, papaya, strawberries, orange.</p>
<p>Vitamin E is also an antioxidant, it fights of oxidants, such as free radicals. The body uses vitamin E up quickly in times of stress and anxiety because it is trying to fight off the free radicals, that may be causing it. If the body gets enough vitamin E it can protect your cells from free radicals and other oxidants that increase your stress levels.</p>	<ul style="list-style-type: none"> • Nuts & seeds: Sunflower seeds, pumpkin seeds, almonds, hazelnuts, pine nuts, peanuts, brazil nuts, pistachios, pecans and cashews. • Oils: Sunflower oil, almond oil, hazelnut oil, cottonseed oil, safflower oil, rice bran oil, grapeseed oil, canola oil, palm oil, coconut oil. • Fruit: Avocado, mango, kiwifruit, blackberries, blackcurrants, cranberries (dried), apricots, raspberries.
<p>Gamma-aminobutyric acid, also known as GABA, is an amino acid and also a neurotransmitter (a substance that sends signals between nerve cells), which is made in the brain. Gamma-aminobutyric acid is often taken as a supplement to relieve stress, improve mood, reduce PMS (premenstrual syndrome) symptoms and ADHD (attention deficit hyperactivity disorder). There is also evidence showing that orally administered (Taken through the mouth) GABA supplements can help promote relaxation, immunity and reduce anxiety during times of stress.</p>	<ul style="list-style-type: none"> • Legumes: Soy beans, Adzuki beans, peas. • Nuts: Chestnuts • Grains: Buckwheat, sprouted grains, brown rice.
<p>5-hydroxytryptophan is a naturally occurring amino acid and neurotransmitter. It is the neurotransmitter that is released before serotonin, which is the "happiness neurotransmitter" in the human brain. When the body is under stress, the stress hormones in the body tend to rise and the neurotransmitters lower. If the body has the correct amount of 5-hydroxytryptophan levels it will be able to produce the right amount of serotonin.</p>	<p>You can't get 5-HTP from food! But the amino acid tryptophan, which the body uses to make 5-HTP, can be found in:</p> <p>Nuts and seeds: Sunflower seeds</p>



Explain your final idea, how it works and how it solves a problem.

How our idea works:

We have made "Relax-A-Balls" to help reduce stress for anybody, including people with diabetes.

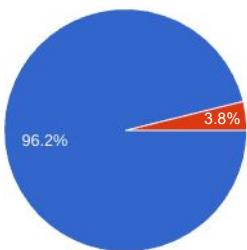
Our Relax-A-Balls consist of ingredients which contain stress relieving vitamins, minerals and herbs. We have also put ingredients in that have high amounts of potassium and magnesium, which are ideal for people with diabetes.

At first, we were thinking of only producing our Relax-A-Balls for people with diabetes - but it hit us, that surely everyone will be experiencing stress during COVID19? So, we decided to challenge ourselves and also extend our idea out to **everybody**. That is, **anyone** who is stressed during this time can eat our **Relax-A-Balls** to help them feel less stressed!

Our Relax-A-Balls don't **just** reduce stress, they are also the perfect snack for people with diabetes to eat between main meals. When we interviewed Anna Dykzeul, a diabetes nurse from Tauranga hospital, she talked to us about the fact that people with diabetes **need** to eat snacks between meals, to maintain their carbohydrate intake throughout the day. She told us that an ideal snack would be 15 grams of carbohydrate or less. Our Relax-A-Balls would be the perfect snack between meals as they contain 5.7g in each ball. Therefore, we are solving two problems for people who have diabetes::

- 1) We are producing a healthy and organic snack to eat between meals.
- 2) We are also providing stress relieving nutrients which may help increase immunity.

On our survey we asked the people what they thought about our product



Our "Relax-A-Balls" are snack balls which contain well known stress relieving ingredients. Would you be more likely to choose our product over other frooze ball or snack options because of this benefit?

- Yes - 96.2%
- No - 3.8%

How does our innovation affect the environment?

Our Relax-A-Balls will be made of organic and natural ingredients.

