Recommending Additional Features for a Hippotherapy Space and Multisensory Environment to Accommodate Children with Autism at the Kawallu Hippotherapy Center in Cuenca, Ecuador

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Abstract

Autism resources are limited in Ecuador, making it difficult for people to receive effective therapy. Kawallu Hippotherapy Center provides hippotherapy treatment to clients with different emotional, mental, and physical disorders. We worked with Kawallu to recommend features for their hippotherapy arena and multisensory environment (MSE) for the treatment of clients with autism. Through interviews with hippotherapy and MSE experts, we determined critical features to incorporate into these spaces. We analyzed the data and researched 20 features to incorporate at Kawallu. We presented Kawallu with a guidebook containing three options for each feature varying in price and quality to best suit the needs of clients with autism.

Los recursos para el autismo son limitados en Ecuador y aquellos con autismo tienen dificultades para buscar tratamiento terapéutico. El Kawallu Centro de Hipoterapia provee el tratamiento de hipoterapia a los clientes con desórdenes emocionales, mentales, y físicos. Trabajamos con Kawallu para recomendar características para su espacio de hipoterapia y entorno multisensorial para el tratamiento de clientes con autismo. A través de entrevistas con expertos de la hipoterapia y los entornos multisensoriales, determinamos características cruciales para incorporar en estos espacios. Analizamos los datos e investigamos 20 características para Kawallu. Presentamos tres opciones para cada característica variada en precio y calidad para quedar los necesarios de los clientes con autismo en la forma de una guía.

Acknowledgements

We would like to thank our sponsors Isabel Calle-Solis, Carolina Larriva, and the entire Kawallu community for welcoming us for the past few months. We thoroughly enjoyed working with you and cannot wait to see what you continue to accomplish in the upcoming years. In addition, we would like to extend our thanks to Gary Pollice, Jermoh Kamara, and Courtney Kurlanska from Worcester Polytechnic Institute. We would also like to thank all of the experts who took the time to help us with this project by providing invaluable advice. Finally, a special thank you to Professors Laureen Elgert and Fabienne Miller, without whom this project would not have been possible.

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All members contributed equally in preparing our IQP paper.

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Executive Summary

John[1] was diagnosed with autism at a young age. His mother immediately began searching for a treatment program local to Cuenca, Ecuador as he was unable to speak or communicate. He had no friends and was struggling in school. John's mother had difficulty finding an affordable therapy option that made any impact on him. That was until she found the Kawallu Hippotherapy Center run by Carolina Larriva and Isabel Calle-Solis. Since being treated at Kawallu, John has become a happy, social child, performing better in school than the majority of his classmates. Hippotherapy is the highlight of his week and his mother notices an immediate shift in his mood after participating in a session (Kawallu Client 1, personal communication, February 22, 2021). John's is just one incredible success story from our sponsor, of which they have dozens. Their work for the Cuenca community has been invaluable for so many since opening in June of 2017.

Image taken at Kawallu Hippotherapy Center

Our sponsor works with a variety of physical and mental disorders, but for our project we focused on **autism spectrum disorder (ASD)**. We were tasked with recommending features for their hippotherapy and multisensory environment (MSE) spaces specifically for the treatment of ASD, a neurodevelopmental disorder characterized by difficulty in social interaction and communication (Blenner et al., 2011). Those that are diagnosed with ASD can lead a fulfilling life as long as they have access to a proper diagnosis and a comprehensive treatment plan. One of these treatments is hippotherapy, the main tool employed at Kawallu.

Hippotherapy is a type of equine-assisted treatment that utilizes the horse's movement in combination with occupational therapy (OT), physical therapy (PT), and speech therapy to work towards functional goals, such as better social interaction (Koca & Ataseven, 2015). It is most often used to treat conditions such as cerebral palsy and ASD as it has both mental and physical benefits. The main benefits are improved communication, motor skills, focus, behavior,

[1] Name changed to respect confidentiality

strength, and balance (University of Colorado, 2015). Hippotherapy is just one tool Kawallu uses to treat their clients. Off the horse, they have other therapeutic tools and sensory items to help create a more well-rounded treatment session. Although Kawallu's sensory spaces are effective, they have expressed the desire to upgrade their typical sensory room into an **MSE.** MSEs are used as controlled spaces to regulate stimulatory input for therapeutic treatment. Since clients with ASD have high sensitivity to stimuli, MSEs are an effective way to create a safe environment (Stadele, 2001). When used in combination with hippotherapy, an MSE helps clients to make larger strides towards their goals.

The goal of this project was to recommend improvements to be made to Kawallu's hippotherapy and sensory treatment spaces for use with clients with ASD. To accomplish this goal, we collaborated with our sponsor on the following objectives:

1. Collect features typically included in a hippotherapy space and MSE
2. Analyze data and rank treatment features for implementation at Kawallu
3. Create a guide of recommended materials and features, including price ranges

We first interviewed hippotherapy and MSE experts working in the U.S. From these interviews, we were able to gain insight into additions such as those shown below.

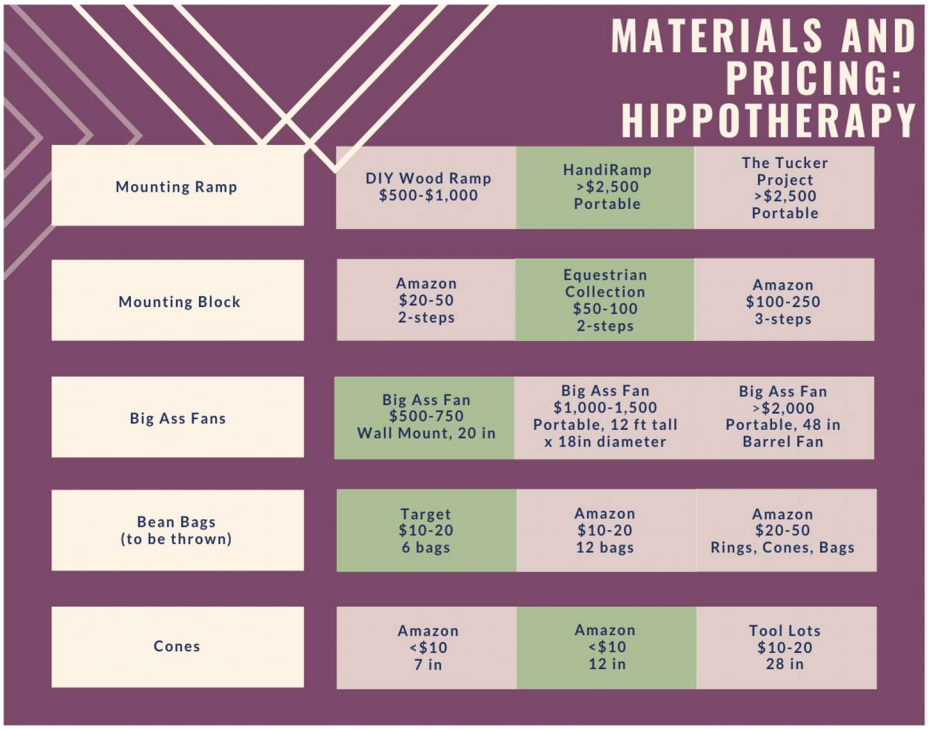
Recommended hippotherapy features

Hippotherapy Arena				
Big Ass Fans©	Grooming Station	Mounting Ramp	Social Stories	Visual Timer
Cones	Mounting Block	PVC Piping	Throwing Bean Bags	

Recommended multisensory environment (MSE) features

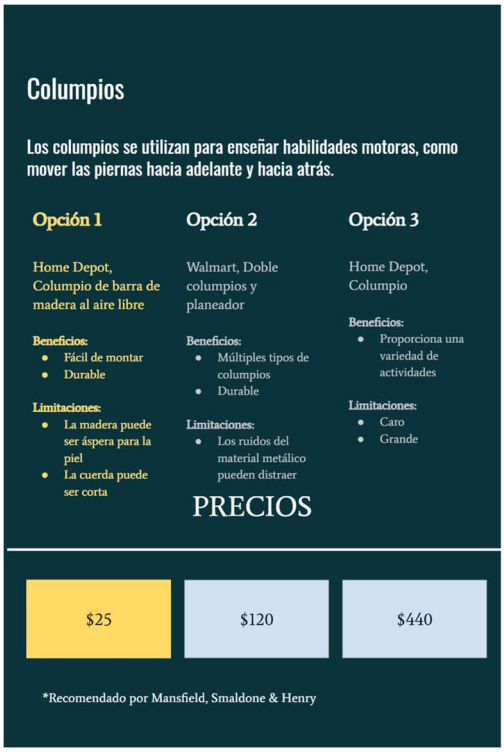
Multisensory Environment (MSE)					
Aroma Diffuser	Fiber Optics	Hidey Hole	Mini Trampoline	Swings	Weighted Blanket
Bubble Tube	Fidget Clickers	Mats	Sitting Bean Bags	Water Bed	

We then ranked the suggestions by how many times they were mentioned and how feasible they were to incorporate at Kawallu. After each respective interview, we analyzed individual recommendations and listed them out in a separate document. As we gathered more data, we organized the document into three categories: “Need”, “Want”, and “Not Possible”. The “Need” category consisted of features that could be incorporated with minimal difficulty at Kawallu and were highly recommended from multiple professionals. The “Want” category consisted of features that were highly recommended, but would have been too costly or difficult to implement (for example, a viewing room for parents and guardians with one-way glass). The “Not Possible” category included features that were only recommended once or twice and were also too difficult to bring to Kawallu (for example, solar panels to provide electricity). Afterwards, we researched places to purchase the materials needed for each suggestion and compiled the companies, prices, and benefits of each into a spreadsheet. We then looked into pricing out items we planned to recommend. We created a spreadsheet to organize links and prices for materials that could be purchased in or shipped to Cuenca, Ecuador. An example of different purchase options with pricing can be seen below.



Pricing of hippotherapy materials

All of the information we collected throughout the duration of the project was combined into one main deliverable: **a 33 page guide of recommended additions to Kawallu's hippotherapy arena and sensory treatment space, complete with the prices of such materials that could be sourced in Ecuador.** A page from the booklet is shown below, which displays information for the addition of swings. Each page contains the name of the recommendation, as well as a short description of its use. From our research we provided three options to offer different functionalities. We suggested the best finding based on quality and affordability, and highlighted it in yellow. On the bottom of the page, there is a list of experts that recommended the overall addition. Looking at the swings page, we selected the least expensive option as it offered the same general benefits as the others, but for a significantly lower price. In the guidebook before describing each feature, we gave a thorough outline of what is contained in the booklet in order to make it user-friendly.



Sample page from the guide of recommended materials

Our guidebook of recommended features will help to improve the treatment offerings for Kawallu's clients, especially for those with ASD. Their clients will have access to a more well-rounded treatment program and will be able to progress even further with their goals. Our final deliverable holds a wealth of knowledge about features for hippotherapy spaces and MSEs that our sponsor will slowly begin incorporating at Kawallu over the coming years.

Resumen Ejecutiva

Foto de Kawallu Centro de Hipoterapia

John[2] ha sido diagnosticado con autismo cuando era niño. Su madre empezó a buscar un programa de tratamiento en Cuenca, Ecuador inmediatamente porque John no tenía la capacidad de hablar ni comunicarse con nadie. No tenía ningunos amigos y se estaba costando en sus clases. La madre de John tenía dificultad para buscar un programa a buen precio que tenía un impacto para John. Eso fue hasta que ella encontró el Kawallu Centro de Hipoterapia, operado por Carolina Larriva e Isabel Calle-Solis. Con Kawallu, John se ha vuelto un niño feliz y sociable, y tiene más éxito en la escuela que la mayoría de sus compañeros. La hipoterapia es la parte más memorable de su semana y su madre puede ver un cambio instantáneo en su humor después de una lección (Cliente anónimo de Kawallu 1, comunicación personal, 22 febrero 2021). La historia de John es solamente una de las historias de éxito de nuestra patrocinadora, y tiene docenas. Su trabajo para la comunidad de Cuenca ha sido inapreciable para mucha gente desde su apertura en junio de 2017.

