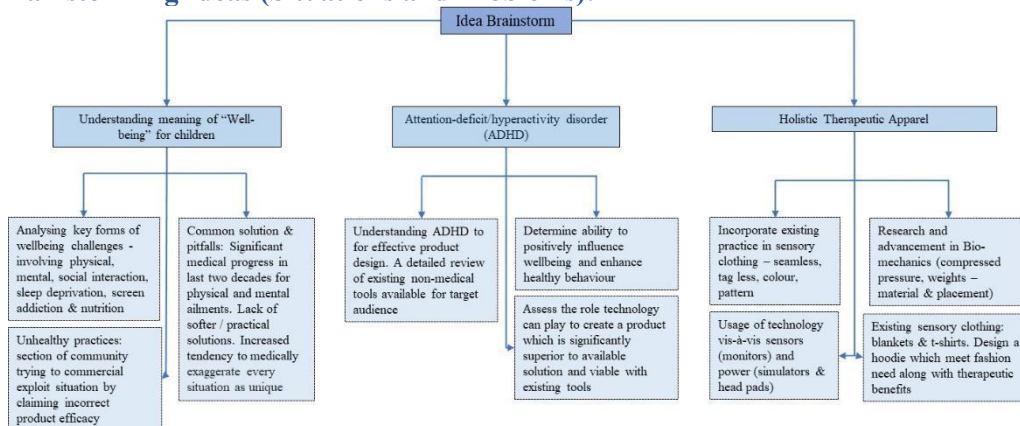


CRITERION A: INQUIRING AND ANALYSING

Ai (Design Need): Explain and justify the need for a solution to a problem for a specified client/target audience

Brainstorming Ideas (Situations and Problems):



Decoding the unit plan, I identified different situations prevalent in today's world that I relate with or have noticed in my daily life. Furthermore, I identified a few problems for each of the situations

Finally, I identified one of the problems based on the personal connection (how close the problem is to me), and the urgency to create a solution, to work to start creating a solution. According to my personal connection and the results, the problem of non-availability of customised therapeutic apparel based on better understanding on how apparels provide physical comfort to ADHD children along with applying advancement in biomechanics (use of weights), communication technology (Wifi)

Goal: My goal is to be able to design a product which helps children with attention deficit hyperactivity disorder (ADHD) to remain calm and help better focus on their activities. Through my design project my aim is to make therapeutic apparel which can help PYP students with ADHD to better concentrate in classes. My goal of my therapeutic apparel will be to provide a calming effect to the young children like a warm hug from their loved ones making them feel more comfortable even in a disturbing and chaotic classroom environment. This should help improve attention span - helping them concentrate in class and making them able to cope up with their school life from a young age itself. I also aim to reduce the anxiety levels of a child with ADHD when faced with new environments.

Design Situation: (a) According to Reuters over 130 million people all around the world have ADHD which affects their ability to work significantly, making them lack behind in school and work; (b) Currently over around 5% of all children deal with ADHD, a condition where the child is not able to pay attention and is considered "special". Due to this condition, they often lack behind in school and are excluded from social groups; (c) According to National Centre for Biotechnology over 50% of ADHD children face social rejection and find difficulty in making friends due to their behaviour whereas only 15% of children without ADHD face social rejection.; (d) University of Chicago Medicine study concluded that over 18% of children with ADHD face depression with suicidal thoughts 5+ times in their life, whereas this is 2 times for normal children. These symptoms are a cause of ADHD and the change in behaviour a person faces severely impacts their social and mental well-being. (e) Another study conducted by Simply Psychology informs us about how children with ADHD have inconsistent energy released due to which they are tired easily; (f) As per CDC reports, 4 out of 10 children with ADHD have elevated anxiety levels which causes academic and social stress. Medical advancement has happened for medical treatment for ADHD children, but little efforts have occurred on scientifically developing a therapeutic apparel.

Need for Solution: I aim to boost the children's self-confidence with my product which will help them in any field they decide to pursue. High self-confidence and lower anxiety will encourage the young students with ADHD to step outside their comfort zone and make friends from a young age so they always feel included in society thus enjoy a healthy life in all aspects. There are minimal tools or equipment available to help these young children overcome such great challenges making it difficult for them to have a healthy well-being. The product would aim to maintain constant energy levels for ADHD children as against sudden changes which is common for hyperactive ADHD children.

Role: As a grade 10 student and a designer my role is to solve a problem with impacts of over 5% of children from the age of 5 to 9 globally according to CKS Nice. My role as product designer for the product includes (a) provide calmness and support to children with ADHD; (b) educate parents what ADHD is, and the side effects of ADHD, a practice recommended by Child Mind Institution to enable them to support children get

through difficult times; (c) affordable product so the maximum number of families can purchase and help their children deal with ADHD; (d) maintain good quality in the product, using high quality materials and making the apparel with high quality of precision so no irritation or discomfort is caused while using the product. As an active designer seeking to improve, it is my duty to obtain primary feedback from the audience after the first version to keep improving with the target to make the product an industry standard and create real impact.

Connection with the Unit Plan

<i>Global Context:</i> Scientific and Technical Innovation	<i>Key Concept:</i> Development	<i>Related Concept:</i> Adaptation	<i>Statement of Inquiry:</i> Healthy practices can shape well-being
The design problem is closely related to global context as it focuses on scientific innovation of bio-mechanical knowledge & sensory tools and technical novelty built to <i>last and meet unusual needs of every member of the target audience</i> . The product will help in improving both physical and mental wellbeing of the increasing population of ADHD children and their caregivers. The product is a demonstration of how to build a healthy physical relationship between environment and technology that impacts psychological and lifestyle choice for the society	The design problem talks about the need to have a mechanism which <i>incorporates technological evolution to find efficient solutions</i> to modern day societal problems. Primary focus was on the key-concept of development by introducing fresh design ideas to create a unique product. The process involved exploration of ADHD medical condition, existing products, scientific basis of relief being experiences for various aspects (weights, fidget toys, fabric, fitting) to develop a product which comprehensively encompasses available knowledge and tools	The well-being solution being designed for the target audience is adapted after thorough analysis of existing products and adapting them to target audience's needs. As each ADHD child is unique the product is designed to provide flexibility to adjust weight (gradual increase & distribution) while addressing the need for the product to be socially acceptable (stylish design, layout, and pattern). Approach adopted to <i>adapt & integrate design</i> principles with understanding of human and technology to create solutions that positively impact lives	The design problem connects to the statement of inquiry as the product design focuses on <i>blending existing best practices with advances in sensory / communication (WiFi) technology</i> along with <i>positive results in bio-mechanics</i> tools of compressed pressure & weights usage. The product will directly affect quality of lives, academic development, overall development, and well-being of a section of society. Moreover, the design of the product is efficient to incorporate new technologies in a cost-effective manner.

Product: I aim to make a product which can help young children feel comforted and have a better well-being. I want to do this through the medium of therapeutic apparel which takes comfort to a high level, doesn't have any itching material which distresses the child and where apparel is an enabler making them feel secure and comfortable. My product will be affordable so the maximum families can take advantage of it and improve the well-being. If possible, I will make the product sustainable by using eco-friendly materials so the product can be easily disposed of after the child has outgrown the product. The product will be moderately stylish looking like normal clothing to avoid embarrassment for children in public places and normalizes their experience of wearing therapeutic apparel. It will additionally be ensured that the apparel perfectly fits the child with there being no loose end or fitting too tight making it uncomfortable. Thick material will not be used, which makes the product uncomfortable to wear in warmer weather conditions and making the child feel like they are wearing normal clothing rather than “clothing for special people”

Standards: There are some basic standards which my product requires to have for success

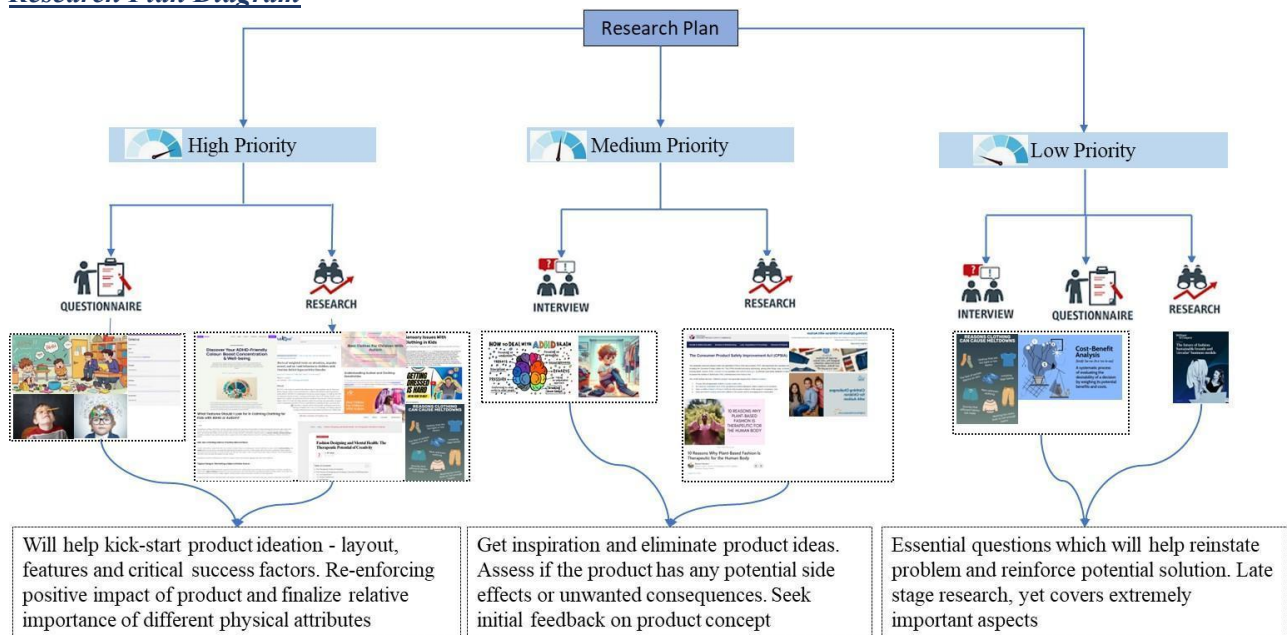
- *Comfort:* It is crucially comfortable, soft material is used throughout the product to ensure the client while wearing the product does not encounter any difficulty or become uncomfortable causing unwanted anxiety
- *No tags or labels* should also be left on the product as they can cause irritation and rashes impacting the mental and physical well-being of the client.
- *Durability & easy to wash:* The product should be durable enough so the user can wear the product almost everywhere without worrying about any tears. A durable product also ensures the users can stretch in their product and perform any activity such as playing sports and doing activities such as yoga. Making the

product durable is a must to keep up with the active and outdoor life of a PYP student. It is also crucial that the product is easy to wash as the children will be wearing the clothes every day hence the clothes will need to be washed every day. Laundry wash product would increase everyday efforts for caregivers and force them to spend money they do not have to get the clothes washed from outside

- **Nontoxic materials:** It is crucial that nontoxic materials are used to ensure no allergies or rashes are caused to the users when the therapeutic apparel is worn.
- **Lifespan:** Considering my product will be comparatively more expensive than normal clothing in the market. It is crucial that the product has a long lifespan and can provide value for its price. It needs to be ensured that the fabric does not lose its texture after a few washes, the apparel is able to maintain its consistent colour and the apparel does not expand or loosen making it ineffective.