For our packaging we came up with the idea of having 2 size packs. There will be a larger pack and a smaller pack. The larger pack will be made of paper, so it is recyclable. The smaller packs will be reusable, resealable and made of cornstarch. This way, when you finish one of the smaller packs of our Relax-A-Balls, you can just refill the reusable cornstarch bag with the larger pack.

Our Final Ingredients:

Ingredient:	Why we chose this ingredient:	Measurement:	Carbohydrate content (percentage):
Sunflower seeds	We chose to use sunflower seeds as one of our ingredients because it is high in stress relieving vitamins and minerals, such as, the B complex vitamins, vitamin E and tryptophan (which is the neurotransmitter that the body uses to make 5-hydroxytryptophan).	1/8 cup	11.4%
Pumpkin seeds	Pumpkin seeds are rich with in vitamin E . They are also high in magnesium and potassium . Research has shown that people with diabetes lack magnesium, which is shown to directly influence the blood sugar control of type 2 diabetics. By having a healthy diet with potassium, people with diabetes may improve their insulin sensibility.	1/8 cup	10.7%
Chickpeas	We have chosen to use chickpeas in our Relax-A-Balls because they are rich in the stress relieving B complex vitamins . Chickpeas are also high in magnesium .	1/4 cup	39.6%
Almond meal	We are using almond meal, which is made from organic almonds. Almonds are high in stress relieving active ingredients, such as, vitamin E and one of the B complex vitamins which is biotin(B7) . Almonds are also rich in magnesium and potassium .	1/4 cup	9.1%
Blackcurrant powder	We have chosen to use Blackcurrant powder, which is made out of organic blackcurrants. Blackcurrants are rich in stress relieving antioxidants, including, vitamin C and vitamin E .	10 grams	65.5%
Raw cocoa	Raw cocoa is very rich in magnesium which people with diabetes lack.	10 grams	52%
Lavender	Lavender is one of the most common aromatherapy oils , it can help to reduce anxiety and stress. According to research, it does this by impacting the limbic system, the part of the brain that controls emotions.	1/4 teaspoon	0%
Dried cherries	We have decided to use dried cherries in our relaxaballs. Acerola cherries contain high amounts of stress relieving, vitamin C .	1/4 cup	84%
Freeze dried strawberries	We have used dried strawberries in our relaxaballs because they are rich in stress relieving vitamin C .	1/4 cup	72.5%
Pitted dates	Dates contain high amounts of potassium , which helps bring the sugar levels in the body back down to a healthy level. There were many other foods that contained high amounts of potassium, but we used dates because they helped hold our mixture together.	2 cups	65%
Raisins	Raisins are also high in potassium , and we also used raisins to help moisten our mixture.	1 cup	79.2%
Coconut oil	Coconut oil is contains some vitamin E , but not as much as other ingredients. We used coconut oil because it helped our final mixture stick together.	4 Tablespoons	0%
Shredded coconut	Dried coconut is a great source of potassium . We used shredded coconut to coat the outside of our relaxaballs.	1/2 cup	7%

Our Final Product - Relax-A-Balls

After much discussion, planning and researching, Holly (using our decided ingredients), set out to bake a prototype for our Relax-A-Balls. We'd found that the five senses were very important to lowering stress levels, so we wanted the texture to be smooth, easy to eat, have a good taste, and of course still include all those essential proteins, fats and carbohydrates as well as the stress relieving elements!

Along the way, we discovered that our Relax-A-Balls were having trouble sticking together, so we added in some potassium rich dates and raisins to give them their sticky texture and firm shape. At the same time we also managed to keep our deal that we would only be allowed to use natural and organic ingredients!

To make sure we had the right amount of carbohydrate in each of our **Relax-A-Balls**, we found the carbohydrate percentage in each of our **ingredients**, and then found the **overall** percentage. Our Relax-A-Ball mixture was 38.2% carbohydrate. Each of our relaxaballs weighed **around** 15g, resulting in 5.7g carbohydrate in each ball. This shows that a person with diabetes can have 1-2 relaxaballs between each meal! (it is best they don't have more than 15g of carbohydrate between main meals).

Our Relax-A-balls were a great success! The whole family enjoyed them, and after eating **just one**, you felt full of energy and comfortably content until the next main meal.



INNOVATION NAME

Relax-A-Balls