Nuestra patrocinadora trabaja con una variedad de desórdenes físicos y mentales, pero para nuestro proyecto se enfocó en **el autismo.** Nos recomendó unas características para el espacio de hipoterapia y el entorno multisensorial específicamente para el tratamiento del autismo, un desorden neurodesarrollo caracterizado por una dificultad con la interacción social, la comunicación, y los modelos repetitivos del pensamiento y comportamiento (Blenner et al., 2011). Mucha gente que está diagnosticada con autismo tiene la capacidad de vivir una viva cumplienda, si tiene acceso a un diagnóstico adecuado y un plan de tratamiento exhaustivo. Uno de esos tratamientos es la hipoterapia, la herramienta principal de Kawallu.

La hipoterapia es un tipo de tratamiento asistido por equinos que utiliza el movimiento del caballo en combinación con terapia física, ocupacional, y del lenguaje para trabajar hacia metas funcionales (Koca & Ataseven, 2015). Está usado con mayor frecuencia para condiciones

[2] Nombre cambiado para respetar la confidencialidad

como la parálisis cerebral y el autismo porque tiene beneficios físicos y mentales. Los beneficios principales son mejoras de la comunicación, las habilidades motoras, el foco, el comportamiento, la fuerza, y el equilibrio (University of Colorado, 2015). La hipoterapia es una de las herramientas de Kawallu para el tratamiento de los clientes. Desmontado del caballo, tiene otras herramientas terapéuticas y cosas sensoriales para crear una sesión completa. Aunque los espacios sensoriales son efectivos, nuestra patrocinadora ha expresado el deseo de mejorar su espacio sensorio a un **entorno multisensorial**. Un entorno multisensorial es un espacio controlado para regular la información sensorial para el tratamiento terapéutico. Ya que los clientes con autismo tienen una sensibilidad a estímulo alta, los entornos multisensoriales son un método efectivo para crear un espacio seguro (Stadele, 2001). Cuando es usado en combinación con la hipoterapia, un entorno multisensorial ayuda a los clientes para hacer grandes avances a sus metas.

La meta de este proyecto fue recomendarle unas mejoras a Kawallu para los espacios de tratamiento de hipoterapia y sensorial para los clientes con autismo. Para realizar esta meta, colaboramos con nuestra patrocinadora en los siguientes objetivos:

1. Recopile características que normalmente se incluyen en un espacio de hipoterapia y MSE
2. Analice los datos y clasifique las características del tratamiento para su implementación en Kawallu
3. Crear una guía de materiales y características óptimos con rangos de precios estimados

Terminamos las etapas siguientes para producir nuestra guía:

Primero, entrevistamos a los representantes de programas de hipoterapia y de entornos multisensoriales alrededor de los E.E.U.U. A partir de estas entrevistas, pudimos obtener información sobre las adiciones en las tablas siguientes.

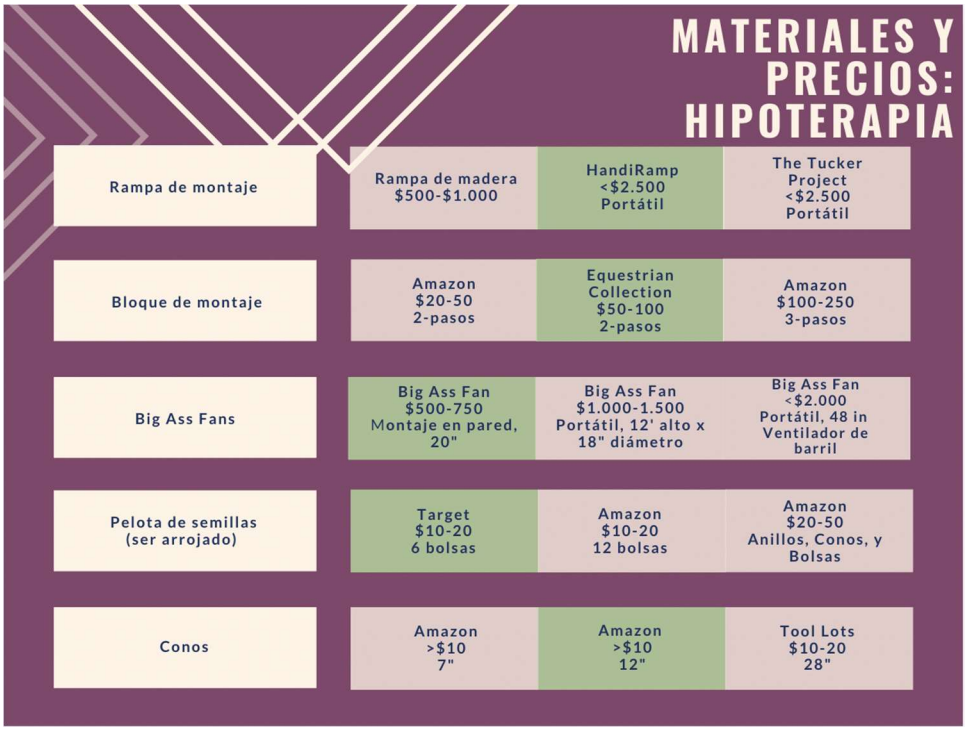
Recomendaciones por características de hipoterapia

Arena de Hipoterapia				
Big Ass Fans©	Conos	Kit de Almohazar	Rampa de Montaje	Tubos de Plástico
Bloque de Montaje	Historias Sociales	Pelota de Semillas	Temporizador Visual	

Recomendaciones por características de entorno multisensorial

Entorno Multisensorial					
Clicker Inquieto	Colchón de Agua	Difusor de Aroma	Escondite Pequeño	Puff Fiaca	Tubo de Burbuja
Cobija con Peso	Columpios	Esteras	Fibra óptica	Trampolín en Miniatura	

Luego clasificamos las recomendaciones por cuántas veces se mencionaron y cuán factible era incorporarlos a Kawallu. Después de cada entrevista respectiva, seleccionamos recomendaciones individuales y las enumeramos en un documento separado. A medida que comenzaron a llegar más sugerencias, organizamos el documento en tres categorías: "Necesidades", "Deseos" y "No es posible". La categoría "Necesidad" constaba de características que podían incorporarse con una dificultad mínima en Kawallu y fueron muy recomendadas por varios profesionales. La categoría "Quiero" constaba de funciones que eran muy recomendadas, pero que habrían sido demasiado costosas o difíciles de implementar en Kawallu (por ejemplo, una sala de visualización para padres y tutores con vidrio unidireccional). La categoría "No es posible" incluía características que solo se recomendaron una o dos veces y que también eran demasiado difíciles de llevar a Kawallu (por ejemplo, paneles solares). Después, investigamos los lugares que tienen los materiales necesarios para cada recomendación y recopilamos las empresas, los precios, y los beneficios de cada uno en una hoja de cálculo. Luego examinamos el precio de los artículos en la categoría "Necesidad". Creamos una hoja de cálculo para organizar los enlaces y los precios de los materiales que podrían comprarse o enviarse a Cuenca, Ecuador. Encontramos tres opciones para cada función y seleccionamos la que, como grupo, creemos que es la más rentable, pero aún así le dimos todas las opciones a nuestro patrocinador. A continuación se muestra un ejemplo de diferentes opciones de compra con precios.



Precios para materiales de hipoterapia

Toda la información que recopilamos durante la duración del proyecto se combinó en un producto principal: **una guía de 33 páginas de adiciones recomendadas al arena de hipoterapia de Kawallu y al espacio de tratamiento sensorial completa con los precios de dichos materiales que podrían obtenerse en Ecuador.** Se muestra una página del folleto, que muestra información para la adición de columpios. Cada página contiene el nombre de la recomendación, así como una breve descripción de su uso. A continuación se dan tres opciones para ofrecer diferentes precios y funcionalidades, y ofrecemos nuestra recomendación de la mejor opción basado en la calidad y la asequibilidad, resaltada en amarillo. En la parte inferior de la página, hay una lista de expertos que recomendaron la adición general. Mirando la página de columpios, seleccionamos la opción menos costosa como si ofreciera los mismos beneficios generales que las demás, pero por un precio significativamente más bajo. Antes de comenzar con los materiales y los precios, damos un esquema completo de lo que contiene el folleto para que

nuestros patrocinadores puedan usarlo con facilidad sin que el grupo esté presente para obtener ayuda adicional.

Nuestra guía de características recomendadas ayudará a mejorar el tratamiento para los clientes de Kawallu, especialmente los con autismo. Sus clientas tendrán acceso a un programa de tratamiento completo y avanzarán fácilmente con sus metas. Nuestro producto final tiene una abundancia de conocimiento de las características para los espacios de hipoterapia y entornos multisensoriales que nuestra patrocinadora empezará a incorporar a Kawallu en los años siguientes.

Página de mustra de la guia de materiales recomendados

INTRODUCTION

"To offer a specialized hippotherapy center, with professionals who manage to exercise favorable therapy for those who require it, seeking a contribution to society and working in favor of holistic stimulation" (Kawallu Centro de Hipoterapia, n.d.). That has been the mission of our sponsor, the Kawallu Hippotherapy Center, since they opened their doors four years ago in June of 2017. Since then, they have provided hippotherapy and other therapeutic services to Cuenca's youth. Hippotherapy is an equine-assisted treatment that utilizes the natural movements and gait of a horse to improve neurological and sensory function by combining aspects of physical therapy (PT), occupational therapy (OT), and speech therapy (Koca & Ataseven, 2015).

Figure 1: Kawallu logo

One of the main diagnoses Kawallu works with is autism spectrum disorder (ASD). ASD is a neurodevelopmental disorder often associated with difficulty in social interaction, communication, and restricted or repetitive patterns of thought and behavior (Blenner et al., 2011). In Ecuador, approximately 0.4-0.6% of the population is diagnosed with a form of ASD (Figure 2). Children with ASD are not well-supported in Ecuador due to the lack of diagnostic and treatment resources, making it difficult for them to receive the help they need to lead a fulfilling life (Dekkers et al., 2015).

Our goal was to suggest additional features for Kawallu to implement in order to designate a portion of their space for clients with ASD. Currently, Kawallu is composed of stables, two large treatment arenas, some sensory rooms, and a few offices. One arena is fully functional for clients with different disorders and there is a small sensory off to the side filled with toys and therapeutic tools. We focused on the less developed hippotherapy arena and small room, specifically to meet the needs of clients with ASD. Through interviews with occupational therapists and hippotherapy center owners, we developed a list of features to deliver to Kawallu. Additional interviews led us to decide to recommend implementing a multisensory environment (MSE) in place of the sensory room. We analyzed and incorporated all recommendations into a guidebook, complete with suggested materials and approximate prices, for our sponsor to use while developing these two spaces to build a more accommodating space for clients with ASD.

2 BACKGROUND

We discovered that one of the most influential, but lesser known, treatments for ASD is hippotherapy. Throughout this background we discuss our findings on the principles of ASD including diagnosis, treatments, hippotherapy, and MSEs. All of this information helped us to propose the final recommendations for Kawallu.

2.1 Autism Spectrum Disorder

ASD is a neurodevelopmental disorder characterized by difficulty in social interaction, communication, and repetitive patterns of thought or behavior (Blenner et al., 2011). ASD is a broad spectrum, meaning there is a wide variation of severity. It currently affects around 0.625% of the world population, and that percentage is growing due to better practices in detection and diagnosis (World Health Organization: WHO, 2019).

The Childhood Autism Rating Scale (CARS) is the most common method used to diagnose a child with ASD and compares the skills and behaviors of a neurotypical child to one that may be affected by a type of ASD (Sharma et al., 2018). The best way to differentiate between types is by utilizing the three main subgroups which present different signs, symptoms, prevalence, and average ages of diagnosis. The subgroups include autistic disorder (AD), Asperger's Syndrome, and pervasive developmental disorder-not otherwise specified (Levy et al., 2009).

Early diagnosis is correlated to positive life outcomes, however one of the major challenges those with ASD face is an inability to be properly diagnosed. When diagnosing patients with ASD, doctors perform a comprehensive evaluation that includes a physical assessment, cognitive exam, behavioral observation, and review of family history and medical records (Blenner et al., 2011). Very few physicians have the ability to perform the needed assessments (Dekkers et al., 2015). It is likely that more people have ASD worldwide than are diagnosed due to the difficulty in diagnostic accuracy, leading to a lower documented prevalence worldwide.

