Therapeutic Play

Design for Children in Residential and Group Care

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Thesis Proposal: MFA Industrial Design

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Project Brief

When I started this thesis project 15 weeks ago I was interested in cognitive behavioral therapy, a type of talk therapy, and I wanted to teach its principles to kids through toys and games.

However, what I have found through this research process is that the children most in need of help have no need for traditional talk therapy - they need play therapy - and safe, multi-sensory therapeutic environments like those at Lincoln Child Center, Edgewood Center for Children and Families, the Family Justice Center, and Total Occupational Therapy.

These residential and group care facilities serve children with severe behavioral and emotional problems due to neglect, trauma, and abuse. Therapeutic treatment for these children, aged 5 to 16 is complex, and includes play therapy, occupational therapy, medical and psychiatric care, as well as social skills and academic classes.

I will be examining industrial design opportunities in three areas of therapeutic care:

1) Play Therapy
2) Crisis & De-escalation
3) Innovations in Treatment: Sensory Integration & the Neurosequential Model of Therapeutics

The Last Stop

Each year over 200,000 children are placed in residential and group care facilities in the United States. Many of these children were born addicted to drugs. They have experienced instability, trauma, abuse, and neglect. They are angry, depressed, violent, and vulnerable.

Many kids have bounced from classroom to classroom, to special education, to alternative schools, and so on, until they end up at what is essentially a last resort before juvenile hall, prison, or hospitalization. Lincoln Child Center, Edgewood Center for Children and Families, and 10,000 other therapeutic treatment centers in the United States like them, are these kids *last hope*.

Residential and group therapeutic treatment is complicated. Various approaches, including play therapy, are used to treat children with serious emotional and behavioral problems. Non-profit, community-based facilities typically have children and youths referred through their public school districts, juvenile justice, or child welfare systems. Private facilities typically market directly to parents of children with behavioral problems.

Residential and Day Treatment Centers Cost the U.S. **$5.3 billion dollars** each year - approximately **$25,000 per student**

In this presentation I will take a look at three areas:

1. Play Therapy

The most widely used, effective, and developmentally appropriate therapy for children. Used at Lincoln Child Center and Edgewood residential and therapeutic schools as well as at community-based care, and private occupational therapy centers.

2. Crisis & De-escalation at Lincoln Child Center

What happens when children “blow out” and how caregivers are changing the way they react to these blow outs with astounding results.

3. Innovations in Treatment at Edgewood Center for Children & Families

How researchers, therapists, and clinical directors are looking to the Neurosequential Model of Therapeutics for innovations in treatment.

Stakeholders

PRIMARY USERS
Children (age 5 - 16)
Play, Marriage & Family Therapists
Occupational Therapists
Special Education Teachers
Residential Treatment Center Teachers
Big Brothers/Mentors

SECONDARY USERS
Janitorial Staff
General Contractors (Installation)

CUSTOMERS
Residential/Group Treatment Centers
Clinical Directors
School District Administrators
Play Therapists
Special Education Teachers
Marriage and Family Counselors
School Counselors
Children's Hospital Administrators

ADDITIONAL STAKEHOLDERS
Parents & Grandparents
Foster Parents
Donors from the Community

Industry Experts: My Contacts

LINCOLN CHILD CENTER
Kari Fantacone, Play Therapist, Lincoln Child Center
Valarie Campbell, Intake Coordinator, Child Center
Sonja Baumer, Play Therapist, Lincoln Child Center
Kristin Wong, Behaviorist, Lincoln Child Center

JEWISH FAMILY AND CHILDREN'S SERVICES
Celina H. Ramirez, LCSW

TOTAL OCCUPATIONAL THERAPY
Jazmin Elek, Occupational Therapist OTR/L
Total Occupational Therapy Services
Francisco Rocco, PhD, Department of Pediatrics
UCSF/San Francisco General Hospital

EDGEWOOD CENTER FOR CHILDREN & FAMILIES
Robin Acker, Clinical Director
Jessica Anderson, Play Therapist

EDUCATORS
Heather Carbajal, Marriage and Family Therapist
Jacob Labay, School Counselor, M.Ed Candidate
Heidi Kreklau, Special Education Teacher

BIG BROTHER/MENTOR
Michael Remondino

UC BERKELEY
Jane Hu, Psychology Doctoral Student & Researcher
Brian Waismeyer, Psychology Doctoral Student & Researcher
Christy Collins, Infant Massage Specialist
Cate Lewis, MSW/MPH Candidate

Play Therapy

Kari Fantacone, play therapist at Lincoln said play therapy is “purposeful play” that is guided by “a treatment plan, intuition, and insight.”