Aii (Research Plan): Identify and prioritize primary and secondary research needed to develop a solution to the problem

Research Plan Diagram



High Priority Research

Inquiry Questions		Relevance & Justification for Priority
 Primary	What type of therapeutic apparel should be made to help ADHD children (shirt, trousers, blanket, etc) (Conceptual)	This is the starting point of my research which will enable me to gain insight into client's expert opinion on the problem and its intended solution. Will guide me about aspects which are important for impacted children in terms of preferred features and design considerations. I will corroborate the feedback received from experts by researching online to understand common product flaws and expected minimum design standards. This will allow me to select and brainstorm certain features and themes for my product which would cater to the target audience. The survey feedback would focus on (i) good features / experiences are present in existing available therapeutic apparels; (ii) shortcomings or improvement areas in existing product
	What size should the therapeutic apparel be for it to perfectly fit you? (Factual)	Given the background of end-use i.e. children with ADHD condition, who are hypersensitive to touch, this feedback is important to determine product fit. It is important to have this information at the early stage as overall apparel design and type of sensors & weights to be used will be driven by this feedback. The survey would focus on aspects like (i) Fit type: body hugging or loose / airy; (ii) standardised sizing scale [small, medium, large] appropriate; (iii) Length preference: short or long; and (iv) Preference for sleeve length [sleeveless vs short sleeve vs long / full sleeve]

Inquiry Questions		Relevance & Justification for Priority
Secondary 	How can safety features in therapeutic apparel be ensured to meet global standards? (Conceptual)	This aspect is also critical for parents and caregivers, given the background of children. This research will provide me with a detailed insight into the features and components that I must incorporate in my product. Having a good understanding at early stages of product design will guide me for initial product design that fulfils all the criteria.
Secondary 	Can electronics be incorporated into the product for optimal use? If yes, how? (Debatable)	These research questions enabled me to obtain accurate and appropriate information about use for technology and gain deeper insight into its impacts. This high priority question will help assess (a) real-time monitoring and consultation needs for ADHD children (b) apply recent advancements in biotech, sensory tools, and communication devices. The plan is to blend healthcare needs for ADHD children with cross functional technology availability
Secondary 	What are the key aspects therapeutic apparel should focus on to help children from the age of 5 to 9 optimally (weighted clothing, pressurized clothing, etc)? (Debatable)	This research provided me with a brief insight into the features and components that I must incorporate in my product, thereby setting-up design guide rails. Secondary research was chosen as preferred means to eliminate personal bias in primary survey, lack of firsthand experience of surveying audience and limitation of existing product acting as barrier for feedback provider. Online research on multiple sources would provide diverse information about various aspects, which would be combined to create a holistic product.
Secondary 	What psychological or behavioural outcomes are linked to therapeutic apparel and how can I leverage them? (Debatable)	This aspect of the project is important, as it assesses the intangible benefits associated with the project and is the most critical success criteria. The primary premise of the product is to improve calmness for ADHD children. It is documented research that therapeutic apparel has a positive outcome for ADHD children. Feedback would help understanding specific aspects of psychological or behavioural outcomes with different design variations to create a balanced effective product.

Medium Priority Research

Inquiry Questions		Relevance & Justification for Priority
Primary 	Have you ever used therapeutic apparel to help a child, if yes, did it work and how can it be improved in the future, if no, would you be open to trying therapeutic apparel? (Factual)	This information would be gathered by conducting an interview of an existing parent or caregiver to an ADHD child. Firsthand information obtained by existing users of the product would provide valuable insights into things which work well and areas where the need gap is felt. The feedback received would also be compared with online literature on the subject to ensure personal bias of the interviewer is not balanced. The reason for having this in medium priority is to ensure that I seek this information only after having a good understanding of the problem situation and potential solution – this will ensure that feedback on existing products does not curb my creative instinct.
Secondary 	Which materials could be used – comfortable, durability and lifespan into consideration? (Conceptual)	As most of the information to be explored here is generic in nature, this was identified as medium priority. While significant advancements and technological break-through has happened in this space, it is important to research basic characteristics of different clothing fabrics. Comfort needs of ADHD children would be given utmost importance while assessing different material. Durability of material also has both cost and sustainability considerations.
Secondary 	Designer challenges –while making therapeutic apparel? (Conceptual)	While a designer constantly pushes the boundaries of conventional wisdom to create a unique product, secondary research would help assess common pitfalls and challenges around the product. Practical appreciation of identified challenges would provide a path to brainstorm alternatives to resolve them. Good understanding of challenges would facilitate viable product design

Inquiry Questions		Relevance & Justification for Priority
Secondary 	What health standards are applied to clothing designed for children? (Conceptual)	ADHD children have a medical condition and it is logical for parents and caregivers to be extra sensitive about health standards. This information at intermediate stage will provide information before finalising the material to be used and specific manufacturing process. Online research would provide information about globally prescribed minimum standards for children's clothing. Good understanding of both regulatory requirements and best practice are critical to design a viable product.

Low Priority Research

Inquiry Questions		Relevance & Justification for Priority
Primary 	Is there anything specific you would want to be added to the product to help you (colour scheme, pattern, features, etc)? (Conceptual)	By conducting a survey of people to determine specific features can improve effectiveness of the product and better understand psychology relates to aspects like colour, pattern. This will help create designs that can add real comfort to ADHD children. Feedback would be sought on all aspects related to (i) Colour & pattern: colour vs multiple colour and plain vs printed; (ii) Design considerations: zip vs buttons vs pull-over; (iii) Base material - Cotton <lightweight, but does not prevent for cold> vs Polyester blend <smooth, but reduced air flow> vs Leather
Primary 	What ideal price therapeutic apparel should be for you to be able to afford without discomfort? (Debatable)	The cost of a product is a fine balance between affordability vs material & its features. It is extremely important to have a good understanding of cost considerations and pricing points to enable a commercially viable product. I would be conducting a survey to assess how much additional amount parents or caregivers are willing to spend for customised apparel as compared to standard apparel. This would be in the range of Nil to 100%+. The product price point would act as a guide while considering various aspects of materials, features, and manufacturing techniques.
Secondary 	Environmental Considerations (Conceptual)	I would undertake online research to determine appropriate techniques to be applied for making therapeutic apparel sustainable. It is important to ensure sustainability is considered at the design stage itself to ensure that boundaries for materials to be used and techniques adopted are established before actual product design and implementation.

Aiii (Existing Products) Analyze a range of existing products that inspire a solution to the problem

Lunar Therapeutic Apparel

Customer: This is therapeutic apparel designed by a Canadian based company called Lunar whose aim is to be able to reduce chronic pain and make life easier for more than 50 million Americans. The product is focussed on narrow customer segment and same could be customised to cater to patients with conditions such as CRMO and arthritis cases. The uses could experience Joint stiffness while using the product - When the knee brace is used it adds resistance to the knee due to which most users tend to move their knee less compared to when not wearing the therapeutic apparel causing joint stiffness and impacting a person's physical well-being. Currently users can adjust the vest band by adjusting the tightness strap by themselves, if the strap is pulled upon more than indented and the users do not realise then instead of improved blood circulation the pressure straps can hinder

Function: The way Lunar's therapeutic apparel works is simple, first the users put on Lunar's patented support bands on their knees and vest, after which the users put on Lunars clothing. They do this by making therapeutic apparel to support crucial joints and increasing circulation. There are no sensors embedded, limiting use of technology and product functionality. Currently this product only deals with areas like knees and vest, by applying Pressure technology products can provide pressure and improve blood circulation throughout the body – which would provide higher comfort to ADHD patients by applying pressure to certain veins. The product functionality could be improved by adding a simple stress or gyro sensor. The stress sensor would detect the user's stress levels and provide them to the user's phone to better track well-being. While the gyro sensor would help provide real time feedback for the user's posture, by detecting when the user is slouching, has an improper posture, or is not walking properly.

circulation not providing blood to certain parts of the body.

Cost: The pricing data for this product is not available in the public domain. Being a relatively new company, it appears that they are still in the development stage and selling on a direct basis to the customers. The product is positioned on the website for unique design and not costing

Aesthetic: Lunars clothing is generally aesthetic and has designed zippers in areas from where clients must adjust the support bands for a seamless experience. While the product is generally aesthetic, but there are limited colour options and lack of pattern which reduces the appeal



Material: Lunar AG claims that it uses the thinnest, lightest materials available, while engineering compression bracing directly into any garment or uniform. The idea behind the concept is to provide soft and uniform comfort to user and avoid exaggerating touch sensory cells coming with regular clothing

Size: As the product is not capable of being adjusted for fitting, the product could result in *Posture deformity*: While wearing the vest brace may help temporarily to improve the posture, however if used for a long time, muscles often get dependent on the stretch causing posture deformity

Strengths: (a) *Improved circulation*: By applying pressure to specific joints it helps compress the garments which helps push blood back to the heart reducing the possibility of swelling and reducing soreness after heavy workouts; (b) *Posture alignment*: Wearing support bands in areas such as the vest and knees helps support & activate core muscles even when not doing work which helps in a healthier posture and reduced chronic pain; (c) *Increased confidence*: According to a study conducted by “Beauty that walks”, individuals feel significantly more confident depending on the way they look due to the psychology of the human brain. Therapeutic apparel which helps build posture helps a person look better resulting in a higher level of confidence; (d) *Comfort*: Compression wear can help provide a sense of comfort throughout the day by helping activate core muscles and leveraging thin and soft cloth. Activating muscles additionally helps the body enhance reaction speed.