2.1.1 Prevalence Around the World

Although the reported prevalence of ASD has increased because of advancing diagnostic practices and awareness, many remain undiagnosed. Figure 2 shows a world map with countries

colored to show the percentage of the population with ASD. The data may depend on the diagnostic resources available in each region, not necessarily the actual prevalence. Ecuador's percentage lies towards the middle of the data, with approximately 0.4-0.6% of the population being diagnosed with ASD (Figure 2).

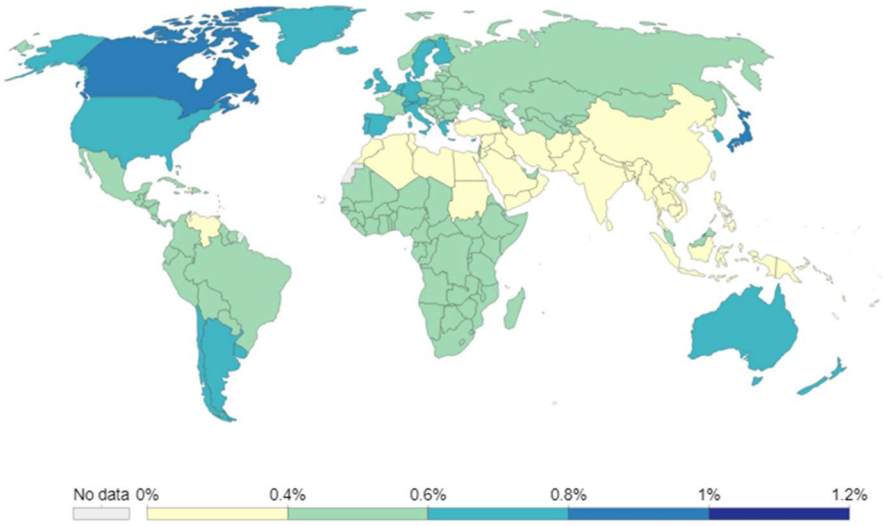


Figure 2: Prevalence of Autistic Spectrum Disorder
"File:Prevalence of autistic spectrum disorder, OWID.svg"
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ASD is not well-recognized in Ecuador due to a lack of resources. Children with ASD are not frequently integrated or accommodated in the school system, which is essential for proper development and growth. In Quito, the capital of Ecuador, 0.11% of 51,453 public school students were diagnosed with ASD and an additional 0.21% were thought to be undiagnosed, according to data from 2015 (Dekkers et al., 2015). This goes to show that Ecuadorians are being diagnosed with ASD much later in life than in other countries. When they are diagnosed in childhood, they are not supported in the public school system as teachers do not have the necessary resources to aid their learning. In an attempt to solve this problem, Ecuadorian law states that every child must go to school and that nobody can be turned away. An Ecuadorian organization, Entra en Mi Mundo, is currently working on integrating children with ASD into public schools by providing resources to parents and teachers (La Hora, 2018). Entra en Mi Mundo and Kawallu are similar in that they work to provide resources to children with ASD, break the stigma, and spread awareness in Ecuador. The first step to breaking the stigma may be providing adequate resources for the treatment of ASD in Ecuador.

2.2 Autism Treatments

There are a wide variety of treatments for ASD such as applied behavior analysis (ABA), pharmacological therapy, MSEs, OT, and more (CDC, 2019). Although no universal treatment plan has been discovered, this section covers a few basic methods.

ABA is the process by which unhealthy or self-destructive behaviors are identified and improved through therapy. The goal of ABA is to teach new skills by introducing desired behaviors and letting these skills become second nature, while attempting to eliminate undesired behaviors (Sanchack & Thomas, 2016).

Pharmacological therapy is the prescription of medication to help those with ASD perform better during daily activities (LeClerc & Easley, 2015). It focuses on two recurring characteristics in children with ASD: repetitive behaviors or restricted interests and communication impairment. Overall, pharmacological therapy can ease the day-to-day challenges of ASD (Sharma et al., 2018).

MSEs are used as controlled spaces to regulate stimulatory input for therapeutic treatment. Since children with ASD have high sensitivity to stimuli, MSEs are an effective way to create a safe environment (Stadele, 2001). Sensory rooms are often confused with MSEs. Unlike MSEs, sensory rooms are not designed for therapeutic treatment. When creating an MSE, there must be enough materials used that all eight senses, shown in Figure 3, are stimulated.

In an MSE, the therapist allows the client to direct the experience. The therapist typically does not instruct the client, but rather only intervenes when it is necessary to demonstrate new activities. The client is encouraged to explore the room on their own and direct most of the experience for themself (Malfara, personal communication, March 2, 2021). The typical non-prescribed MSE includes weighted blankets, swings, various lights, ball pits, and white background noise (Texas Woman's University, 2017). These rooms provide the opportunity for emotional development, improved communication, minimization of challenging behavior, and many other benefits (Stadele, 2001).

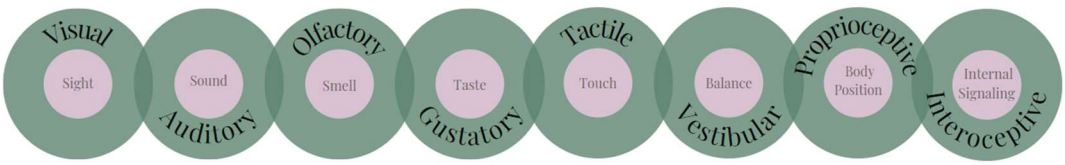

Figure 3: The eight senses

OT is a treatment for the development, recovery, or assessment of motor and cognitive functions. This therapy is used to help people who have trouble participating in everyday activities because of illness, developmental disorders, or past trauma (Pacific University, n.d.). OT patients typically become more socially aware and responsive to their environment (Case-Smith & Arbesman, 2008). A 2006 study by Sams et. al. produced positive results by introducing animals and sensory activities into OT. They found in their research that the use of animals in medical treatment has become more popular in recent years. It was stated that children have a natural tendency towards animals, and certain animals have been repeatedly shown to have positive therapeutic effects (Sams et al., 2006).

2.3 Hippotherapy

As mentioned previously, animals tend to have a therapeutic effect on people with ASD. One treatment involving animals is hippotherapy, a type of equine-assisted treatment. Hippotherapy uses a horse's movement along with OT, PT, and speech therapy to work toward functional goals (Koca & Ataseven, 2015). Each time the horse moves, it challenges the physical stability of the rider to improve posture and provides sensory stimulation similar to the swinging of the human pelvis during walking. Hippotherapy is used as treatment primarily for people with cerebral palsy or ASD. In both cases, the care helps the development of core strength and motor function (Ajzenman et al., 2013). Even without riding, hippotherapy can build confidence and improve self-esteem through guiding and caring for the horses.

Case Study:

Case studies have been done to collect data on the effectiveness of hippotherapy in children with ASD. Harris & Williams performed a study in 2017 which implemented pre- and post-tests using Childhood Autism Rating Scale (CARS) and observational measures for compliance and behavior. The intervention consisted of two 45-minute riding sessions a week with a total of 5-7 sessions. Some of the activities included putting on proper riding equipment, mounting the horse, and performing activities while on the horse. From the study, it was concluded that after intervention there was a significant reduction in the severity of ASD symptoms and hyperactivity, proving hippotherapy improves some aspects of ASD. Overall, the study showed a significant reduction in hyperactivity and ASD symptoms for the intervention group (Harris & Williams, 2017).

Box 1: Case Study

Figure 4 explains the different benefits that hippotherapy can have on people with ASD, with data gathered from a University of Colorado research study. There are four main improvement areas: communication, focus and behavior, motor skills, and strength and balance. Since horseback riding is an intense activity, there are a lot of benefits for patients with ASD or other related disorders. The specific benefits can be seen in Figure 4, with improvements rated on the Aberrant Behavior Checklist, another method for analyzing the severity of ASD (University of Colorado, 2015). In Boxes 1 and 2, additional evidence emphasizing the successes of hippotherapy treatment are highlighted.

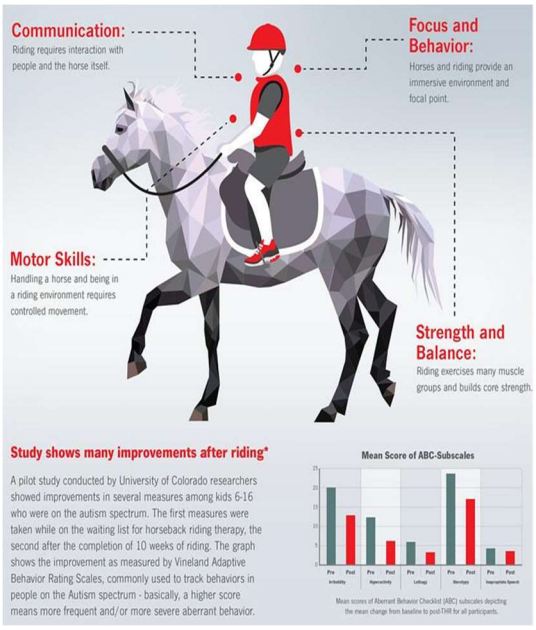

Figure 4: Therapeutic horseback riding for autism
"Therapeutic Horseback Riding for Autism infographic" by State Farm is licensed under CC BY 2.0

Treatment sessions are different for each client in order to accommodate their needs. A typical session may begin with petting and becoming acquainted with the horse before mounting it. Once mounted, games and tasks are completed as a form of OT. Between each task, the client is encouraged to verbally communicate to the horse to "Move!" or "Stay!" as a form of speech therapy. Each client is typically led by a therapist as well as side-by-side assistants, referred to as side-walkers. Tasks end with stretching and bending to encourage movement. Before leaving, the clients are encouraged to pet and thank the horse. Depending on their treatment plan, they are sometimes led into sensory activities to continue improvement off the horse, or provided with calming tasks. Overall, the interaction with the horse paired with therapeutic activities provides benefits beyond what can be learned in a classroom (Malcolm et al., 2018).

Success Story:

A testimonial comes from a mother, Rene, who has three children with developmental disorders. Her daughter Abby was diagnosed with cerebral palsy at six months old and her son Bradley with autism at two years old. Her youngest child, Timmy, was deprived of oxygen at birth and suffered from brain damage. Rene enrolled all three of her children in Special Strides, a farm that provides services in therapy, recreation, and education. The therapy program at Special Strides is similar to that of Kawallu. They provide physical therapists, occupational therapists, and speech-language pathologists during their sessions to engage sensory and cognitive systems. Special Strides has significantly improved her children's attitudes and behaviors, putting smiles on all of their faces (Special Strides, n.d.).

Box 2: Success Story

2.3.1 Kawallu Hippotherapy Center

Our sponsor, the Kawallu Hippotherapy Center, uses hippotherapy to treat children with many different conditions. Kawallu was a passion project of Carolina Larriva, who was born on a farm in Cuenca, Ecuador and began riding horses at the age of 11. She was a professional horseback rider and participated in a number of competitions until her horse, Normando, was injured. During this break from the competitive world, Carolina received her bachelor's degree in Educational Psychology at the University of Azuay. She started researching hippotherapy and earned her master's degree in Education Center Management and Research in Educational Change in Spain. During school vacations, she volunteered at a hippotherapy center treating children with Down syndrome. Upon returning to Ecuador, she and her friend Isabel Calle-Solis opened up the Kawallu Hippotherapy Center in her father's stables. With help from a number of volunteers and donors, Carolina and Isabel officially opened their doors to the public on June 6, 2017 (BLL, 2019). Over the years, Kawallu has grown into a much larger business, prompting the need for expansion to accommodate a larger and more diverse clientele. Currently the center is composed of two large riding arenas, a few offices, and small, sectioned off areas that serve as sensory rooms for the clients. As their treatment population continues to grow in the coming years, they need updates to create a more inclusive treatment space for all clients, especially those with ASD.

Figure 5: Photograph taken at the Kawallu Hippotherapy Center

Working with Carolina and Isabel, the overarching goal of this project was to recommend improvements to be made to Kawallu's hippotherapy and sensory treatment spaces to use for clients with ASD. In order to recommend impactful improvements, we had to determine features that satisfy the needs of both the clients and horses. Hippotherapy is especially effective because the horse is used as a treatment modality. It walks with a steady gait and has a body temperature slightly higher than that of a human, helping to relax the client's body and allow for more control over fine motor movements (Lenz, n.d.). Therefore, when we researched materials to recommend

for the hippotherapy arenas we focused on items that build upon what the horse already provides. Kawallu currently has a sensory room they would like to advance into an MSE so that it can be used for therapeutic purposes. Recommendations for this room focused on features that cater to the senses such as using customizable music and lights, as well as more tangible features like ball pits and swings. Throughout this project, we have determined recommendations and new features to include in the existing hippotherapy and sensory spaces at Kawallu Hippotherapy Center to be implemented in the coming years.