Heather Carbajal, a private practice marriage and family therapist I spoke to explained, “Therapy is a scary place. There is a lot of anxiety. Play therapy is soothing, relieving anxiety. Play therapy offers something they are familiar with and helps them forget where they are.”

Play therapy can be both an educational and preventative tool. Kids can act out their problems with figurines, reveal their anxieties, or learn how to react in social situations. When speaking of the play therapists role, Heather explained that the child directs the play. “I try to respond to them and be supportive. I follow them and pay close attention.” Not all play is a literal acting out of the child’s problems, instead, “They can build trust with me and see that I am sensitive and respond to their emotions.”

EVIDENCE-BASED THERAPY

Play therapy is a well recognized and research-supported form of child psychotherapy.

According to research done by Renuka Dutta, Ph.D and Manju Mehta, Ph.D., “This therapeutic approach assumes that individuals have the ability to solve their own problems satisfactorily, and that their growth impulse makes mature behavior more satisfying than immature behavior. The use of empathy, understanding, acceptance, warmth, congruity and behavior limits provide an environment in which the child is given an opportunity to move toward adaptive behavior. A meta-analytic study of 94 research studies showed that play therapy was effective in many conditions and subgroups, despite the utilization of different theoretical orientations.” [Dutta, 2006]

DEFINITIONS

Play Therapy: a developmentally sensitive therapeutic modality in which a trained play therapist uses the therapeutic powers of play to help clients prevent or resolve psychosocial difficulties and achieve optimal growth and development

(Association for Play Therapy, 2003)

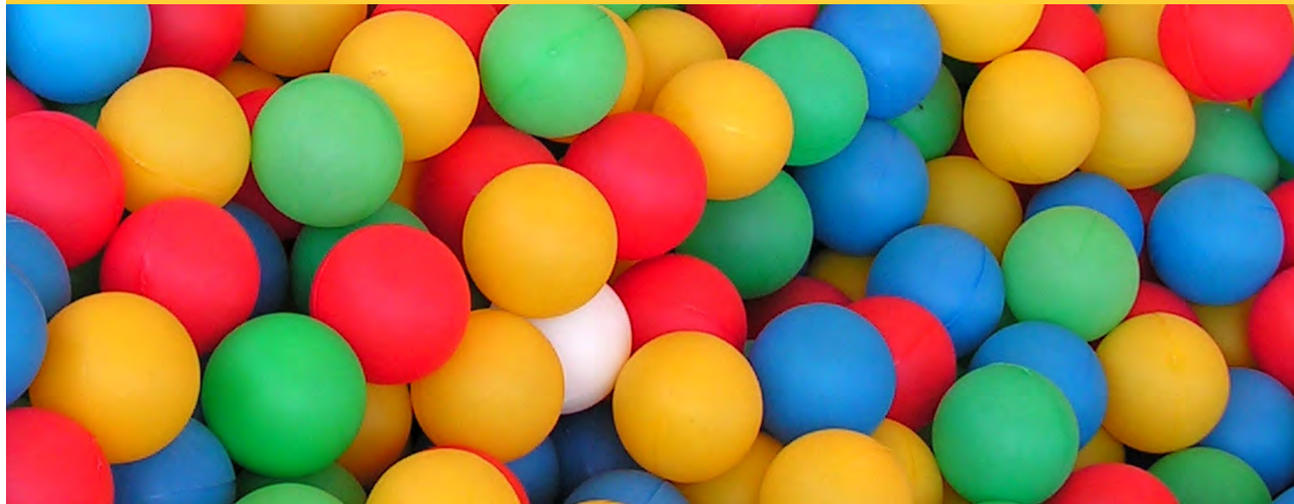
Filial Therapy: a therapeutic intervention that can help children by teaching parents, and other paraprofessionals such as teachers, basic child-centered play therapy principles and methods to use with their children.