Weakness: (a) *Number of joints*: This product is only able to provide support for the Knee joints and vest, while these are important parts of the body and are crucial while circulating blood and to maintain posture; other joints such as the elbow joints could also be focused on to provide better stability to the body. (b) *Integration of electronics*: There are no electronics present in the Lunars therapeutic clothing making the process of attaching the support bands and adjusting their strength extremely manual. In order to use Lunar apparel, the users must manually attach support compressive clothing over their joints, without any confirmation from if the apparel is attached at the wrong spot or not with the perfect technique the apparel can end up damaging the user’s body by applying pressure to the wrong spot. (c) *Difficulty adjusting in public*: While for the knee braces small zippers have been provided in the pants where the users can comfortably open the zip and adjust the knee brace in public the same has not been done for the vest support, where to adjust the vest support the users must lift their shirt and manually adjust the support band which may be uncomfortable to do in public areas. (d) *Lack of colours and patterns*: There are very few colours available and no patterns available. This is an extremely important aspect in clothing where most of the user's choices depend on how the cloth will suit them and will it look good on them. (e) *Long term impact*: According to AAPF if support braces are worn for a prolonged time the muscles in the region become dependent on the pressure brace and become weakened. This impacts the physical well-being of a person severely

Fidget rings by Taksh

Customer: The customer of the product is anyone with ADHD from the age group of 25 to 60, this is due to the limited ring size, where there is only one ring size available. The diameter of the ring is 10cm, this size may be a little too big for children or teens. Considering this product is made for adults to be used in a workplace, according to me the colour scheme of the product could be improved in the future. The current colour scheme of this product uses bright colours,

Material: There are 3 main materials used to design this product. The first material being rubber: rubber is used inside the ring to provide a smooth and comforting feeling, in addition to the anti-stress technology the rubber also helps provide a feeling of calm. The second material used in the ring is metal: metal is used in the outer body of the ring. Using metal has 3 main advantages. (i) cost: metal is extremely cheap allowing the product to be sold at such cheap and cost-effective prices, (ii) durability: Metal allows the ring to be highly

these colours are usually preferred by children, whereas adults prefer a more subtle colour scheme using colours like black.

durable and be used or kept in harsh environments, (iii) feeling: normal rings are made from metal, hence making a special aid ring out of metal helps normalize the experience for the user.

Cost: The cost of this product is INR 499, in each packet 3 rings are given to the user with no additional cost required. Assuming if the users want to buy 6 rings for both their hands the total cost will be less than INR 1000, this is an extremely cheap price compared to other products in the market. Due to using cost efficiently this company was able to make such a product that both succeeds in functionality but also is aesthetically pleasing to the eye and is very affordable. New age material being form of polymer and other synthetic material should be explored to improve product safety

Aesthetic: This product has a nice colour variety; which helps normalize the experience of using a special toy. This product is also available in multiple different bright colours, this makes the product look fun and interesting rather than dull and boring. Additionally, the magnetic and pressure strap is hidden in the middle of the coloured black. This pattern helps the ring look like a normal ring rather than a therapeutic aid for special needs children. It also has hidden pressure mechanics which help the child relax, without hampering with looks of the ring and making it look like a normal ring while completing its functionality in an effective manner



Function: The aim of the product is to be able to help its client relax, this product does this by pressuring certain veins on the client's hand. From primary reviews it can be concluded that the product is able to help calm the section of the body it is being used upon, however is not a good permanent solution for people with ADHD as this product only focuses on a couple veins present on the. This results in there still being stress and other conditions of ADHD present on other areas of the body.

Size: The dimensions of this product are 14 x 12 x 10 Centimetres. This means the inner diameter of the ring is 10cm, the circumference of the ring is approximately 32cm, the outer length of the ring is 14cm and the inner length is 12cm. The diameter allows the ring to be comfortably used in any finger of an adult giving the client flexibility of how to use the product. There is limited scope for size variation for this product given its design to be worn in fingers. Small size makes the product easy to carry but hardly a differentiator within the product category

Strengths: This version of fidget rings is highly effective and there are numerous strengths associated with this product like (a) *Durable* product made out of high-quality material like metal and is built to survive for long periods of time; (b) *Easy to carry* – due to its size, simple toy and light weight it is easy for ADHD children to carry the product with them throughout the day and while travelling; (c) *Availability* – product is easily available both online and offline. It is popular on e-commerce websites due to durability, easy to carry and transport; (d) *Effective for attention diversion* – this being a form of fidget spinner is extremely effective to divert attention and therefore reduce anxiety and stress level. This is likely to be one of the 1st products every caregiver of hyperactive buys; (e) *Cost effective* product due to simple nature of product, made from non-specialised materials, does not require high end engineering skills or new age production techniques; (f) *Innovative* variation of a fidget spinner and show creating of designer in developing this product; (g) *Likely product for all age segment* and is a universally acceptable product

Weakness: The product does have various weaknesses which compared with a wider set of products for ADHD children. Key weaknesses may include (a) *Magnetic Components*: Which could result in accidents with smaller children and impact function of metal-based equipment. Due to small size, it is also considered a health hazard emerging from choking risk; (b) *Limited purpose basic product* – which could be used during initial days by ADHD children. Once they get accustomed to the product, the product may not be effective. (c) *Limited application* – product can only support distraction conditions for children in classroom and it does not provide any other form of physical or emotional comfort; (d) *Lack of variation* – the flipside of simple design is lack of ability to customize. Taksh also offers fewer design or size options compared to other fidget rings on the market; (e) There has been some feedback / concerns about *durability* of Taksh fidget rings; (f) Taksh has *limited distributor network* and despite e-commerce penetration the product may not be easily available in all the locations.

Pressure vest for ADHD

Customer: The target audience of this product is children from the age of 5 to 12 years old as only their sizes are available in these vests. This product is made for all genders as there is no specific gender written in the product images both male and females can be seen wearing the same vest indicating that this product is made for all genders. Customer feedback on Amazon “The vest itself is lightweight, very adjustable with velcro tabs on shoulders and sides for better control with precision & kennel of desired compression.”.

Aesthetic: This product is a pressure vest for children with ADHD, meant to be worn on top of the child’s clothing and purpose is to help relax the user. The way this happens is by using pressured weighted technology. The overall colour scheme of this product is just jet black with no external designs or patterns. This very simplistic design is decent at first, however when taken a close look this has a lot of problems. The colour scheme of the vest is jet black, while at first this may look like a good choice as it can never get dirty it is not viable. The colour jet black tends to trap heat from the sun frequently, this permits the children to only wear this vest indoors in cool environments. As the product is just a vest and not a t-shirt it makes the child using this product stand out, this may make the child uncomfortable in public areas. To enhance its discomfort this product has open adjustable weight straps on the back side.

Cost: On the website Amazon this product costs INR15,569, considering a minimum of 3 vest are required for a child at once due to wash time the pierce of these vest is extremely expensive. This cost may be too much for a middle-class family permitting them from investing in this technology. It also needs to be accounted for that this product is made for growing children, this means after investing over INR 45,000 on 3 of these vests the child may outgrow the vest in a matter of only 3 to 6 months forcing the family to invest even more in these vests.

Function: Easier to use without limiting mobility, balance, or regular movement. The simple product design ensures a soothing, comforting feeling. Compression by applying uniform pressure to the body. For children struggling from lack of focus, stress, or anxiety, this product creates a warm, supportive hug. Unique features is the “Hook-and-Loop Adjustability” – this tremendously increased functionality of the product and let the user adjust the fit to give you smooth, even pressure across the shoulders, chest, and stomach for a full upper-body hug



Material: The material used for the product is breathable, Flexible Neoprene. Customer feedback “It is very soft fabric as well - which hasn't changed since it first arrived! Good quality item for its intended purpose”. The product provides optimal balance of weight and comfort. Material used provides it the flexibility to be used both over or under regular clothing. The product is available in solid primary colours like green, blue, black, grey and purple.

Size: This product is coming in 4 different sizes, x-small, small, medium, and large. Most of the customers on Amazon felt that sizing was an issue and the product is smaller in size as compared to regular clothes.

Strengths: Pressure vests when introduced was considered a significant break-through in providing physical relief to ADHD children. The strengths of the product include (a) *Improved focus* for children by providing deep pressure stimulation that is effective in reducing anxiety, hyperactivity, and restlessness; (b) *Independence to child*: Product usage helps the child to manage their physical challenges and handle emotional situations better; (c) *External application*: Product being externally used is natural solution without use of any drugs; (d) *Sizing*: Product being offered in various size does help partially tackle the concerns around limited customisation; (e) The product is *easy to carry* while traveling and does not need any special arrangements. Lightweight and easy to wear under clothing for use at home, school, or in public; (f) *Versatile Use*: All types of users like ADHD children, autism spectrum disorder, or sensory processing issues people find the product effective.

Weakness: The product when compared to other pressure vests and widely other tools available highlights significant weakness and area of improvement. Key aspects include: (a) *Social acceptance*: The vest needs to be worn above regular clothing and is easily visible to everyone. ADHD children feel extremely self-conscious using the product; (b) *Limited flexibility*: The product does not have straps to adjust pressure and weights can be self-modified. As the needs of each ADHD child is different, the product would invariably be either too tight or loose and similarly to heavy or light; (c) There is *no consistency* in terms of product effectiveness amongst its users. Different individuals experience different levels of benefits; (d) As the product is exposed to all environments all the time, it needs to be washed / cleaned to maintain hygiene. This increases the costs and efforts to maintain the product; (e) As evident from above *cost* is a source of discontent amongst its users. The product needs to be made affordable to improve its use case; (f) Some of the users have claimed that the product is *not effective when regularly used* and recommend to use this only for short periods.