3 METHODOLOGY

The goal of this project was to suggest new features and updates that could be adapted to the existing hippotherapy and MSE spaces used to treat children with ASD at the Kawallu Hippotherapy Center in Cuenca, Ecuador. Our objectives were broken down as follows:

- Collect features typically included in a hippotherapy space and MSE
- Analyze data and rank treatment features for implementation at Kawallu
- Create a guide of recommended materials and features, including price ranges

In the following section, we discuss each of our research objectives in detail. For each objective, we explain what we planned to do, how we accomplished it, who we got the information from, and how we used that information to complete the objective.

3.1 Objective 1: Collect features typically included in a hippotherapy space and MSE

To determine basic features to include, we needed to learn more about hippotherapy activities, MSE materials, and what an optimal center layout for clients with ASD includes. In order to do this we conducted semi-structured interviews with different hippotherapy and MSE center owners in the United States, which we contacted by email. A sample list of interview questions can be referenced in Appendix A. Prior to each interview, we provided the interviewees with a consent agreement, which can be referenced in Appendix B and follows the template set by the WPI Institutional Review Board (IRB). The approval by the WPI IRB can be seen in Appendix C. All interviewees waived their right to be read the informed consent document by one of our team members in lieu of reading and signing themselves. Each interviewee also consented to our use of their name in our paper. We held meetings with our sponsor to discuss the existing treatment space, what they wanted to achieve in a new MSE, and updates to the hippotherapy arena. Once interviews with professionals were completed, we began organizing our findings and recommendations for the space.

3.2 Objective 2: Analyze data and rank treatment features for implementation at Kawallu

To begin organizing our findings, we categorized and ranked interview responses by the most frequent occurrences, prioritizing the most prominent suggestions. We took all findings and created suggestions for important features to be added. In addition to the recommendations for the hippotherapy space, we also included updates to the sensory room, now recommended to be an MSE, for children with ASD. We continuously checked in with our sponsor to ensure we were meeting their needs.

3.3 Objective 3: Create a guide of recommended materials and features, including price ranges

We researched options for each feature, focusing on quality and price. Due to our sponsor's known financial constraints, we used the information we gathered to create a guide of affordable materials and features. We began by compiling a wide variety of options for each feature. Then we condensed the choices by eliminating those that were too expensive, poor quality, or unsuited for the spaces. We pinpointed the best option by determining which had the best overall quality for the lowest price. This idea of beginning broad and narrowing down the options can be seen in Figure 6. We combined all of our findings into a guide for Kawallu to improve their existing center as they see fit.

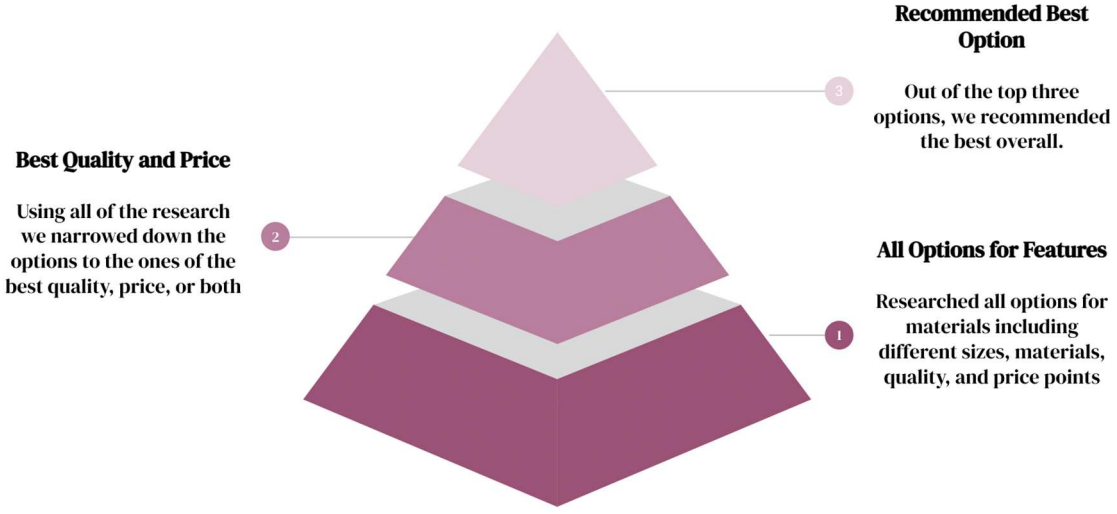

Figure 6: Choosing the best recommendation options

4 RESULTS AND ANALYSIS

In order to develop the most advantageous hippotherapy space to be implemented at Kawallu Hippotherapy Center, we interviewed with eight hippotherapy professionals and two MSE experts. We learned about the building structure and features that have and have not been successful for each center. We recorded and tracked the frequency at which features were recommended by our interviewees. Our findings guided our research in suggesting new features for the hippotherapy space and MSE.

4.1 Safety

All interviewed professionals emphasized that there must be a safe environment in order for progress to be made on the clients' functional goals. This includes implementing safety measures concerning both the client and their horse.

The client's safety is the main priority during therapy. One safety tip came from Mansfield, who said to incorporate swinging doors and gates with caution as clients may get their fingers caught. Additional safety measures must be taken with regards to overstimulation. Echoes, for example, can be an auditory trigger for children with ASD or become a distraction from treatment productivity. Mansfield suggested that we be cautious about echo, while Payne mentioned that minimal distractions are acceptable as they mimic real-life situations. Each client responds differently to tools implemented by the therapist. Therefore, it is important for their therapist to do an initial examination to understand their client and repeatedly analyze their progress. This ensures that the treatment is efficient and the therapist understands every client's needs in order to keep them safe.

The horse produces an innate risk not present in traditional therapy. However, all horses used during therapy sessions are desensitized, or "broke," prior to therapy, meaning that trainers introduce all materials to the horse before use in a therapy session. Payne gave one example of this, sharing that a hula hoop with beads inside scared one of her horses as it sounded like a snake. Desensitizing the horse may also include mimicking possible scenarios of a client outburst, so that the horse will not react poorly to the thrashing or loud noises that may occur. Payne cautioned that no matter how trained horses are, they will still become startled as a result of certain sounds. These triggers have to be identified during desensitization, so the therapist can avoid using such tools during treatment and the horse is prepared in case of an outburst.

In addition to caution of certain materials, the therapy arena must be structured with the needs of the horse in mind. The corners should be covered with wooden slats in order to make the arena more rounded as horses often get nervous around sharp corners and can accidentally trap themselves. Burrows suggested using a few wooden 2' x 4' pieces as an inexpensive option to eliminate corners. By having rounded corners, the safety of the horse and the rider are significantly improved. Once proper safety measures are in place, sensory stimulation can be introduced into therapy in order to improve treatment outcomes.

4.2 Sensory Stimulation for Autism Treatment

As described by Malfara, there are eight senses that must be active in order to properly stimulate clients. There are two main ways a client can achieve sensory stimulation at Kawallu: while riding the horse and inside of the MSE. Whether a particular client receives stimulation from the hippotherapy session or the MSE depends upon their specific needs and attitude for the day. We found that hippotherapy often puts clients in the ideal state to engage in other forms of therapy. Mansfield had discussed how the riding part of treatment was the beginning of the process and a client could move to an MSE afterwards. Stalsburg expanded on that idea, informing us that the horse was meant to put the client in a focused mental state where they could improve upon speech, memory, and social skills. Mansfield suggested doing the riding session and then a short sensory piece. Stalsburg recommended having sensory materials (water, sand, parachutes, etc.) easily accessible anytime the client is dismounted. Unlike other interviewees, she also suggested performing sensory activities prior to hippotherapy to help get clients into a focused state to ride and work with the horse. Using a combination of interviewee suggestions, we created Figure 7 that represents the hippotherapy treatment process from arrival to completion. In the usual lesson, the client would mount the horse, complete their lesson plan for the day, and then do more activities off the horse. The professional is responsible for

observing the client to see if they are becoming uncomfortable at any point in order to stop the lesson.

Figure 7: Flow chart of a typical hippotherapy lesson

4.2.1 Stimulation from Hippotherapy

In each interview, **the horse was stressed as being the main treatment modality in hippotherapy**. Horses are an important treatment tool because they provide stimulation for many of the senses, especially vestibular and proprioceptive. Payne described one reason a horse is such a special tool is because of the bond that it creates with the client. She explained that animals are non-judgmental, unlike people. Clients are able to build trust with the horses and communicate their thoughts and feelings without any repercussions. The bond developed with the horse is essential because the rider must be motivated to ride or else they may refuse treatment. Horses can even bond with specific clients, and are often originally matched with children based upon personality types and needs (Smaldone and Henry, personal communication,

February 25, 2021). Without the desire to ride, it is hard for the clients to focus during treatment (Stalsburg, personal communication, February 4, 2021). Stalsburg also added that once the clients are comfortable with the horse, there is a visible increase in their focus and emotional awareness. She also suggested that therapists should let the horse do most of the work to avoid a barrage of activities.

In addition to the emotional connection provided by the horse, there are also physical benefits. The horse has three planes of movement that mimic a human pelvis when walking. Stalsburg and Payne described how the movement impacts the rider's leg motion and helps to normalize, tone, and even establish muscle memory. In order to remain atop the horse, Stalsburg said that the client must engage their core muscles to balance. Depending on the horse's gait, it can provide calming stimuli for hyperactive clients and excite the more timid ones (Smaldone and Henry, personal communication, February 25, 2021). Through OT, PT, and speech therapy activities, clients can improve even further. As Smaldone and Henry phrased it, hippotherapy is part of a greater treatment plan and should be used as a tool to help achieve functional goals. These additional therapeutic activities can be performed within an MSE prior to or after the hippotherapy treatment session as referenced in Figure 7.

There are many features that we found crucial to include within a hippotherapy center. All interviewees emphasized the importance of a high quality mounting ramp. Stalsburg and Mansfield each said that Hoyer or hydraulic lifts help mount the clients onto the horse. Payne suggested using the Handi-Ramp company, which makes mounting ramps out of wood which complies with the Professional Association of Therapeutic Horsemanship (PATH Intl.) and the American Hippotherapy Association (AHA) standards. Payne and Burrows also suggested that the mounting ramp be mobile in case a client needs to mount or dismount in an alternate location. Burrows noted the importance of having a separate mounting block on the horse's off-side for the side-walker to aid in mounting the client onto the horse.

All of these components are the bare minimum of what needs to be included in the hippotherapy center. Other accessory components include Big Ass Fans© to regulate temperature, as recommended by Burrows and Stalsburg. Another accessory that would be a beneficial addition is an outdoor sensory trail with varied terrain and activities. Families of clients could benefit from a welcoming lobby and a viewing area with guardians sitting behind a one-way mirror so as to not be distracting to their children during lessons. Mansfield mentioned

sprinklers to keep the ground moist, so that workers do not need to water the arena manually. All of the professionals' suggestions for materials have been taken into consideration in creating the deliverable for our sponsor and the recommendation section of our paper.

In order to have a successful treatment session, senses that cannot be activated by the horse itself (i.e. visual and auditory) must be stimulated. These senses can be incorporated through the use of supplemental materials. Catering to the sense of touch, the temperature of the room can affect the quality of a session, as clients cannot focus if they are not comfortable (Payne, personal communication, February 20, 2021). Payne also added that pushing and pulling heavy objects helps motor skills and creates a good sensory activity for clients that have difficulty focusing. To stimulate the sense while mounted, Mansfield suggested having streamers hang down from the ceiling so that riders could move through them. She also advised creating didactic materials out of cement and PVC piping, such as a tree to put rings onto while riding. Stalslburg said that obstacles can be introduced to challenge clients to employ critical thinking skills and guide the horse. Guiding the horse to move around, over, or stop in front of obstacles provides the benefits of practicing communication and potentially coping with frustrations if the horse does not do as the client intended (Burrows, personal communication, February 19, 2021).