(Guerney, B., Guerney, L., & Adronico, 1966; Landreth, 1991/2002; Landreth & Bratton, 2006).

Play Therapy is...

“Purposeful Play”

Kari Fantacone, PhD
Play Therapist,
Lincoln Child Center



Lincoln Child Center

Oakland, California

Ultimately, group care facilities like Lincoln are trying to teach kids emotional regulation and social skills in order to reintegrate them back into their school district and classroom. To do this, students typically start at their day school, which has approximately 60 students.

Students take classes in a highly structured environment with a low student to teacher ratio. They have play therapy two or more times a week in addition to group therapy.

Some students (approximately 15 to 20 at any given time) then “step up” into the residential program, staying at the center full time. Then, as they transition back to their homes they “step down” into the day program again. From there, they head back to their special education program at their school district.

Industry Experts: My Contacts
Kari Fantacone, Play Therapist
Valarie Campbell, Intake Coordinator
Sonja Baumer, Play Therapist
Kristin Wong, Behaviorist

Statistics

- 60 day students
- 16 residential students
- 80% male
- Ages 5 to 14
- 100% students with disabilities
- Students from all over the Bay Area
- Typical stay 1 to 3 years

Hypothesis/Direction One: **Play Therapy**
If a designed environment and accompanying toys offers children a tactile, ordered, and safe place for play therapy then kids will have a better opportunity for healing.

Needs

LONG-TERM THINKING & PLANNING

Children who have been through trauma, abuse, and neglect have very little, if any, control over their lives, let alone their environment. In fact, when I spoke to Kari Fantacone, play therapist at Lincoln Center, she said one of the biggest developmental deficiencies these kids have is that they have no ability to think long-term because, for them, there is no long term. They don't know who they will be living with, what they will be eating, or where they will be going to school.

One of the first things Lincoln does for these kids is provide them with structure and organization. Kids come to Lincoln for a minimum of one year but much more typically two or three years.

SAFETY

According to Kari, this lack of long-term thinking manifests itself in the way these kids play. They don't think of consequences, so they take risks other children would not take. Therefore their toys and furniture need to be very safe.

According to Kristin Wong, behaviorist "Make nothing that can be used as a weapon." She explained that anything small, light, and throw-able can be used as a weapon. "We thought stress balls would be a good idea for the kids... we were wrong - they threw them at the teachers."

Finally, rugs, curtains, beanbag chairs, and similar items must be made with fire resistant materials to meet code.

Lincoln's Play Therapy Room

SAND TRAY THERAPY

Children's need to have control over their lives has led to role play with figurines during play therapy. Sand tray therapy - where a table-top sized sand tray, typically made of wood and with a blue painted bottom is used for play - grew out of this. Play therapists are split into two camps:

They love sand trays: Celina loves to use her sand tray with children aged 3 and up. Her tray is raised off the ground 24 inches so younger children and toddlers can't use it. She covers it with a sheet of foam she bought at the art supply store when it is not in use. When the sand falls on the floor it is swept up with mini dust cleaner. Celina would LOVE to have a table with a lid that slides on securely at the top. She would also like storage for her figurines underneath.

Heather uses sand tray therapy in her private marriage and family therapy practice. She thinks it is tactile and natural. She has not had problems with its mess.

Jazmin's sand table is filled with pinto beans and lentils; she changes the contents - using rice and other beans - to explore different textures. During her play group two or three children would play together, scooping up the beans to make homemade stress balls. Lots of beans ended up on the floor and were swept up after each session. Three kids in Jazmin's play group said that the sand tray table was their favorite thing in the entire playroom.

They hate sand trays: Kari and Sonia both feel that sand trays are too messy and do not use them. They said kids can throw sand in someone's eye, eat it, or spread germs. They would consider the trays if they were improved with alternative materials, like lentils or cornstarch, but would have to try them out first.

Jewish Family and Children's Services

East Bay, Founded in 1877

This non-profit organization in the East Bay helps children and families of all beliefs in Alameda and Contra Costa counties with mental health and social services, as well as services for seniors and refugee families.