Key Takeaways

#	Product	Description	Key Takeaways (Functionalities and Features)
1	“Therapeutic Apparel by Lunar AG” , is a start up company launched in 2020 in Canada by two brothers. They have created patented support bands on knees and vests. Product aim is to provide convenience while using knee braces, vest support with focus on aesthetics	Knee braces are hidden benefit stretch pants and can be accessed by opening the zippers. The design goal was to provide superior back, knee, and postural support. The engineer compression bracing is directly placed in the garment made by thin and light material	• Simple design technique being used to improve product usability • The product durability needs to be assessed to check if knee braces and withstand regular washing without losing their integrity • Limited use to technology to improve product features
2	Fidget rings by Taksh is a form of fidgeting toy like fidget spinner, but more discreet and easier to handle. They are magnetic finger rings that provide a discreet fidgeting experience.	The user can spin, roll, and perform tricks by holding the rings by their fingers. Being in ring format the product can be passively held and does not get dropped like fidget spinner	• Easy to carry, durable and cost effective • Not safe for children’s, small size magnets which can be swallowed • Basic product that has limited purpose and short time distraction
3	Pressure vest for ADHD is a modified form of vest that is designed to provide deep pressure stimulation. It is found to be effective with people with ADHD conditions.	This product is a pressure vest for children with ADHD, this product is meant to be worn on top of the child’s clothing and the purpose is to help relax the it’s user. Target audience is children from the age of 5 to 12 years old as only their sizes are available in these vests.	• The product has a calming effect on most users and improve their focus • The vest can be carried easily like normal clothing • All users do not experience same level of benefit and may need further customisation

Analysis of Existing Products, Design Inspiration and Product Outline:

After discovering a problem, conducting primary and secondary research and analysing 3 different products which are made to solve this problem some of my key findings consist of:

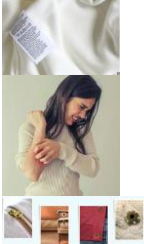
There are currently over 130 million people worldwide who suffer with ADHD out of which 33 million are children from the age of just 5 to 9. These children face many problems such as short attention spans, anxiety and sudden bursts of energy, due to these problems these young children aren't able to cope up with their peers from a young age making them lack behind. Children with ADHD also are 4 times more likely to face social rejection than a child without ADHD making them socially neveris and grow up without any friends. Various researches show that children with ADHD mainly face symptoms when exposed to new or noisy environments. To solve this problem, I as a designer and a grade 10 student aim to make therapeutic apparel to help these children. Therapeutic apparel is normal clothing with a few special features which will help calm down these PYP students and help them overcome their symptoms and challenges. A few basic standards which need to be met for this therapeutic apparel are no labels or tags, durability and easy to wash, use of nontoxic materials and a good lifespan. From a survey I conducted 90% of my clients wanted loose sensory clothing for their upper body, this sensory clothing can be like a T-shirt or a hoodie. 90% of my clients also wanted to therapeutic clothing to be made from breathable fabrics such as cotton and some parts of the clothing to be made from stretchable materials such as elastic. Majority of my clients also wanted my product to be a pull over cloth rather than having zips or buttons. In unanimity my audience also agreed that the material used should be soft and that there should be one continuous color throughout the product. 90% of my audience also think the price of my product should be incrementally more than others in the market making my product cost between inr 10,000 and 12,000. According to my own research some of my key findings are that there are no global health and safety standards hence I will have to make and follow my own standards. One of the key points I need to focus on is flexibility as my audience said they will be wearing this product all day hence it needs to be flexible. According to many sources along with using cotton, even bamboo could be a good material to use for therapeutic apparel. Using the right material can have a major impact on the physiological state of the user as research has shown that a better sense of calm helps the physiological state of a human resulting in higher self-esteem and attention. After conducting my research, to gain a better understanding on the topic and observing my competition, I analysed 3 different products all aiming to help people with ADHD and some of my key findings are as follows:

- (i) Seamless and tag-less apparel reduced irritation and discomfort for individuals. Lack of seam and tag enables the child to reduce sensory distractions with improved focus on other activities.
- (ii) Alternatives like adjustable closures, elastic waistbands, and Velcro fastenings instead of complex buttons, zippers, or laces. This provides independence to kids and simplifies the dressing process.
- (iii) Priority should be given to use of soft and gentle fabrics that minimize tactile discomfort. Amongst conventional materials cotton and bamboo score higher due to all weather application, soft, breathable, non-irritable on skin and hypoallergenic properties.
- (iv) Weights used for the product would be in pellet form and placed in a manner to ensure evenly distribution over shoulder and trunk.
- (v) The cost impacts the numbers of customers who can access the product hence the cost needs to be taken into consideration while choosing the materials to make the product.

As there is no global safety standard about therapeutic apparel some unspoken rules which need to be applied are, rules of general children's apparels and market practice includes (i) limitation of use of lead and other harmful chemicals in clothing; (ii) restrictions and standards for use of drawstring and small parts like buttons, zips; and (iii) minimum disclosure requirement.

CRITERION B: DEVELOPING IDEAS

Bi (Design Specifications): Develop design specifications, which clearly state the success criteria for the design of a solution

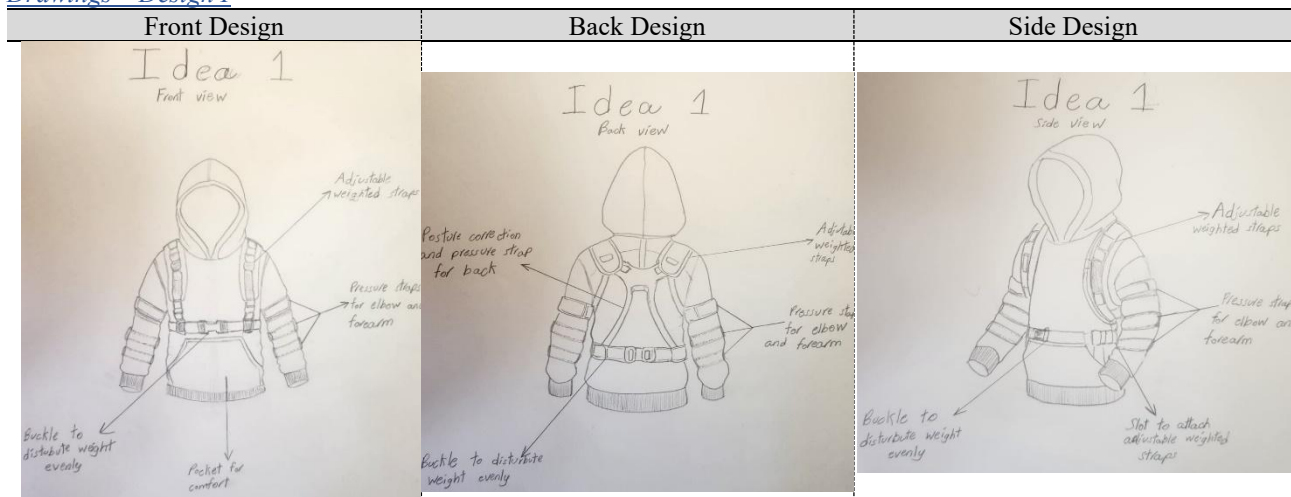
Aesthetics 	● Simple design: Apparels for ADHD children should be free of any distraction and hence should not have any decorative features like buttons, unwanted pockets, or meta/leather straps. While a clean and classic look does not appeal to fashion enthusiasts, it is the most comfortable approach. In the apparel it needs to be made sure there are minimal straps/buckles visible from the outside, this helps normalise the experience making children want to wear therapeutic apparel in public. ● Colour: Researchers have discovered that certain hues can either soothe or stimulate the brain, which is now being named as “ADHD colours”. There is no universally effective ADHD colour and each person must determine and observe which are effective for them, via a trial-and-error process. Parents / Caregivers and the child needs to demonstrate patience and appreciate the relevance of personalisation as they explore the colour discovery journey. However, it is good to know that certain colours tend to have universal effects (a) Colour “Blue” due its calming effects on the mind has emerged as the most popular ADHD-friendly colour; (b) “Green” is believed to supports harmony and reduces anxiety considering its resemblance to nature; (c) “Yellow” is associated with warmth of a sunny day and is preferred as it resembles bright and energising, sparks creativity and enthusiasm. One of the important pitfalls to be avoided is “Overstimulation” i.e. tendency to infuse too much colour or the wrong shade which could increase anxiety or distraction ● Pattern: The pattern or print chosen should be gentle and not visually overwhelming. While non-linear or distracting patterns appeal to the audience by attracting attention for regular teens this aspect is disturbing for ADHD children.
Customer 	Minimalistic, Simple Designs ● Tags: Should be avoided and information can alternatively be a printed-on fabric. Tags are one of the most common challenges faced resulting in irritation and interrupting with focus ● Labels and tags may cause an irritating feeling or a feeling of discomfort, and this feeling can be enhanced when the child has ADHD so it needs to be ensured that the apparel has no labels or tags. ● Seams: Feels scratchy to hypersensitive children which is distracting or uncomfortable. For ADHD children seam can result in skin irritation especially around the shoulders, underarms, or sides. Items with flat seams or seamless designs are ideal ● Minimalistic patterns: Elastic or Velcro bands to be considered instead of buttons, zippers, or decorative belts
Size 	● ADHD children have a desire to control things, they do well in clothing that is not too tight, flexible with elastic and made of stretchy fabrics with soft cuffs. These things make them feel less restricted, reduce frustration while helping them feel confident and dressing independently. ● To ensure that the therapeutic apparel fits all children from the age of 5 to 9 there should be 4 different sizes available (all units in inches), these sizes should be X-small which is (L = shoulder to vest length, W = chest width) 14L x 24W, Small which is 17L x 30W, Medium which is 20L x 36W and large which is 24L x 42W ● To ensure that the apparel perfectly fits all in addition to these 4 different sizes there should be adjustable straps and bands which manually allows the user to tighten or loosen the apparel slightly according to their conformity.
Function 	The main purpose and function of this therapeutic apparel should be to calm the child by pressuring on and simulating certain sensory nerves. This provides the feeling of a warm hug to the child, relaxing them while increasing their attention and reducing their sudden bursts of energy. Some ways this functionality should be achieved is ● Compression Clothing: The idea behind specialised clothing to make ADHD children have a sense of calm, feel grounded which helps them focus which is achieved through controlled moderate pressure giving a feeling of warm hug. ● Fidget-Friendly Clothing: Research has shown the ADHD children are fidgety and there are numerous toys like fidget spinner, fidget rigs available these days. The idea here is