To stimulate the auditory sense, music is a good option to block out background noise. Since the sound of LED lights humming can be bothersome to clients with ASD, the music could help mask the sound of the lights. Using natural light is another option to avoid using LEDs altogether. To further stimulate the sense of sound, Stalsburg had recommended an activity station with different sized PVC pipes that could be hit to allow the client to create the noise they desire. This serves a dual purpose because it is also a cause-and-effect task. These types of activities allow for some kind of result upon completion, so that the client can conceptualize the consequences of their actions (Mansfield, personal communication, February 3, 2021). Stalsburg added that with an incentive or reward, clients may be more motivated to complete their lesson.

Most professionals we talked to had suggestions for how to target the sense of sight. Colors are an important factor to consider, as bright colors can overstimulate a person with ASD. Stalsburg suggested more muted colors to have a calming effect. When it comes to treatment, visuals are also an important factor for those with ASD. Payne recommended using pictures to show a client their schedule for the session. This visual display of instructions, otherwise known as social stories, had also been mentioned by Mansfield, along with having a timer easily visible

within the treatment area. All of these sight-targeting materials help to keep the client comfortable, increasing communication and understanding between them and their instructor. These activities help create a well-rounded hippotherapy session when combined with the supplementary activities of an MSE.

4.2.2 Stimulation from the Multisensory Environment

Almost every professional advised that the hippotherapy space should have direct access to a sensory space to enrich treatment. This is because clients with ASD can become overstimulated easily and need a space where they can engage with controlled surroundings. Since Kawallu wants to use their sensory space for therapeutic treatment, we dove further into research and found that an MSE would be best for their needs. An MSE would provide a space for clients to take a break from any external stimuli, and provide options for the clients to choose the activities and materials they would like to focus on while in the space. The targeted senses and their relative materials can be seen in Figure 8, which shows each of the six senses that can be safely addressed in an MSE along with corresponding activities that help to engage each sense. The gustatory sense cannot be safely addressed, because if a child is given something to eat or lick they may be at risk of choking or having an allergic reaction. The interoceptive sense is not able to be addressed in a typical therapy session as it deals with internal organs and functions.

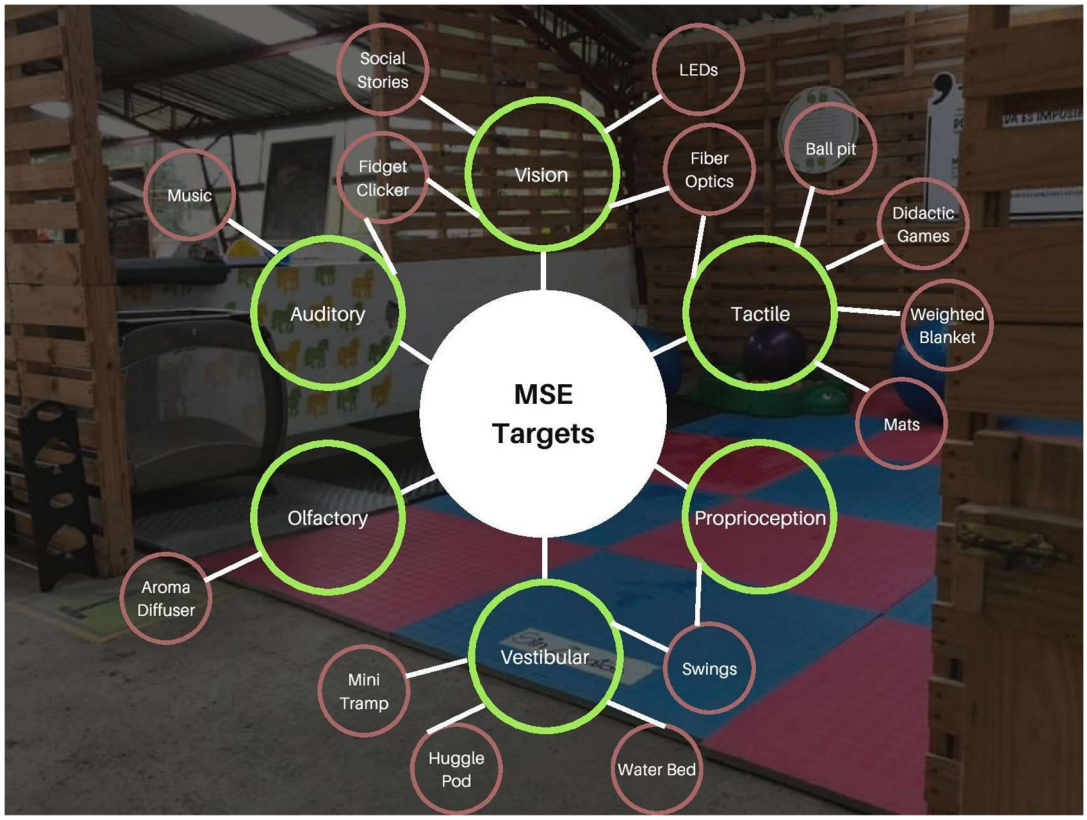

Figure 8: MSE target senses and materials

Throughout our interview process, we discovered that specific sensory items were essential to stimulate clients with ASD. Malfara, who specializes in MSEs, provided additional insight by explaining that an MSE provides free reign for the client to use the available materials to their liking. She said that it is crucial to have switches for lights and movable objects so the client can make the space their own. A room with mats and bean bags was suggested by Payne so that clients could have a soft area to sit. There are many different ways to engage the senses of clients with ASD, and each person responds differently to each type of stimuli. This is why Payne and Burrows had recommended that materials within a treatment space be detachable whenever possible as something that may positively stimulate one person may negatively affect another. Smaldone and Henry suggested that the materials should be washable and kept in bins since many clients are touching them in a setting with lots of dirt and grime. They also suggested having doubles of everything so that matching games can be performed. They utilize weighted balls, hula hoops, foam letters and dice, basketballs, and a variety of other toys to stimulate their clients.

4.3 Additional Findings

Through professional interviews, we received additional feedback indirectly related to our project, but that included helpful tips and tricks for Kawallu. Everyone we interviewed was passionate about hippotherapy and expanding awareness. They were happy to educate us further on topics such as equine-specific terminology and the benefits of individual versus group treatment sessions. We also conducted two interviews with guardians of our sponsor's clients, who were able to give us more insight into the spirit of community at Kawallu and the impact that it has already had on their children.

4.3.1 Floor Plan

One of the recommendations from the Carlisle Academy and High Hopes concerned setting up the center in a manner conducive to treatment. Using the external building structure and the recommended features, there must be an organized flow established. One suggestion was that the entryway to the building should be close to the parking lot to ensure that anyone who is wheelchair-bound or that has other ambulatory difficulties can easily access the building. Burrows recommended adhering to the Americans with Disabilities Act while suggesting improvements to ensure equal access, since Ecuador does not have these types of laws. The floor plan should allow for easy access to the stables where clients will learn to care for the horses through brushing, petting, and feeding them. From the indoor arena, the pastures should also be readily accessible for outdoor treatment.

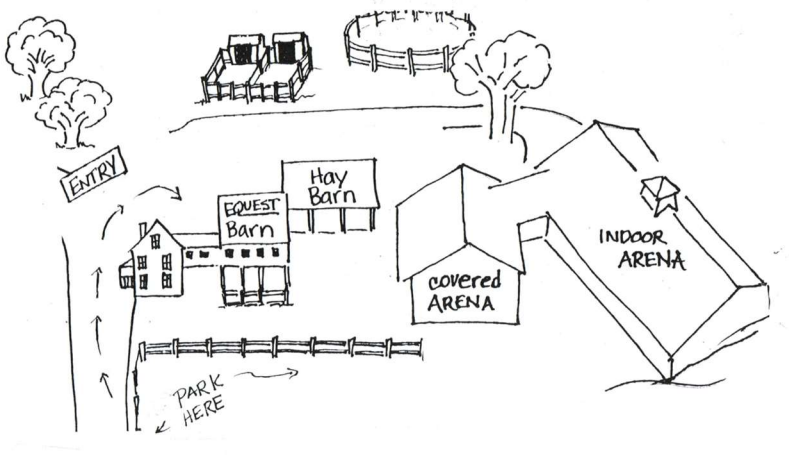

Figure 9: Layout of Carlisle Academy for Integrative Equine Therapy

A general layout of the Carlisle Academy for Integrative Equine Therapy and Sports in Lyman, ME can be seen in Figure 9. One of the critiques shared by Smaldone and Henry was that the distance between the parking lot, the hippotherapy arena (labeled indoor arena), and the other therapeutic tools (labeled covered arena) was too far. During these transitions some of the

momentum from therapy is lost, meaning there should also be activities available for use in the main arena. The hippotherapy clients at the Carlisle Academy only work in the covered and indoor arenas, which are fairly far from the parking lot and are connected via a narrow indoor hallway that they must dismount the horse to move through. While we only received a diagram of the floor plans from the Carlisle Academy, each interviewee stressed the importance of good flow between spaces.

4.3.2 Terminology

Throughout this experience we learned the importance of terminology for equine-assisted treatments. Stalsburg explained that PATH is working on clarifying the difference between equine-assisted therapy and hippotherapy. Hippotherapy is unique because the instructor must be a licensed occupational, physical, psycho, or speech therapist (Smaldone and Henry, personal communication, February 25, 2021). Equine-assisted therapy focuses more on learning riding skills, while hippotherapy is prescribed as a treatment for a particular disorder (Stalsburg, personal communication, February 4, 2021). Smaldone and Henry told us that they prefer the Carlisle Academy to be referenced as one that offers hippotherapy treatment, rather than strictly a hippotherapy center. This is because hippotherapy is only one of the treatments they offer as part of a cohesive plan.

4.3.3 Group vs Individual Therapy

In addition to the differing opinions regarding terminology, we found through each interview that there is debate about the use of group therapy. During our interview with Payne we talked extensively about individual versus group therapy treatments, as their hippotherapy sessions are designed to be one-on-one. Other centers implement both group and individual therapy, but emphasize the importance of building a cohesive group that has similar desired outcomes from treatment. At the Carlisle Academy, Smaldone and Henry put clients into groups of 6-8, matching them based on their abilities and sensory needs. Together group members rotate through activity stations, usually ending the lesson with a horse grooming session.

At High Hopes, Stalsburg enjoys using groups due to the benefits that stem from increased social interaction. However, she emphasizes that some clients cannot work in a group setting, and need one-on-one treatment. Whether a client should be working individually or in a group is dependent on their specific needs and goals, which should be regularly re-evaluated by

their therapist (Smaldone and Henry, personal communication, February 25, 2021). The spectrum is incredibly large, and it is impossible to accommodate every client with a uniform approach (Payne, personal communication, February 20, 2021). To have multiple sessions at once, Burrows also recommended moveable fence panels to help with easy access into different parts of the building and allow the arena to be divided.

4.3.4 Kawallu Community Input

Through interviews with clients we saw the true impact of Kawallu's work. Both clients we spoke with had many positive comments such as a sense of relief that their child has a proper diagnosis and support from Kawallu. While most of the feedback was positive, one anonymous interviewee explained that she would like there to be more didactic materials available. Using this feedback, we made it a priority to suggest many options to incorporate into hippotherapy and the MSE. Another guardian expressed nothing but appreciation for Kawallu, saying that the benefits from their work have been immeasurable and she would not change a thing. We kept this in mind, making sure we did not take anything away from Kawallu but simply added new treatment tools. Since Kawallu's clients are their top priority, we worked to ensure all of their needs were met.

4.4 Suggested Additions

Our interviews with hippotherapy and MSE professionals gave us insight as to what features to recommend to Kawallu. From our collected data we recommend the following list of additions:

Table 1. Features included in the recommendations for Kawallu Hippotherapy Center

Hippotherapy Arena				
Big Ass Fans©	Cones	Grooming Station	Mounting Block	Mounting Ramp
PVC Piping	Social Stories	Throwing Bean Bags	Visual Timer	

Multisensory Environment (MSE)

Aroma Diffuser	Bubble Tube	Fiber Optics	Fidget Clickers	Hidey Hole	Mats
Mini Trampoline	Sitting Bean Bags	Swings	Water Bed	Weighted Blanket	

We received dozens of suggestions from the various professionals we interviewed and distilled them down to a feasible list to give to our sponsor. To do this, we created three categories: “Need”, “Want”, and “Not Possible”. Our “Need” list consisted of additions that were both highly recommended and easy to implement at Kawallu, like mats for the floor of the sensory space. Our “Want” list had features that were highly recommended, but would have been too costly or difficult to implement at Kawallu. The “Not Possible” category included features that were only recommended once or twice and were also too difficult to bring to Kawallu. The features and the list they fall under are shown in Table 2. After deciding which features to include, we organized all of the information into a final deliverable for our sponsor to refer to in deciding what features they would like to implement.