COMMUNITY PLAY GROUPS

JFCS also works with local government agencies to help families of domestic violence and abuse. I visited two locations for JFCS. The first was a play group for parents and infants. The group, facilitated by Celina Ramirez, LCSW, uses a relationship-based approach to guide the caregivers in strengthening the emotional bond and nurture a secure attachment with their infant. The importance of routines, early stimulation and positively responding to baby's verbal and non-verbal cues are themes incorporated each week.

SAFE PASSAGES EARLY CHILDHOOD INITIATIVE

Identifies children ages 0-5 exposed to violence in Alameda County and offers services across multiple agencies:

- child welfare services
- non-profit agencies
- schools
- police
- district attorneys

All of these services are offered at one location - this increases the chances that victims of domestic or dating violence get the services and protection they need. Programs also train police officers how to interact with children at the scenes of violent crimes.

Industry Experts: My Contacts

Celina H. Ramirez, LCSW
Early Childhood Mental Health Specialist

Design Opportunities: Play Therapy

ACCOMMODATE OVER & UNDER STIMULATED KIDS

A room with a variety of areas - some areas meant to soothe, others to stimulate - would serve the needs of children who are both over and under stimulated.

At Lincoln, if a play therapist feels that a child needs less stimulation, because he or she has, for example ADHD, the child is given two or three toys and taken into a somewhat bare room (see right). On the other hand, children who are neglected may need a more stimulating environment to develop their senses. Staff at Lincoln along with Celina Ramirez of JFCS want to be able to accommodate both over and under stimulated kids in the same room. It would save them space, and make it easier for therapists to accommodate a child's changing needs.

LEARNING TO NURTURE

Lincoln therapists - Sonia Baumer and Kari Fantacone - expressed the desire for the kids to have a transitional object - a small toy - that they could nurture. They said several students have had snakes and small animals in the past. The transitional object could be a symbol of the child's achievements in therapy. They requested a soft, cuddly toy that provides comfort and gives the child support in uncertainty. They said the toy need not be gender specific, and that their boys frequently had a soft animal in addition to their pro wrestling figures. They also remembered the Tamogotchi digital pets and felt that they weren't hardy enough for the boys.

REDESIGN OF SAND TRAYS

According to Cate Lewis, sand trays are frequently used because of their tactile function. Kids can interact with sand differently than they can with standard toys - sometimes they bury a toy that represents someone whom they have conflict with in the sand, or they build walls around themselves and set up different characters outside. She thought giving kids different opportunities to communicate was very important because different mediums have different limitations. Sand can communicate something different than clay and they both are different than cardboard, for example. Therefore providing kids with multiple mediums for expression is an important goal.

Unfortunately, sand boxes have inherent flaws - sand can get eaten, kicked, or thrown about. A redesign, incorporating different mediums would be interesting.

NATURAL MATERIALS

The therapists also would like to include more natural materials in the play therapy room. While they were not certain whether children would choose natural toys over more traditional plastic action figures, they both thought their presence in the room as a potential choice would be important. Their desire for natural materials is supported by research: children in day care settings with greater access to nature are less impulsive and concentrate better (Wells, 2000).

User Scenario

LEARNING TO PLAY

Jack was a boy who was one of the worst cases of neglect the Lincoln Center had seen. On his first day of play therapy, he walked into a room full of toys and sat on the floor, confused and unsure. Jack did not know how to play. He had never pushed a toy car or played with dolls. His speech was delayed, and he could not express his frustration and fear.

Patiently, the therapist first tried coaxing him to push a car over the ground. He watched for a while and then started to copy her. Later she taught him about animals. First she explained what each of the figurines were - a horse, a pig, and a dog. As he learned to play, he came out of his shell.

Today, a new transitional object - a toy or “pet” to nurture - has helped him make the transition from residential treatment to day school. He faithfully tends his toy each morning before school He has learned to care for the toy. He has learned a routine with it - “feeding” it in the mornings, at recess at school, and at night.