	channelising the energy of such children which enables them to focus on the classroom. I am considering a design which in-builds fidget tools, such as textured fabrics, small removable toys, or hidden compartments for sensory-friendly items. Weighted jackets can provide “Calmness & Reduced Anxiety” to ADHD children and has various advantages (a) They appear as stylish hoodies out the observed and can easily be worn by ADHD children without attracting unwanted attention; (b) Proven research that Weighted jackets help increase attention span and reduce hyperactivity. Weight has also proven effective in situations when there is a lot of sensory input, resulting in meltdowns; (c) The design could be flexible with 5-10 pockets for the insertion of weights at different parts like shoulders and waist. The user can both customise weight placement and remove the weights to be used like a regular hoodie
Material 	- Fabric should be carefully chosen to ensure that it is soft and natural. ADHD children are likely to be extremely sensitive to the texture. Organic materials like Bamboo or organic cotton are also preferable as they are hypoallergenic, light weight, breathable and gentle on the skin. Whilst popular among regular teens materials like wool or synthetics should be avoided as the same is likely to irritate sensitive skin. Cotton and natural material also help in reducing issues due to overheating or chill resulting from letting children feel cozy during winter and cooler during summer months - In some areas where slight flexibility is needed bamboo is another material which could be used. Bamboo is very similar to cotton being soft, breathable, and comforting, however bamboo also provides flexibility and sustainability. However, bamboo cannot substitute cotton due to increased cost of bamboo. - Durability is another important aspect as ADHB children tend to repeat items of clothing that feel comfortable to them. Therefore, there would be a need for the apparel to withstand multiple washes while retaining its shape, softness, and size - For pressure and compressive bands nylon straps, velcro and spandex blend fabric could be used, these materials are extremely flexible, durable and provide a high lifespan making them perfect. These materials however can be a little rough and sharp, hurting the skin, hence memory foam along with a breathable mesh fabric could be used to cover these bands providing a high level of comfort for the users. - Elastic wrapped around high-quality cotton could also be used to make elastic bands for the arms and the waist. Elastic provides the users with an easy slip on the pressure band.
Cost 	- Designers need to ensure that material and product cost is within reasonable limits for commercial acceptability. There should be no compromise on the safety aspect of the product and designers should innovatively design, explore new age materials and manufacturing techniques. Based on client feedback they are willing to pay premium over standardised product due to customisation, but cost should ensure affordability. - According to research and the calculations above the total cost of the therapeutic apparel should be around INR 10,000 and 12,000 - There would be a total of 1.5 to 2.5 meters of cotton used, with the per meter price being between 500 and 600 the total price of cotton would be around 1,500. - Nylon straps and velcro of 2 to 3 meters would cost around 300 - Spandex-Blend fabric of 1.5 to 2 meters would cost around 1,000 0.5 to 1 square meter of memory foam would cost around 1,200 - Breathable mesh fabrics for 0.5 to 1 meters would cost around 400 - High quality elastic band of 1 to 1.5 meter would cost around 150 - Weighted insiders would cost around 1,600 - According to the prices above the cost of raw materials being between INR 6,150. - The price of labour being between inr 2,000 and 3,000 and other costs such as transportation, etc being between inr 500 and 1,000 the therapeutic apparel would be meet it's exact cost requirement
Safety 	Focus on natural material and use of simplistic design help meet all the industry standards and best practices around children apparel. Therapeutic apparel will be based on natural fibre and there would be no use of lead or any other harmful chemical to artificially soften the material or cheaper chemical for print. The apparel would not have any loose attachments like buttons and zip and would rather use elastic and Velcro.

	There will not be any tags used and details of material used would be printed in the fabric. As there is no global safety standard about therapeutic apparel some unspoken rules which need to be applied are, Rules of general children's apparels and market practice includes (i) limitation of use of lead and other harmful chemicals in clothing; (ii) restrictions and standards for use of drawstring and small parts like buttons, zips; and (iii) minimum disclosure requirement.
Sustainability	The product should be made from sustainable material (organic or biodegradable fabrics). It should be ensured that apparel is durable and capable of being repaired. Clear instructions should be provided on disposal of packaging material and the apparel

Bii (Design Ideas): Develop a range of feasible design ideals, which can be correctly interpreted by others

Drawings – Design I



Idea 1 is a hoodie which has inbuilt pressurised and weighted clothing to help the child. Idea 1 also has posture correction straps.



- Large pocket in the front to keep stuff or place hand or fidget with inline material in pocket



Evenly weights on both side of truck using an adjustable strap

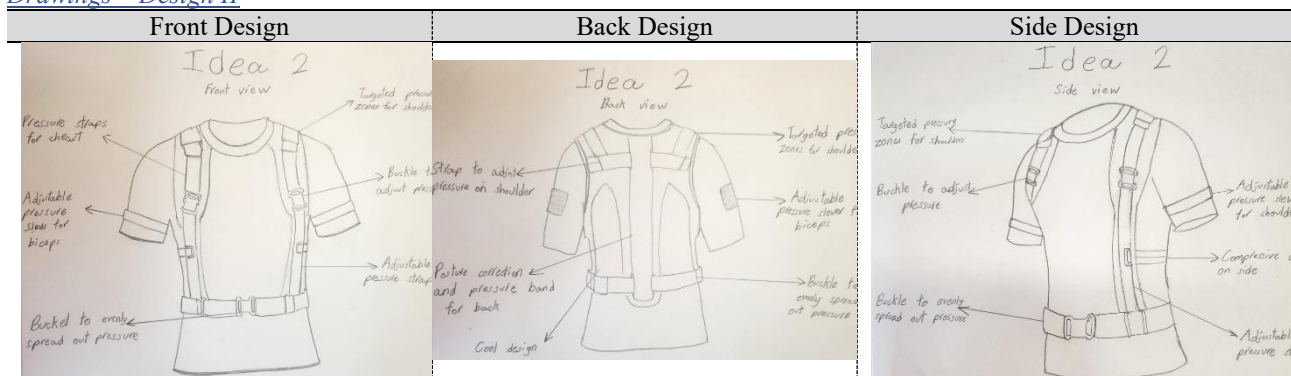
Buckle to hold & distribute weights



- A well cover posture correction and pressure strap on the back

- On the sleeve and around elbow pressure straps

Drawings – Design II



Idea 2 is a T-shirt with pressurised and weighted clothing. Idea 2 also has some patterns and designs on both sides.



- No large pocket to place hands or keep stuff

- End of short sleeve to have a strap for adjusting pressure on biceps



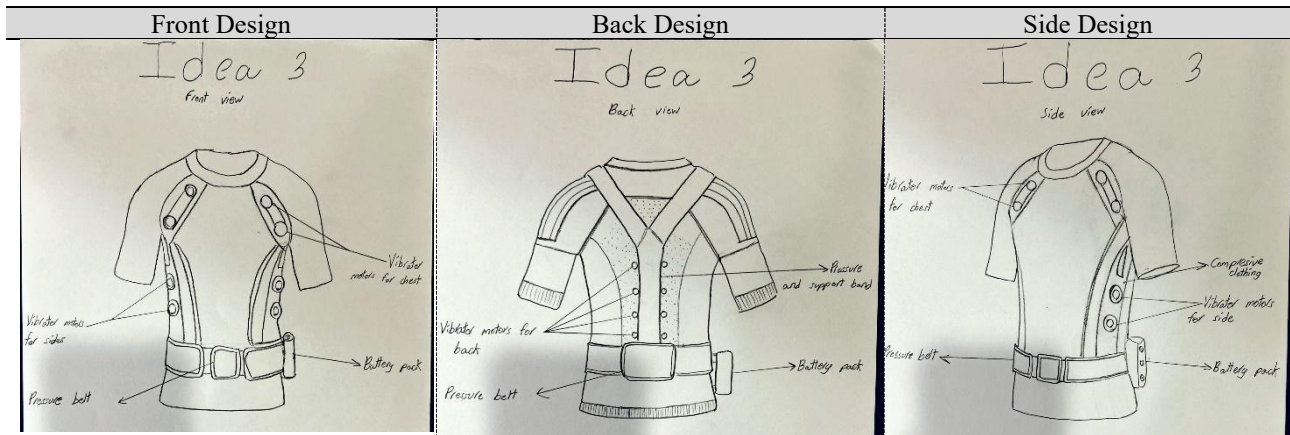
- Evenly distributed weights primarily around chest on both sides using an adjustable strap

- Large buckle to evenly spread pressure

- Small pocket on the sleeve to keep weights
- Adjustable pressure strap running from shoulder to waist
- Targeted pressure zones around the shoulders



Drawings – Design III

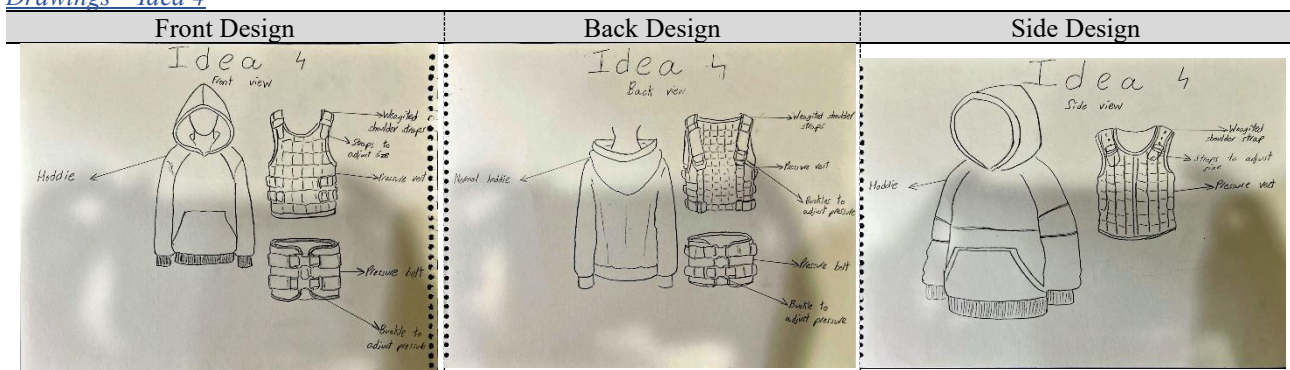


Idea 3 is a T-shirt with vibrator motors, these motors help provide the user sensory feedback. There are a total of 8 big vibrator motors on the front side of the hoddie and 8 small vibrator motors on the backside.