Table 2. Categorization of features recommended in interviews

List of Recommended Features		
Need	**Want**	**Not Possible**
Aroma Diffuser	Bean Bags	Barn Doors
Big Ass Fans©	Bubble Tube	Climbing Wall
Cones	Grooming Kits	Lobby
Mats	Hidey Hole	More Horses
Mounting Block	Mini Trampoline	Projector
Mounting Ramp	Padded Sensory Room	Sprinklers
PVC Tree	Social Stories	Solar Panels
Swings	Viewing Room	Wind Farm

Visual Timer	Water Bed	
	Weighted Blanket	

We provided the recommendations to our sponsor in the form of a guidebook of optimal materials and prices. The entire pamphlet, which was sent to our sponsor at the conclusion of the term, can be found in Appendix D and an example page can be seen below in Figure 10 in which we recommended swings. The guide starts with a table of contents, title page, and preface that lists out the professionals interviewed so that our sponsor was aware of their credentials and experience. Through the preface, we explained that the final decision of the materials to implement was left to our sponsor. The individual recommendations are found in either the hippotherapy or MSE section to be clear as to where each recommendation should be implemented. The name of the feature is at the top, followed by a short description of how it impacts clients with ASD. The names of the professionals who recommended this feature are listed at the bottom of the page. There are three purchase options that are organized left to right from least to most expensive. Along with the price, we also listed the benefits and drawbacks of each choice. We discussed which option might be best for Kawallu and highlighted this choice in yellow. Our decision was made from a combination of the cost and benefits that each option offered. For the swings, we suggested the cheapest option because it cost hundreds of dollars less

than the other two, and all of the swings provide the same stimulation. The guide concludes with a summary, an overview of the team, and thanking those who have helped us along the way.

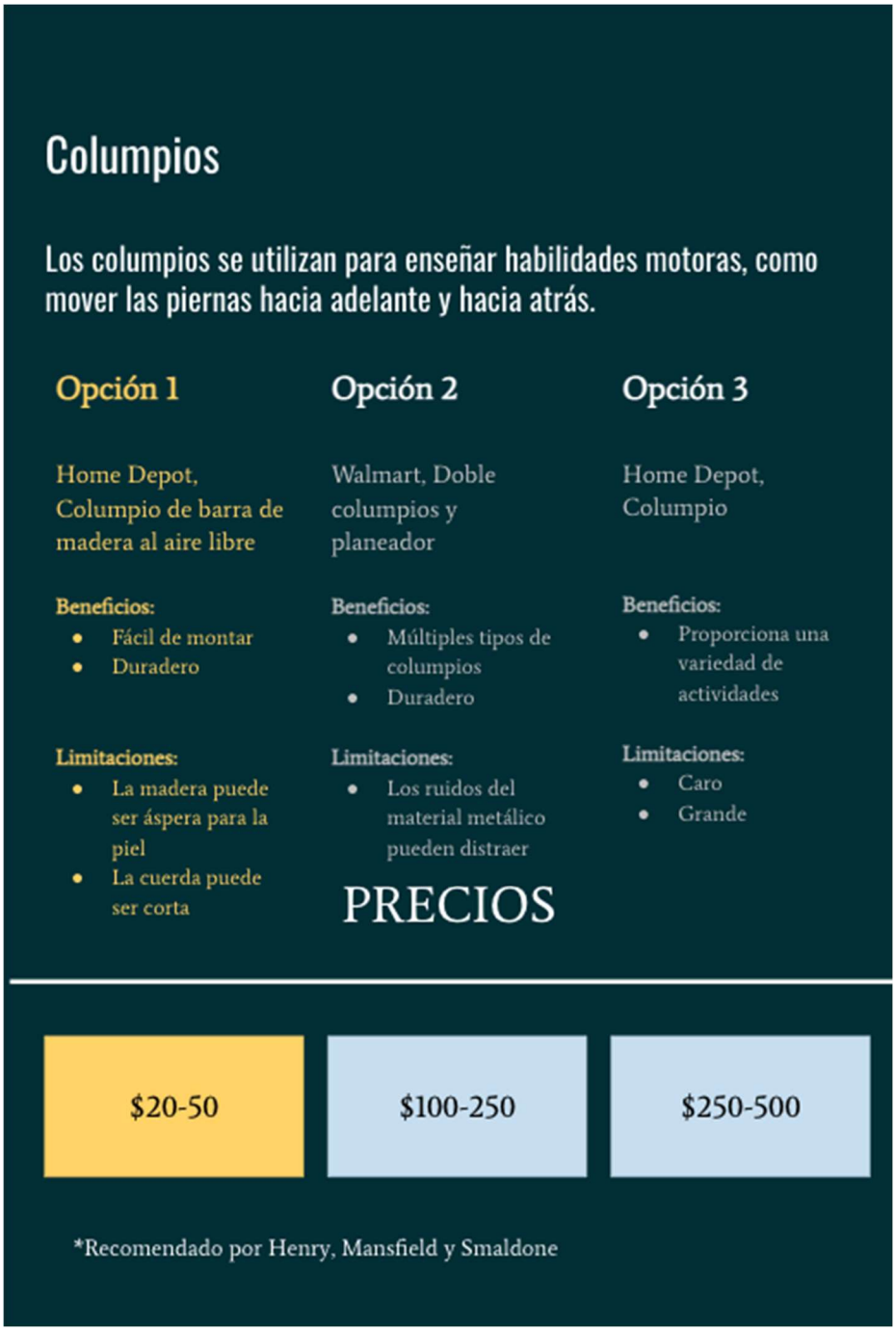

Figure 10: Example page from our deliverable

5 CONCLUSIONS AND FUTURE APPLICATIONS

The Kawallu Hippotherapy Center provides clients with a place to be independent, learn, and grow in a safe and welcoming environment. The services they provide help their clients advance their motor, speech, and social skills without added financial stress due to their generous pay-as-you-can plan. Since Kawallu was founded four years ago, the hippotherapy field has expanded to include more advanced methods. Sensory treatments have also advanced from using sensory input as relaxation into using MSEs to provide therapeutic treatment. Our goal for this project was to aid Kawallu in finding new or updated features for use in their current spaces. The following section summarizes our conclusions and recommendations we have for future project work.

The recommended features will be incorporated into the Kawallu Hippotherapy Center as our sponsor sees fit. We provided three suggestions for each feature and recommended one as our top choice for each. Once the features are implemented into Kawallu, they will serve to better treat clients with ASD. We provided a list of 20 total features, but it is likely that our sponsor will not implement them all into their center. For the MSE, Kawallu will likely bring in the aroma diffuser and the fiber optics, as these are two inexpensive choices that help to target a few important senses. For the hippotherapy arena, Kawallu will likely bring in the visual timer and the social stories, rather than choosing to update their mounting station. The development of the MSE will provide an improved treatment regimen to the clients as it is autism-specific and will have elements to meet their sensory needs. While Kawallu has made a huge impact on their community and has been successful, our recommendations will help improve upon the treatment provided and keep our sponsor informed on best practices in the hippotherapy field.

Unfortunately, we were not able to travel to Ecuador due to the COVID-19 pandemic. This presented many challenges that are not typical of an IQP, such as added difficulties in communication due to issues with technology. In terms of data gathering, it was difficult to schedule interviews with the clients as we had no direct line of communication with them. We had initially planned on speaking with 10-15 clients about their experience at the center and their opinions on our ideas. We were only able to speak with two clients who discussed how well Kawallu is doing and how thankful they are for their children's treatment. Though we faced a handful of limitations, our project was successful and we are proud of our work. We would love to see our project be taken a step further with future IQPs.

We hope that future IQPs can work with Kawallu to further aid in improving their center. The guide book we have provided would ideally be the first step in a series of improvements and additions to the center to truly highlight the amazing work they have been doing for the people of Cuenca. If more project teams are able to work with Kawallu, it would be beneficial for them to address conditions aside from ASD since hippotherapy has been found to be useful in patients with cerebral palsy, multiple sclerosis, and Down syndrome. Having features specific to treatment of each of these conditions would increase the effectiveness of hippotherapy. Treatment could also be improved by inviting PATH volunteers to Ecuador to work with Kawallu on their program and activities. While conversing with Burrows, she mentioned that she had previously been to Nicaragua with PATH to aid in advancing hippotherapy practices at a center there. She added that she would be thrilled to go to Ecuador and meet our sponsor. For a much larger and more ambitious undertaking, we would love to see a brand new, state-of-the-art hippotherapy facility built at Kawallu complete with modern equipment and features. To do this, there would need to be advertising and fundraising for Kawallu, followed by construction. All in all, we were so grateful to work with Kawallu and would love for future IQPs to have that same opportunity.

As a group we have grown immensely while working with Kawallu. Aside from the academic improvements in our research abilities and Spanish skills, we had the opportunity to speak with such intelligent and inspirational people. We all went from knowing next to nothing regarding hippotherapy as a treatment for ASD to making strong connections with hippotherapy professionals and recommending features for a hippotherapy center and MSE.

LIST OF INTERVIEWS

Table 3. Interviews with hippotherapy and MSE professionals

Interviewee	Date	Center Name	Location	Occupation
Michele Bruhn	March 3, 2021	Colorado Therapeutic Riding Center	Longmont, CO	Therapeutic Riding Center Director
Jane Burrows	February 19, 2021	Special Strides	Monroe, NJ	Occupational Therapist
Molly Downing	March 10, 2021	SEASPAR Special Parks and Recreation	Downers Grove, IL	Recreation Coordinator - Youth, Day Camp, and Multi-Sensory Rooms
Rebecca Henry	February 25, 2021	Carlisle Academy for Integrative Equine Therapy and Sports	Lyman, ME	Occupational Therapist
Kristen Malfara	March 2, 2021	The Morgan Project	Melbourne, FL	Multisensory Environment Center Director
Marny Mansfield	February 3, 2021	SUNY Cobleskill	Cobleskill, NY	Director of the Therapeutic Horsemanship Program
Becky Payne	February 20, 2021	Nature's Edge Therapy Center	Rice Lake, WI	Founder and Speech Language Pathologist
Janet Smaldone	February 25, 2021	Carlisle Academy for Integrative Equine Therapy and Sports	Lyman, ME	Physical Therapist
Kitty Stalsburg	February 4, 2021	High Hopes Therapeutic Riding Center	Old Lyme, CT	Executive Director
Elise Weiss	February 3, 2021	SUNY Cobleskill	Cobleskill, NY	Associate Professor of Early Childhood Development

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Appendix A

Interview Questions

Client Questions:

1. Could you give us an overview of a typical lesson? (i.e. length, activities, level of participation)
2. Have you seen improvement in your child's condition since starting at Kawallu?
    a. Why did you choose Kawallu?
    b. What is your child's favorite part of hippotherapy?
    c. If comfortable sharing, what is your child's diagnosis?
3. Is there anything new you would like to see incorporated at Kawallu?

Hippotherapy Expert Questions:

1. What are your interests and passions that led you to this career?
2. What features of your center help to make it successful? (e.g. stimuli, lights, materials, activities, etc.)
    a. What features have you seen used in the past that were not successful?
    b. What sensory features should be included in a treatment environment?
    c. What stimuli are most detrimental when treating children with autism?
    d. Do you have any improvements or things you would change about your center if you were able to?
3. Do you think treatment is best done in groups, individually, or both?
    a. What are the advantages and disadvantages of each?
4. What effect do animals have on children with ASD or other neurodivergence?