- No large pocket to place hands or keep stuff
- Vibrator motors on chest and back (eventually distributed 4 sensors on each side of spine)
- Separate Vibrator motors on sides
- Battery pack placed on side of pressure belt
- Broad pressure belt with large buckle
- Compressive clothing and fitting on the sides



Drawings – Idea 4



Idea 4 is a regular hoodie with separate pressure vests and belts. These pressure vests and belts are to be worn under the hoodie, this helps normalize the experience of wearing therapeutic apparel.

- Large pocket in the front to keep stuff or place hand or fidget with inline material in pocket
- Weighted shoulder straps
- Overall inner vest is pressurised
- Multiple pressure belt to adjust the pressure
- Multiple belts with buckle to adjust pressure and weights



Biii (Chosen Ideas): Present the Chosen Design and Justify its Selection

Balanced Scorecard

- I conducted a survey, whereby participants were asked to rate eight (6) design criteria i.e. Aesthetics, Size, Functionality, Material, Costing and Safety on scale of 1-5, with 5 being highest.
- The feedback was tabulated to create a scoreboard.
- For example if 4 surveyor rated a particular design “5” in aesthetics, whereas 1 surveyor rated the design a “4” in aesthetics, the design score would be – Aesthetics is “24” [(4X5)+(1X4)]
- Overall scores computed by summation of criteria-wise score. Alternatively, I could have also computed weighted overall score (higher weights being provided to more important criteria)

Design wise feedback: The feedback will help me choose appropriate final design – provided understanding of what materials to be used for therapeutic apparel and which designs people are more inclined toward.

Design I	Surveyor I	Surveyor II	Surveyor III	Surveyor IV	Surveyor V
Aesthetics	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★☆
Size	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Functionality	★★★★★	★★★★★	★★★★★	★★★★☆	★★★★☆
Material	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Costing	★★★★★	★★★★★	★★★★★	★★★★★	★★★★☆
Safety	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

Design II	Surveyor I	Surveyor II	Surveyor III	Surveyor IV	Surveyor V
Aesthetics	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★☆
Size	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★☆
Functionality	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Material	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Costing	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Safety	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆

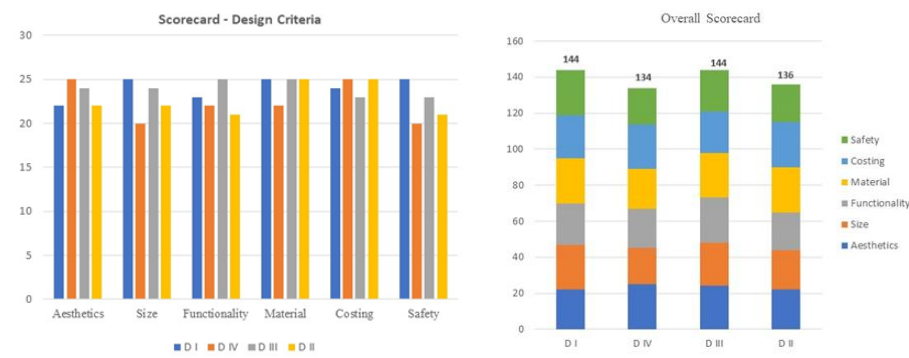
Design III	Surveyor I	Surveyor II	Surveyor III	Surveyor IV	Surveyor V
Aesthetics	★★★★★	★★★★★	★★★★★	★★★★★	★★★★☆
Size	★★★★★	★★★★★	★★★★★	★★★★★	★★★★☆
Functionality	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Material	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Costing	★★★★★	★★★★★	★★★★★	★★★★☆	★★★★☆
Safety	★★★★★	★★★★★	★★★★★	★★★★☆	★★★★☆

Design IV	Surveyor I	Surveyor II	Surveyor III	Surveyor IV	Surveyor V
Aesthetics	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Size	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Functionality	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★☆
Material	★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★★
Costing	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Safety	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆

Scoreboard

Key observation

- All 4 designs were well appreciated by participants
- All 4 designs scored highly on Costing and Material
- Safety received lowest score
- D IV and D II scored similar



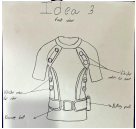
Overall Scoreboard

- Total scored tied for D I and D III. D I scored lower on Aesthetics
- Improving on Safety, Size and Functionality will help further improve overall score
- Overall high scores make it challenging to make significant improvement in the product

Pros and cons

After a lot of feedback and self-reflection I decided to make a table showcasing the pros and cons of each design. This table consists of both my own thoughts on each design, the experts' thoughts on each design and my audience's thoughts on each design each combined into one table highlighting the pros and cons of each design to give me a factual understanding on which design to pick and some areas which could be improved upon while making the final sketch.

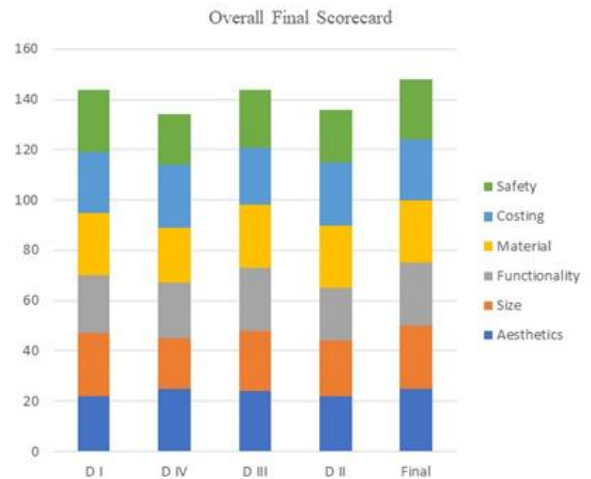
Design	Pros	Cons
Hoodie Design I	✓ Has pressurised and weighted therapy ✓ Has in built straps hence is easier and safer to use	✗ A lot of straps and buckles are visible from the outside ✗ It may get hot inside the hoodie

	✓ Supports the full upper body including arms ✓ Provide posture supportive technology ✓ Has a big pocket to increase storage ✓ There is even pressure distribution ✓ Pressure and weight are adjustable	✗ Every process is manual ✗ Is difficult to wash
T-Shirt design II 	✓ Has a stylish design ✓ Has pressurised and weighted the therapy ✓ Has in built straps hence is easier and safer to use ✓ There is even pressure distribution ✓ Pressure and weight are adjustable ✓ Will not get hot or claustrophobic in the t-shirt ✓ Is easy to wear	✗ Does not support the full upper body including arms ✗ No posture supportive technology ✗ No pocket to increase storage ✗ A lot of straps and buckles are visible from the outside ✗ Every process is manual ✗ Is difficult to wash ✗ Not much pressure on the back ✗ Has a lot of buckles
T-Shirt design III 	✓ Provides pressure and vibration support ✓ Does not have too many visible straps or buckles ✓ Looks somewhat stylish ✓ There is even pressure distribution ✓ Pressure is adjustable ✓ Will not get hot or claustrophobic ✓ Is easy to wear ✓ Provide posture supportive technology ✓ Vibrators stimulate sensory nerves	✗ Does not support the full upper body including arms ✗ Does not have a pocket to increase storage ✗ Every process is manual ✗ Is difficult to wash ✗ Cannot be worn under the sun for a long time ✗ Needs the user to always charge and carry a battery pack
Hoodie Design IV 	✓ Has pressurised and weighted the therapy ✓ Has in built straps hence is easier and safer to use ✓ Provide posture supportive technology ✓ Has a big pocket to increase storage ✓ There is even pressure distribution ✓ Pressure and weight are adjustable ✓ Looks like a normal hoodie from the outside ✓ Will not get hot or claustrophobic in the t-shirt	✗ No support for full upper body including arms ✗ No posture supportive technology ✗ Every process is manual ✗ Is difficult to wash ✗ Does not provide pressure to back ✗ Clothing can't be adjusted publicly ✗ Manually wearing components increases incorrect technique chance impacting posture/blood flow

Evaluation of Designs: After creating a range of several design ideas and evaluating them from various sources. Here is a table incorporating the evaluation process of all final design ideas, clearly depicting, and justifying the reason for the chosen design

-
- Battery pack placed near weight distribution straps
-
- A well cover posture correction and pressure strap on the back
- 
 - On the sleeve and around elbow pressure straps
-
- Stylish weight distribution straps
-

Overall, according to the clients and myself as a designer, combining both ideas to make a final sketch allowed a different unique perspective to show and for the final sketch to be nearly flawless. The overall score in Idea 1 and Idea 3 was also 144 points while the final product was able to reach a score of 148 out of 150.