MSE Specialist Questions:

1. What are your interests and passions that led you to this career?
2. What are essential features included in your sensory room? (if not already on website)
    a. Are there any features that should be avoided?

    b. What elements in your sensory room are clients with autism most typically drawn towards?
3. What is the optimal amount of space for a sensory room?
    a. Should a sensory room be enclosed with a door?
    b. How much padding should be included within the space?
4. What are the stimulating and non stimulating items that you would suggest?
    a. What are simple stimulating activities that can help a patient focus within a sensory room?
    b. Are there typical soothing elements that have been proven to help simulate a serene environment?
5. How important is light regulation in a sensory room?
    a. For a room without walls, would (blackout) curtains be helpful?
    b. In our situation there is natural light coming from the outside. Do you see this being a problem?
6. What is the best timing for the use of a sensory room? (i.e. before or after other forms of therapy)

Appendix B

Informed Consent Agreement for Participation in a Research Study

Principal Investigators: Laureen Elgert and Fabienne Miller

Student Investigators: Braden Foley, Brittany Henriques, Sarah Jones, Brianna Mulloy

Contact Information: gr-c21hipoterapia@wpi.edu

Title of Research Study: Hippotherapy Center Design for Children with Autism at Kawallu Hippotherapy Center in Cuenca, Ecuador

Sponsor: Isabel Calle Solis, Coordinadora de Kawallu

Introduction: You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of study: The purpose of this study is to gain more information about methods that are currently used in hippotherapy treatments and ways they can be improved. We will be using your responses to formulate plans for a space for hippotherapy treatment for children. Our primary research goal is to improve this space so that kids and their families can more effectively use it and experience impactful progress.

Procedures to be followed: This interview will last 20-45 minutes and have about 5 questions, but are intended to be flexible in order to have conversation. The interview will proceed as follows:

1. You will be sent a link to join a video call at least 30 minutes prior to the meeting
2. The research team and yourself will join the call
3. You will once again be asked if you are comfortable interviewing with the team and having the audio recorded, and will be reminded that you can stop at any point during the meeting
4. The team will then go on to ask you 4-6 questions and give you as much time as you would like to answer each one
5. You will then be offered the chance to ask the research team any questions that you have, or give any more feedback that was not covered in the scripted questions

Risks to study participants: This study may create discomfort because it will discuss the current state of Kawallu Hippotherapy Center.

Benefits to research participants and others: Requests and concerns regarding the state of the Kawallu Hippotherapy Center will be addressed and taken into consideration for the new design of Kawallu Hippotherapy Center

Record keeping and confidentiality: No individual data will be reported as individual answers will be combined with those of all respondents for analysis and reporting. No contact information will be collected (we do not ask for names or addresses), voice recordings will be deleted within 48 hours, and no photos or videos will be taken. Responses will be stored on a secure Google Cloud drive that only the research team will have access to.

Compensation of treatment in the event of injury: There is no risk of injury - all interviews will be conducted via Zoom or WhatsApp. Participants will not be doing any physical activity.

Cost/Payment: There will be no payment offered to study participants.

For more information about this research or about the rights of research participants, contact: the study team Email: gr-c21hipoterapia@wpi.edu; IRB Manager, Ruth McKeogh, Tel. 508 831- 6699, Email: irb@wpi.edu, and the Human Protection Administrator (Gabriel Johnson, Tel. 508-831-4989, Email: gjohnson@wpi.edu

Your participation in this research is voluntary. Refusal to participate in this interview will not penalize you in any way or cause any loss of benefits. You may decide to stop participating at any time without penalty or loss of benefits.

By signing below, you acknowledge that you have been informed about and consent to be a participant in the study described above. Make sure that your questions are answered to your satisfaction before signing.

_____ Date: _____

Study Participant Signature

_____

Study Participant Name (Please print)

_____ Date: _____

Signature of Person who explained this study

Appendix C

WORCESTER POLYTECHNIC INSTITUTE

100 INSTITUTE ROAD, WORCESTER MA 01609 USA

Institutional Review Board
FWA #00015024 - HHS #00007374

Notification of IRB Approval

Date:	29-Jan-2021
PI:	Elgert, Laureen
Protocol Number:	IRB-21-0279
Protocol Title:	Hipoterapia
Approved Study Personnel:	Mulloy, Brianna~Jones, Sarah~Foley, Braden~Henriques, Brittany~Elgert, Laureen~Miller, Fabienne~
Effective Date:	29-Jan-2021
Exemption Category:	2
Sponsor*:	

The WPI Institutional Review Board (IRB) has reviewed the materials submitted with regard to the above-mentioned protocol.We have determined that this research is exempt from further IRB review under 45 CFR § 46.104 (d). For a detailed description of the categories of exempt research, please refer to the IRB website.

The study is approved indefinitely unless terminated sooner (in writing) by yourself or the WPI IRB. Amendments or changes to the research that might alter this specific approval must be submitted to the WPI IRB for review and may require a full IRB application in order for the research to continue. You are also required to report any adverse events with regard to your study subjects or their data.

Changes to the research which might affect its exempt status must be submitted to the WPI IRB for review and approval before such changes are put into practice. A full IRB application may be required in order for the research to continue.

Please contact the IRB at irb@wpi.edu if you have any questions.

Appendix D

Guía de Recomendaciones: Características, Materiales, y Precios

por Braden Foley, Brittany Henriques, Sarah Jones y Brianna Mulloy

de Worcester Polytechnic Institute

18 marzo 2021

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Prefacio

Nuestro equipo recopiló y analizó la siguiente información a lo largo de tres meses. Realizamos una investigación anterior durante un período de siete semanas y luego realizamos las entrevistas con profesionales de la hipoterapia y del entorno multisensorial. Utilizando nuestros hallazgos sobre las mejores características para incluir en un entorno multisensorial y un espacio de la hipoterapia, investigamos los mejores materiales que se utilizarán para esas características. Hemos proporcionado las tres opciones principales en las siguientes diapositivas. La opción resaltada es la que consideramos la mejor opción para Kawallu. Determinamos la mejor opción en función del precio, la calidad, y los beneficios que proveerían durante el tratamiento. Todos los artículos presentados se pueden enviar a Ecuador o se pueden construir en Kawallu.

Resumen

En esta guía, tenemos una lista de productos que pensamos que serían beneficios para Kawallu durante el tratamiento de un cliente con autismo. Recibimos nuestra información de una variedad de expertos de hipoterapia y entornos multisensoriales. Los expertos han visto debajo. Proveemos opciones para cada producto, con precios y recomendaciones del mejor. ¡Esperamos que esto ayude!

Entrevistado	Centro	Ubicación	Ocupación
Michele Bruhn	Colorado Therapeutic Riding Center	Longmont, CO	Therapeutic Riding Center Director
Jane Burrows	Special Strides	Monroe, NJ	Occupational Therapist
Molly Downing	SEASPAR Special Parks and Recreation	Downers Grove, IL	Recreation Coordinator - Youth, Day Camp, and Multi-Sensory Rooms
Rebecca Henry	Carlisle Academy for Integrative Equine Therapy and Sports	Lyman, ME	Occupational Therapist
Kristen Malfara	The Morgan Project	Melbourne, FL	Multisensory Environment Center Director
Marny Mansfield	SUNY Cobleskill	Cobleskill, NY	Director of the Therapeutic Horsemanship Program
Becky Payne	Nature's Edge Therapy Center	Rice Lake, WI	Founder and Speech Language Pathologist
Janet Smaldone	Carlisle Academy for Integrative Equine Therapy and Sports	Lyman, ME	Physical Therapist
Kitty Stalsburg	High Hopes Therapeutic Riding Center	Old Lyme, CT	Executive Director
Elise Weiss	SUNY Cobleskill	Cobleskill, NY	Associate Professor of Early Childhood Development

Difusor de aroma

Un difusor de aroma se utiliza para satisfacer el sentido del olor durante el terapia.

Opción 1 | Opción 2 | Opción 3

Tubo de burbuja

Los tubos de burbujas se pueden usar para ayudar a calmar a los clientes y proporcionar información sensorial.

Opción 1 | Opción 2 | Opción 3

WPI

La Meta

Nuestro meta fue sugerir nuevas características y actualizaciones que se puedan adaptar a los espacios de hipoterapia y entorno multisensorial existentes, específicamente utilizados para tratar a los niños con autismo en el Kawallu Centro de Hipoterapia en Cuenca, Ecuador.

kawallu
centro de hipoterapia

Metodol

Objetivo 1

Determinar las
características
incluir en un es
de hipoterapia
entorno
multisensorial

Seguridad

La seguridad del cliente y del caballo debe ser la máxima prioridad durante la hipoterapia.

Para los clientes, las puertas batientes deben usarse con precaución para evitar que los clientes se pellizquen los dedos. Además, dado que los clientes pueden tener las sensibilidades auditivas, la eliminación de los ecos y los ruidos de fondo debería ser una prioridad, porque pueden distraer el tratamiento.

Para la seguridad de los caballos, cualquier esquina afilada dentro de la arena debe bloquearse con piezas de madera para que el caballo no quede atrapado en la esquina. Una otra cosa importante es que los caballos estén completamente insensibles a los materiales que se usan en terapia antes de usarlos con los clientes. Los caballos, por muy entrenados que estén, pueden asustarse con ciertos sonidos y sombras, por lo que todo debe introducirse con precaución.

Estructura de hipoterapia

La hipoterapia en combinación con el entorno multisensorial debería estimular todos los sentidos.

Una de las partes más importantes de la hipoterapia es el vínculo del cliente con el caballo. A través de múltiples interacciones, el cliente puede crear confianza que le permite estar abierto con el caballo, a menudo comunicándose con él y expresando emociones.

Si bien la terapia ocupacional, física y del habla debe incorporarse a la hipoterapia a través de actividades, la herramienta más importante sigue siendo el caballo. El caballo estimula los sentidos vestibular y propioceptivo mientras activa los músculos. Debido a la singularidad de cada cliente, las actividades de hipoterapia deben ser ampliamente personalizables.

Big Ass Fans©

Los ventiladores son importantes para controlar la temperatura y proporcionar una entrada sensorial.

Opción 1	Opción 2	Opción 3
Montaje en pared, 20 pulgadas	Portátil, 12 pies de alto x 18 pulgadas de diámetro	Ventilador de barril portátil de 48 pulg
Beneficios: • Fuera del camino • Menos caro	**Beneficios:** • Portátil • El viento puede llegar a los clientes a caballo	**Beneficios:** • Portátil
Limitaciones: • Pesado • Difícil de instalar	**Limitaciones:** • Caro • Pesado	**Limitaciones:** • Caro • Pesado

PRECIOS

$500-1.000	$1.000-1.500	>$2.000

*Recomendado por Burrows y Stalsburg

Bloque de montaje

Un bloque de montaje se utiliza para los andadores laterales cuando el cliente monta el caballo.

Opción 1	Opción 2	Opción 3
Amazon, 2-paso	Equestrian Collection, 2-paso	Amazon, 3-paso
Beneficios: • Menos caro	**Beneficios:** • Colores • Duradero	**Beneficios:** • Colores • Duradero
Limitaciones: • Pequeño • Negro	**Limitaciones:** • Caro	**Limitaciones:** • Caro

PRECIOS

$20-50	$50-100	$100-250

*Recomendado por Burrows, Henry, Mansfield, Payne, Smaldone y Stalsburg

Conos

Los conos se utilizan para crear obstáculos durante una sesión de hipoterapia.

Opción 1	Opción 2	Opción 3
Amazon 7"	Amazon 12"	Tool Lots 28"
Beneficios: • Menos caro	**Beneficios:** • Colores brillantes • Menos caro	**Beneficios:** • Alto • Reflectante
Limitaciones: • Entrada de transporte • Un color	**Limitaciones:** • Entrada de transporte	**Limitaciones:** • Entrada de transporte • Caro • Un color

PRECIOS

<$10	<$10	$10-20

*Recomendado por Burrows, Henry y Smaldone

Historias sociales

Las historias sociales se utilizan para mostrar la secuencia de actividades durante una sesión así que no hay sorpresas para el cliente.

Papel	Tinta	Plastificado
Son de la zona	Son de la zona	Son de la zona
Propósito: • Para imprimir los imágenes sobre	**Propósito:** • Para imprimir los colores en los imágenes • Para el sentido de la vista con colores brillantes	**Propósito:** • Para proteger los papeles del entorno • Para las historias sociales duraderas

PRECIOS

$10-20	$50-100	<$10

*Recomendado por Henry, Mansfield, Payne, Smaldone y Stalsburg

Pelota de semillas

La pelota de semillas es ideal para actividades mientras están montadas, ya que son económicas y se pueden lavar fácilmente.

Opción 1	Opción 2	Opción 3
Target, 6 bolsas	Amazon, 12 bolsos	Amazon, anillos, conos y bolsas de frijoles
Beneficios: • Colores	**Beneficios:** • Colores • Muchas bolsas	**Beneficios:** • Usos múltiples • Colores
Limitaciones: • Solamente 6	**Limitaciones:** • Bolsas pequeñas	**Limitaciones:** • No muy duradero

PRECIOS

$10-20	$10-20	$20-50

*Recomendado por Henry, Malfara, Payne y Smaldone

Temporizador visual

Los temporizadores visuales se pueden utilizar como un recordatorio suave del progreso de la sesión de un cliente.

Opción 1	Opción 2	Opción 3
Fun and Function, Temporizador de Tiempo, 12 pulgadas	Amazon, Reloj de pared LED 3D, 15 pulgadas	Big Time Clocks, El gigante reloj LED azul de 8 números
Beneficios: • Herramienta de aprendizaje para el tiempo • Llamar la atención	**Beneficios:** • Visible en la oscuridad • Talla grande	**Beneficios:** • Talla grande • Control remoto
Limitaciones: • Podría ser difícil de leer • No muy grande	**Limitaciones:** • Puede ser difícil de ver a la luz	**Limitaciones:** • Necesita estar cerca de un enchufe
PRECIOS		
$20-50	$20-50	$100-250

*Recomendado por Mansfield

Tubos de plástico

Los tubos de plástico se utilizarán en diferentes actividades, como hacer diferentes sonidos y colgar aros en árboles hechos con el tubo.

Opción 1	Opción 2	Opción 3
Home Depot	Wal-Mart	Amazon
Tamaños de tubería: 1. 1-¼ in. x 24 in. 2. 1-½ in. x 24 in. 3. 2 in. x 24 in. 4. 3 in. x 24 in. 5. 4 in. x 24 in.	**Tamaños de tubería:** 1. 1-¼ in. x 24 in. 2. 1-½ in. x 24 in. 3. 2 in. x 24 in. 4. 3 in. x 24 in. 5. 4 in. x 24 in.	**Tamaños de tubería:** 1. 1-¼ in. x 24 in. 2. 1-½ in. x 24 in. 3. 2 in. x 24 in. 4. 3 in. x 24 in. 5. 4 in. x 24 in.

A continuación se muestran los precios estimados

PRECIOS

$50-100	$100-250	$100-250

*Recomendado por Mansfield

Entorno multisensorial

Estructura del entorno multisensorial

Los entornos multisensoriales deben usarse antes y después de la hipoterapia. Antes de la hipoterapia, se puede utilizar para calmar al cliente y ponerlo en el estado adecuado para la terapia. Después de la hipoterapia, la sala debe utilizarse para realizar actividades que enriquezcan el tratamiento.

Los entornos multisensoriales deben ser un espacio oscuro o débil. Para lograr esto debe haber cortinas opacas. Dentro del espacio debe haber una variedad de actividades que los clientes puedan elegir por sí mismos y manipular para hacerlas como deseen.

Los materiales dentro de este espacio deben funcionar para satisfacer múltiples sentidos y tener opciones para que el cliente elija. Por ejemplo, los colores de las ópticas fibras deberían cambiarse fácilmente.

Para mantener el espacio organizado y los materiales limpios, debe haber contenedores de almacenamiento dentro de la habitación.

Clicker inquieto

El clicker inquieto ayudará a estimular al cliente y mejorará sus habilidades motoras.

Opción 1	Opción 2	Opción 3
Amazon, Cubo inquieto	Amazon, Dodecágono inquieto	Amazon, Almohadilla de inquietud
Beneficios: • Menos caro • Estimulante • Fácil de usar	**Beneficios:** • Vistoso • 12 funciones	**Beneficios:** • Firme • Duradero
Limitaciones: • Endeble	**Limitaciones:** • Todo plástico • Frágil	**Limitaciones:** • Más caro • Ruidoso

PRECIOS

<$10	$10-20	$10-20

*Recomendado por Malfara

Cobija con peso

Una cobija con peso se utiliza para consolar un niño cuando está sobreestimulando durante el terapia.

Opción 1	Opción 2	Opción 3
Luna 36" x 48", 5lbs	Amazon 36" x 48", 5lbs	Fun and Function 35" x 59", 5lbs
Beneficios: • Creado por niño • Colores brillantes • Hipoalergénico • Lavable	**Beneficios:** • Creado por niño • Lavable • Hipoalergénico	**Beneficios:** • Creado por niño • Colores divertidos • Lavable
Limitaciones: • Entrada de transporte	**Limitaciones:** • Entrada de transporte	**Limitaciones:** • Caro

PRECIOS

$50-100	$50-100	$100-250

*Recomendado por Downing y Malfara

Colchón de agua

Un colchón de agua se utiliza para movimientos pequeños durante un tiempo de relajación.

Opción 1	Opción 2	Opción 3
Waterbed Outlet 48" x 84"	Amazon 76" x 80"	My Waterbed Shop 60" x 80"
Beneficios: • Menos caro	**Beneficios:** • Grande • Almohada de bambú	**Beneficios:** • Grande • Forro de seguridad
Limitaciones: • Entrada de transporte • Delgado	**Limitaciones:** • Caro • Entrada de transporte	**Limitaciones:** • Caro • Entrada de transporte

PRECIOS

$50-100	$1.000-1.500	$1.000-1.500

*Recomendado por Malfara

Columpios

Los columpios se utilizan para enseñar habilidades motoras, como mover las piernas hacia adelante y hacia atrás.

Opción 1	Opción 2	Opción 3
Home Depot, Columpio de barra de madera al aire libre	Walmart, Doble columpios y planeador	Home Depot, Columpio
Beneficios: • Fácil de montar • Duradero	**Beneficios:** • Múltiples tipos de columpios • Duradero	**Beneficios:** • Proporciona una variedad de actividades
Limitaciones: • La madera puede ser áspera para la piel • La cuerda puede ser corta	**Limitaciones:** • Los ruidos del material metálico pueden distraer	**Limitaciones:** • Caro • Grande

PRECIOS

$20-50	$100-250	$250-500

*Recomendado por Henry, Mansfield y Smaldone

Difusor de aroma

Un difusor de aroma se utiliza para satisfacer el sentido del olor durante el terapia.

Opción 1	Opción 2	Opción 3
Amazon	Amazon	Vitruvi
Beneficios: • Muy portable • Menos caro	**Beneficios:** • Forma interesante • Muchas aceites incluyendo	**Beneficios:** • Grande • Capacidad para disperso alto
Limitaciones: • Entrada de transporte	**Limitaciones:** • Entrada de transporte	**Limitaciones:** • Entrada de transporte • Caro

PRECIOS

$20-50	$20-50	$100-250

*Recomendado por Downing y Malfara

Esteras

Las colchonetas son importantes para un entorno multisensorial para mantener a los clientes seguros y para que se sienten.

Opción 1	Opción 2	Opción 3
Amazon 6ft x 6ft x 0.4in	We Sell Mats 4ft x 8ft x 1.5in	Rubber Flooring 4ft x 8ft x 2in
Beneficios: • Menos caro • Piezas de rompecabezas	**Beneficios:** • Grueso • Colores brillantes	**Beneficios:** • Grueso • Colores brillantes
Limitaciones: • Delgado	**Limitaciones:** • Caro	**Limitaciones:** • Caro

PRECIOS

$20-50	$100-250	$100-250

*Recomendado por Downing, Henry, Malfara, Payne y Smaldone

Escondite pequeño

El escondite pequeño es un pequeño espacio acolchado contenido con luces y espejos destinados a calmar o dejar que los clientes sobreestimulados estén solos.

Opción 1	Opción 2	Opción 3
Carpa plegable	Tienda emergente	Tienda tipi
Beneficios: • Menos caro • Fácil de configurar	**Beneficios:** • Gran espacio • Colores brillantes	**Beneficios:** • Paredes más gruesas • Con esteras y luces
Limitaciones: • Espacio pequeño	**Limitaciones:** • Paredes delgadas	**Limitaciones:** • Más caro

PRECIOS

$20-50	$20-50	$50-100

*Recomendado por Downing

Fibra óptica

La fibra óptica ayuda a calmar a los clientes a través de los sentidos visuales y táctiles.

Opción 1	Opción 2	Opción 3
Especial Needs, lámpara de fibra óptica	Amazon, 160 hebras	Fun and Function, cascada óptica
Beneficios: • Menos caro (podría comprar múltiples)	**Beneficios:** • Talla mediana • Efecto centelleante	**Beneficios:** • Muy grande • Como una cortina • Hecho para terapia
Limitaciones: • Muy pequeño (13 " de alto; base de 3,25" de diámetro.)	**Limitaciones:** • Un poco caro	**Limitaciones:** • Muy caro

PRECIOS

$20-50	$250-500	>$2.000

*Recomendado por Malfara

Puff fiaca

Una puff fiaca proporciona un lugar suave para que los clientes se sienten usando el sentido visual y táctil.

Opción 1	Opción 2	Opción 3
Walmart, 70 por 80 centímetros	Autism Products, 30 pulgadas	Fun and Function, 3 pies por 4 pies
Beneficios: • Una persona • Colores brillantes	**Beneficios:** • Una persona • Colores brillantes	**Beneficios:** • Grande, para dos o tres personas
Limitaciones: • No duradero	**Limitaciones:** • Caro	**Limitaciones:** • Caro

PRECIOS

$20-50	$100-250	$100-250

*Recomendado por Henry, Malfara, Payne y Smaldone

Trampolín en miniatura

Un trampolín en miniatura se utiliza para movimiento y un lugar para un alivio de energía para los clientes sobreestimulados.

Opción 1	Opción 2	Opción 3
Amazon 40"	Fun and Function 36"	Amazon 40"
Beneficios: • Mango blando • Duradero	**Beneficios:** • Creado por aporte sensorial • Mango colorido	**Beneficios:** • Altura ajustable • Límite de peso grande • Facil para agarrar
Limitaciones: • Entrada de transporte • Creado por adultos	**Limitaciones:** • Zona para saltar es pequeña	**Limitaciones:** • Entrada de transporte

PRECIOS

$50-100	$100-250	$100-250

*Recomendado por Malfara

Tubo de burbuja

Los tubos de burbuja se pueden usar para ayudar a calmar a los clientes y proporcionar información sensorial.

Opción 1	Opción 2	Opción 3
Amazon, Tubo de burbuja LED sensorial Playlearn	Fun and Function, Mesa de burbujas	Fun and Function, Calmante tubo de burbujas LED
Beneficios: • Fácil de configurar • Menos caro	**Beneficios:** • Interactivo • Proporciona información auditiva	**Beneficios:** • Sin cambio de bombilla • Proporciona estimulaciones visuales
Limitaciones: • Fuerte	**Limitaciones:** • Debería limpiarse con regularidad	**Limitaciones:** • Necesita otro equipo para la construcción que se vende por separado

PRECIOS

$100-250	$1.000-1.500	$1.500-2.000

*Recomendado por Downing y Malfara

Conclusiones

El Kawallu Centro de Hipoterapia es el encargado de decidir cuál de los materiales incorporar a su centro. Aconsejamos que elijan los materiales que consideran más beneficiosos para sus clientes y su centro.

Los tratamientos de la hipoterapia y los entornos multisensoriales continúan evolucionar a medida que las industrias crecen y se realizan investigaciones adicionales. Los materiales que elija Kawallu deben reevaluar a medida que pasa el tiempo y actualizarse según sea necesario.

Agradecemos al Kawallu Centro de Hipoterapia y al Worcester Polytechnic Institute por la oportunidad de realizar este proyecto.

El Equipo

Braden Foley,

ME & Theatre

Braden es un apasionado del diseño de ingeniería y el teatro y espera buscar una combinación de ambos en su futuro.

Brittany Henriques,

User Experience

Brittany quiere viajar por el mundo como desarrolladora de diseño y experiencia de usuario independiente.

Sarah Jones,

BBT

Sarah planea hacer investigación y diseño en la industria farmacéutica después de graduarse.

Brianna Mulloy,

BME

Brianna quería viajar el mundo después de graduarse, incluyendo américa del sur y especialmente Ecuador.

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