Component	Dimension	Quantity	Material
Main Fabric (Cotton-Polyester Blend)	1.5–2.5 meters	1 hoodie	Cotton-Polyester
Elastic Nylon Straps with Velcro	2–3 meters	3 straps needed	Elastic Nylon and Velcro
Spandex-Blend Fabric	1–1.5 meters	4 straps needed	Spandex-Cotton Blend
Memory Foam	0.5–1 square meter	2 sheets	High-Density Foam
Breathable Mesh Fabric	0.5–1 meter	2 sheets	Lightweight Mesh
High-Quality Elastic Bands	1–1.5 meters	4 bands	Durable Elastic
Weighted Inserts (Steel Beads or Sand-Filled Pouches)	1–2 kilograms	3 bands	Non-Toxic Steel Beads/Sand
Vibrator motors	5mm x 2mm	8	Metal
Battery pack	10.6mm x 76mm	1	Cells and metal

APPENDIX A: RESEARCH

Primary Research

Summary of Primary Research: Interview with Client and Interview with Client

What type of therapeutic apparel should be made to help the children the most (shirt, pant, blanket, etc) There is no one specific therapeutic apparel that is effective for all children's. Due to increased research in this area, there are some common available apparels • Weighted Blankets: Primarily for bedtime or during periods of over anxiety. These work on the principal of deep touch pressure and promotes relaxation by helping fall asleep. Users have also experienced improved sleep quality • Weighted Vests: Designed to provide sense of balance, through weight evenly distributed across the human trunk. This can used through-out the day including in school, homework time, or while engaging in physical activities like walking or playing • Compression Clothing: It is a variation of weighted blankets to be used during the day • Sensory-Friendly Clothing: Basic minor modifications to provide some relief. Parents or caregivers can select apparels which are made of soft fabrics and are seamless. Manufacturers tag is usually removed. Elastic waistbands or soft fasteners are preferred to reduce irritation. • Weighted Gloves: For hyperactive kids, these gloves regulate sensory overload and anxiety. Like fidget spinners by calming the child during schoolwork or undertaking social activities. It works on the simple principle of providing pressure or tactile sensitivities on the palms. • Weighted Socks: These focus on feet of the child by making them feel more grounded and relaxed. These can be worn throughout the day and usually made of soft, breathable materials • Calming Neck Wraps or Weighted Scarves: This works by providing calming effect by evenly distributing pressure around the neck and shoulders. This is generally effective in older children or adults and best used during transitions or before bedtime.	Have you ever used therapeutic apparel to help a child, if yes, did it work and how can it be improved in the future, if no, would you be open to trying therapeutic apparel for your child? I have used various available therapeutic apparel available for my son. It did provide some relief; however, I think the benefits are underappreciated by market and more research could be undertaken to improve its utility. Some of the areas of improvement in my experience were: • Weight customisation: The product should have flexibility to replace weight depending on the specific need of child. This is making the product both dynamic and giving control to the child & caregiver • Better use of technology: There is lack of smart clothing with sensors that measure pressure, body temperature, or stress levels. Advancements in sensor & wifi tech should be optimised by enable valuable and timely feedback for caregivers • Enhanced safety standards: There is lack of disclosure about critical aspects viz. type of weights used, its distribution and use of small components which are not properly sewn • Better awareness to be social accepted: Given the exposure to social media, older children are self-conscious about wearing therapeutic apparel. Marketing programs to popularise design elements of therapeutic apparel needs to be undertaken and designers need get more creative to promote unique trends I am keen to explore newer products and believe it is the need of time for design innovation in this space.
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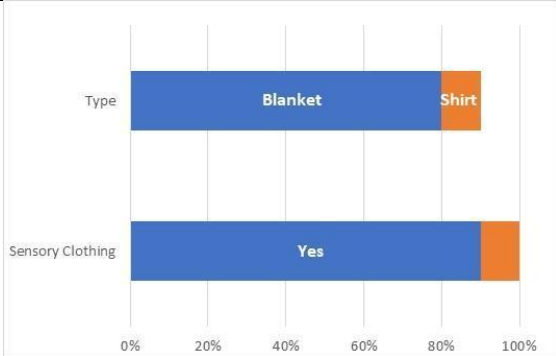
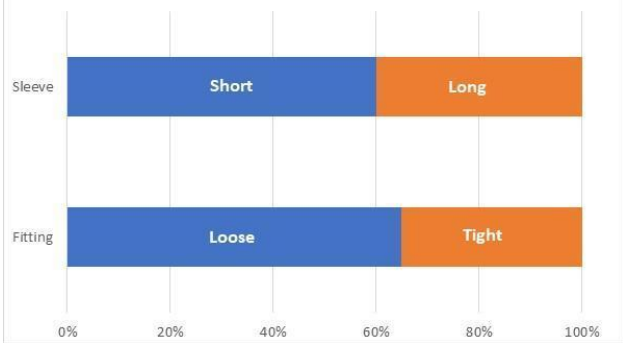
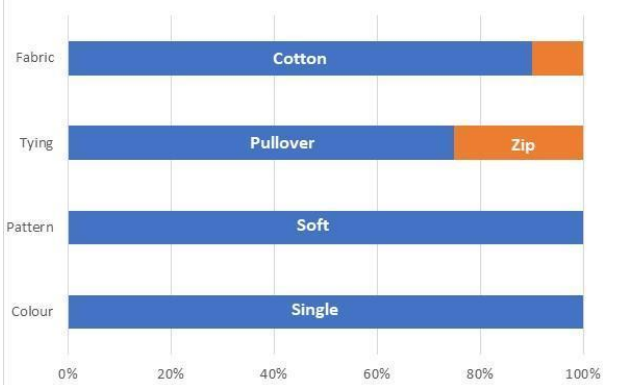
Survey with Target Audience:

Summary

- **Objective feedback**
 - All the of surveyors are willing to incrementally spend more than 50% over standardised product, with over 60% even willing to spend more than 75%
 - Unanimous consensus for plain colour and softer print. While 75% surveyors voted for pullover a small segment of 25% felt zips could also work. Cotton got 90% votes in fabric to be used, feedback was to also explore newer material which could increase fashion appeal
 - 60%+ voted for loose fitting apparel, response for sleeve length was mixed with 60% voting for short sleeves and 40% for long sleeve
- **Commentary**
 - “In addition to sensory tools some of elements that can be included to increase product would be ap posture correction sensors, Heating or Cooling Pads and electrode pads for muscle stimulation”
 - “Overall experience of existing product is far from satisfactory – there is limited flexibility provided and very little effort is taken by designers to embed technology. No initiate taken to make the apparel design appealing to fashion need of young children”

Details

Survey questionnaire was sent to twenty participants across diverse sets i.e. Parents / caregivers vs ADHD children; metro vs non-metro. Feedback was received from ten participants demonstrating decent interest.

Question	Data and Results	Summary
What type of therapeutic apparel should be made to help the children the most (shirt, pant, blanket, etc)	 [Note – Survey only for parents and caregivers.]	All except '1' parent/caregiver had experience with sensory clothings. However surprising the most used clothing was a simple blanket, with only one caregive having experience with customised shirt
What size should the therapeutic apparel be for it to perfectly fit you?		60%+ voted for loose fitting apparel, response for sleeve length was mixed with 60% voting for short sleeves and 40% for long sleeve
Have you ever used therapeutic apparel to help a child, if yes, did it work and how can it be improved in the future, if no, would you be open to trying therapeutic apparel?	All the parents and caregivers where very excited about the development of customised therapeutic apparel targeted for ADHD children. All of them where open to try this new product One of the parents mentioned “Overall experience of existing product is far from satisfactory – there is limited flexibility provided and very little effort is taken by designers to embed technology. No initiate taken to make the apparel design appealing to fashion need of young children”	
Is there anything specific you would want to be added to the product to help you (colour scheme, pattern, features, etc)?		Unanimous consensus for plain colour and softer print. While 75% surveyors voted for pullover a small segment of 25% felt zips could also work. Cotton got 90% votes in fabric to be used. Feedback was to also explore newer material which could increase fashion appeal

Question	Data and Results	Summary
What ideal price therapeutic apparel should be for you to be able to afford without discomfort?	[Note – Survey only for parents and caregivers.]	90% of the surveyors are willing to incrementally spend more than 50% over standardised product, with over 60% even willing to spend more than 75%

Secondary Research

Summary of Secondary Research:

- *Health Standards:* There is a lack of globally prescribed minimum standards for therapeutic apparel. As a designer I need to focus on product safety standards prescribed by various global authorities covering all aspects viz clothing, guidelines of drawstrings & small parts. Separate rules relating to safety protocols dealing with sensors and weights needs to be considered. Also rules for use of WiFi receptors to transfer data to cloud or smartphone
- *Design challenges:* “Keep it Simple” is the *Myntra* while designing apparel for hypersensitive children. Key challenge is to curb the tendency to overdo design elements. Flexibility needs to be provided to user with regards fittings and weights usage
- *Key aspects associated with clothing for ADHD children:* Apparels should be without tags and seams. They should be made of soft natural fabric like cotton or bamboo and avoid using loud colours with complicated patterns. Elastic and Velcro should be preferred material as compared to buttons or zip.
- *Material:* Natural plant-based fibres are preferred. Modal which is a type of rayon fibre made from beech tree pulp is also popular
- *Psychological or positive behavioural outcomes:* Comfortable feeling while wearing this apparel results in reduced hyperactivity & better focus, which in turn results in lower impulsivity and better control over actions. The benefits include emotional regulation, higher self-esteem, and confidence

Details of Secondary Research:

Health Standards [Consumer-Product-Safety-Improvement](#)

There is lack of globally prescribed minimum standard to therapeutic apparel. Some of the prominent general standards include:

- Consumer Product Safety Improvement (US), including clothing: (a) specific limits being placed on lead content in all aspects of apparel including fabric and fittings; (b) Limitation on use of chemicals like Phthalates which is popular to soften plastics; (c) Fabric used should not be highly inflammable; (d) minimum disclosure standards on labels to ensure product information is available and understood by user.
- GOTS certification that specifies strict environmental and social standards, as well as health and safety criteria
- CPSC guidelines of Drawstrings and small parts: (a) limitation of use of drawstring in outerwear for kids and strict rules around drawstring used in hoods around neck area; (b) small, detachable items like beads or buttons must be securely attached to avoid they being swallowed by children

Design challenges [clothes-for-children-with-autism](#)

- Creativity is not just about producing art or coming up with innovative ideas, it should be used to create an effective and relevant product
- One-size all fit approach cannot be adopted as each ADHD children is unique. As a designer the challenge is use neutral elements like colour, pattern and fit which would work with most children, is flexible and customisable. The design challenge is to internalise the fact that every child is unique with individual preferences and sensitivities and hence not impose the design claiming to be scientific.

- Key challenge of designing a customisable clothing solution is to ensure that does not result in more harm. There is tendency to over design which could result in a complicated product with lots of feature, thereby exaggerating the hyperactive behaviour.

Designer need to Prioritizing Comfort and Functionality

Safety features in therapeutic apparel

Proper research with multiple trials needs to be undertaken for use of weights

- Age-Appropriate Weight: The weight for kids should be minimal and gradually increased under appropriate supervision. For older children weights should be gradually introduced observing response to lighter weights.
- Weight Limits: While there are no industry specific guidelines in this regard, the accepted practice is for maximum weight not exceed 10% of the child's body weight. The supervisor needs to ensure that weights does not cause strain or limit movement
- Even Distribution: Physical and Biological knowledge needs to be applied to ensure evenly distributed weights which will avoid pressure points causing harm. If weight is unevenly distributed, it would result in strain in neck and back

Safe Materials: If small parts or pellets are used for weight, it needs to be ensured that it could be accessed by younger children and therefore product should comply with industry safety standards

Key aspects associated with clothing for ADHD children

Most ADHD children are found to be hypersensitivity ie reacts strongly to clothing and therefore extra care need to be taken in this regard. ADHD clothing should

- Not have tags at the back of shirts, but rather stuck to fabrics. For ADHD children tags can feel like pointed object or a sharp bladed being poked constantly
- Like tags seam should also be avoided and the clothing should be stitched to ensure flat seam
- Generally fitting clothes are preferred by ADHD children
- Buttons, zippers and snaps are avoidable as the kids might struggle with certain motor skills. Elastic-waist pants and pullover T-shirts are better option as they are easier to slip into

There are different types of materials and techniques available to consider for Therapeutic apparel designed for ADHD children live embroidery to silicone ridges, silicone and knit and embroidery on foam (digital embroidery made with foam to create a raised quilted-like surface)

Use of Electronics

There are different types of electronics that can integrated into therapeutic apparel

- Sensors which would be used to monitor data such as heart rate, temperature, respiration, and muscle
- Actuators that provide pain relief by delivering interventions like heat, vibration, or electrical stimulation
- Communication Modules: This is optimising development in WiFi technology to transfer data to cloud or smart phone
- Power Sources by incorporating wearable solar panels or rechargeable lithium-ion batteries

Key drivers to include electronics in therapeutic apparel are (i) Rehabilitation and Recovery; (ii) Posture and Movement Correction; (iii) Chronic Disease Management; and (iv) Mental Health Support. This can be achieved by embedding sensors in the fabric or use of modular design ie detachable electronic modules or using conductive threads like silver, copper, or carbon-based which are lightweight, flexible, and washable

Materials [plant-based-fashion-therapeutic](#)

There are various new age innovative or blended materials available for specialised purposed. The conventional fabric is soft and seamless providing a comfortable and non-irritating experience are:

- Cotton: One of the old, most popular and versatile fabric available in multiple textures and weights. It is naturally occurring, soft, breathable and hypoallergenic
- Bamboo: This provides a smooth and luxurious feel against the skin, and similar to cotton available naturally. It also scores highly on sustainability and eco-friendly criteria, has moisture absorption characteristic like microfiber blends and is hypoallergenic
- Modal: It is a type of rayon fibre made from beech tree pulp. It is also soft, breathable and resistance to pilling. It is a very popular material used for creating blended fibres

Blended material like "Microfiber" could be explored, which is often used in sports and activewear due to superior moisture-absorbing properties. It is a synthetic fabric popular for its softness and lightweight nature.

Psychological or behavioural outcomes are linked to therapeutic apparel [Effects of weighted vests on attention](#); [Sensory Processing](#)

It is well researched now that positive psychological and behavioural outcomes can be achieved by use of Therapeutic apparel that have embedded sensory input by promoting focus. These benefits include:

- Comfortable feeling: Moderate pressure being provided by strategically placing weights has the effect of making kids feel more secure and less overwhelmed by their surroundings. The weight does not feel like burden, but that comforting.
- Controlling Hyperactivity tendencies and better focus: As the name ADHD suggest, kids with this condition are hyperactive. The pressure created by weighted clothing helps in creating a feeling of stability and control for kids which enables to reduce hyperactive behaviours. Focus also improves for ADHD kids as pressure / compression created deep pressure stimulation.
- Reduced Impulsivity: Children observe greater control over impulsive behaviours due to calming impact of sensory grounding
- Being able to control their actions the kids can better communicate with their friends and people around them. This significantly improves sense of belonging to the society and improves academic engagement

There are benefits of reduced hyperactivity like

- Emotional Regulation: The kids can control or regulate their emotions due to reduced anxiety and agitation. Therapeutic apparel is particularly beneficial for children who generally struggle to manage emotions
- Higher Self-Esteem and Confidence: As kids feel comfortable due to pressure and can confirm their emotion, they naturally regain lost self-esteem and confidence. This is a cascading effect on their ability to feel in control of their behaviour. Complimentary associated benefits are reduced anxiety and stress. The challenge ADHD children face is ability to control their actions and therapeutic apparel make the moderate behaviour

Sustainability [McKinsey report](#) [Circular Design Guide](#)

The product score high on sustainability given the need to use natural fibre and minimalistic design. Some of common sustainability considerations for all apparels include (i) Ensuring energy efficient manufacturing while following ethical principles; (ii) proper waste management; and (iii) use of biodegradable or recyclable packaging materials. The designer should also ensure that (i) material selected is organic or biodegradable fabrics; (ii) Apparel is durable and designed to enable easy repairs or upgrades; (iii) Recyclability by Upcycling Potential is considered; and (iv) provide clear instructions on caring for and responsibly disposing of the apparel

BIBLIOGRAPHY

Source Type	MLA 9 Citation
Online Articles and Blogs	A1
	1. Circular Design Guide. "The Circular Design Guide." Circulardesignguide.com, 2017, www.circulardesignguide.com/.
	2. Goally. "Sensory Issues with Clothing in Kids." <i>Goally Apps & Tablets for Kids</i> , 10 Jan. 2024, getgoally.com/blog/adhd-and-sensory-issues-with-clothing/.
	3. "Clothing Options for Children with Autism." <i>Brighterstridesaba.com</i> , 2024, www.brighterstridesaba.com/blog/clothes-for-children-with-autism. Accessed 26 Jan. 2025.
	A2
	4. Dexyl Birog. "What Features Should I Look for in Calming Clothing for Kids with ADHD or Autism?" <i>Cloud Nine</i> , 4 Nov. 2024, www.cloudnineclothing.ca/blogs/all/what-features-should-i-look-for-in-calming-clothing-for-kids-with-adhd-or-autism?srsId=AfmBOopjhi_SA WuWXjAUU5D8sRrbQvqWdMmRfHKiY17UX-mvny8tX0A. Accessed 26 Jan. 2025.
Online Reports & Research Papers	5. McKinsey. "The next Normal – the Future of Fashion: Sustainable Brands and "Circular" Business Models the next Normal McKinsey & Company." <i>Www.mckinsey.com</i> , 2022, www.mckinsey.com/featured-insights/the-next-normal/fashion.
	A1
	6. Dunn, W. (2001). <i>The Sensory Profile: A Tool for Identifying the Impact of Sensory Processing Patterns on Functional Performance</i> . In A. Bundy, S. Murray, & C. Dickie (Eds.), <i>Sensory Integration Theory and Practice</i> (pp. 121-137). Philadelphia: F.A. Davis.
	7. Lin, H.-Y., et al. "Effects of Weighted Vests on Attention, Impulse Control, and On-Task Behavior in Children with Attention Deficit Hyperactivity Disorder." <i>American Journal of Occupational Therapy</i> , vol. 68, no. 2, 28 Feb. 2014, pp. 149–158, https://doi.org/10.5014/ajot.2014.009365 .
	A2
	8. "Discover Your ADHD-Friendly Colour: Boost Concentration & Well-Being." <i>Adhdneuro.com</i> , 2024, adhdneuro.com/blog/what-is-the-adhd-color.
	9. admin, IIFT. "Fashion Designing and Mental Health: The Therapeutic Potential of Creativity." <i>IIFT Blog</i> , 8 July 2023, www.iiftbangalore.com/blog/fashion-design-and-mental-health/ .
	10. Ticknor, Lynne. "Dress Rehearsals: Conquering ADHD Mornings." <i>ADDitude</i> , 15 Oct. 2009, www.additudemag.com/morning-routine-adhd-children-getting-dressed-sensitivity/ .
	B1

	11. “The Consumer Product Safety Improvement Act (CPSIA).” <i>CPSC.gov</i>, 18 Feb. 2016, www.cpsc.gov/Regulations-Laws--Standards/Statutes/The-Consumer-Product-Safety-Improvement-Act.
YouTube Videos	A2 “ADHD Clothes That NEED to Exist! #Adhd #Adhdbrain #Neurodivergent.” <i>Www.youtube.com</i>, www.youtube.com/shorts/L0MBngPIAyw. Accessed 26 Jan. 2025. 12. WTNH News8. “School Uses Weighted Vest to Get Kids Focused.” <i>YouTube</i>, 16 Nov. 2011, www.youtube.com/watch?v=P9_Vqe_s4o0. Accessed 26 Jan. 2025.
Social media	B1 13. “LinkedIn.” <i>Linkedin.com</i>, 2025, www.linkedin.com/pulse/10-reasons-why-plant-based-fashion-therapeutic-human-body-couture/. Accessed 26 Jan. 2025.
Links for product	A3 “Buy Special Supplies Sensory Compression Vest Deep Pressure Comfort for Autism, Hyperactivity, Mood Processing Disorders, Breathable, Form-Fitting, Kids and Adults (Black, Medium 20x36 Inches) Online at Low Prices in India - Amazon.in.” <i>Amazon.in</i>, 2025, www.amazon.in/Special-Supplies-Compression-Hyperactivity-Form-Fitting/dp/B087D7MCCL?th=1 . Accessed 23 Jan. 2025. “Elevate Clothing Comfort with Patented Therapeutic Compression Technology.” <i>Lunarag.com</i>, 2024, https://lunarag.com/ Accessed 23 Jan. 2025. “TAKSH EnterpriseMagnetic Ring Unzip Toy Magical Ring Props Tool Fingers Magnetic Rings Fidget Toy Anti-Stress Magnetic Ring for Unisex-Adult (Pack of 1). : Amazon.in: Toys & Games.” <i>Amazon.in</i>, 2025, Amazon Accessed 23 Jan. 2025.