Jack plays with the other boys in his level. They are drawn to WWE Wrestlers. Big and strong, the wrestlers are idealized men that they want to be. Jack teaches his therapist each of the characters. Gaining confidence with his knowledge, his speech has improved along with his behavior.

While he has a long way to go, he has taken important developmental steps and has found confidence in play.

JFCS Play Therapy at the Family Justice Center

Oakland, California

- Open since 2005
- The Family Justice Center serves over 10,000 people a year
- The building was converted from a medical center. The play therapy room used to be a doctor's exam room.
- Children may stay in play therapy up to age 7. Sometimes older siblings can be accommodated as well.
- Wide variety of toys - some donated, some purchased
- Furniture donated by Celina
- Couch & bean bag were purchased

SENSES INTEGRATED

- Touch
  - Sand tray
  - Plush toys
  - Wooden doll house
- Hearing
  - Musical instruments
- Smell
  - Playdough
- Sight
  - Brightly colored toys
  - Pictures on wall

SENSES MISSING:

- Vestibular
- Proprioceptive
- Taste
- Integrated sensory experiences

REQUESTS

Celina (pictured above) would love to have:

- A canopy area where the kids could hide out, but still be seen
- An updated sand tray table with a lid that was secure
- Sound - she would like to incorporate music that has 80 beats per minute, the same as a mother's heartbeat

RECOMMENDED MATERIALS FOR PLAY THERAPY ROOM

Dolls, bottles, doll house, multi-cultural people
Aggressive and domestic miniature animals; puppets
Clay, arts/crafts materials
Cars, trucks, emergency vehicles, planes
Wooden blocks
Therapeutic board games
Sand tray or bucket with sand

Seclusion

It is important to remember that facilities like Lincoln and Edgewood are for children and youths who are not in juvenile hall. The centers are therapeutic - not places for punishment. Yet just six months ago when a child's emotional problems escalated, staff had no options but to use mechanical restraints or a "quiet" seclusion room (a padded room) as a way to contain and stabilize a child in crisis.

At Lincoln, incidents when children were not restrained became chaotic and dangerous. Kids would climb up the basketball hoop, sit on the roof, run into nearby freeway, or attack other students and staff.

Having to restrain and seclude took its toll on the children and staff - building anger and hostility. After coming out of the quiet rooms children would frequently attack staff members.

They needed to find another way.

"QUIET" ROOMS

- Goal is to contain & stabilize a child in crisis
- Adds more chaos and trauma to vulnerable children
- Results in harm to self, other kids, and staff
- Without seclusion kids would run into the street, attack staff

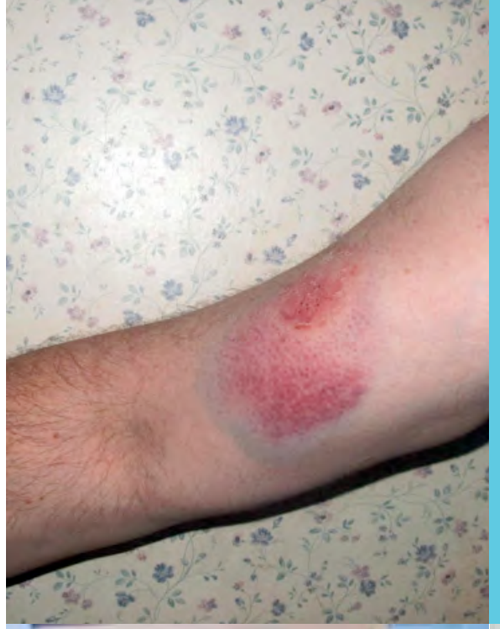
Physical & Mechanical Restraints

The use of mechanical restraints is prevalent in mental health care today. But restraints often add more chaos and trauma to a child's already overstimulated system, and are associated with harm to the child, other children and staff, high costs, reduced care, and a mistrust between children, their families, and staff. (Champagne, 2003)

Furthermore, a 2008 Government Accountability Office report found restraint and seclusion are sometimes misused as punishment resulting in further trauma to already vulnerable children. (GAO, 2003)

According to the Child Welfare League of America, “There is no reliable national data and very little state data on how many child deaths and injuries involve behavior management restraints. It is estimated that 8 to 10 child deaths in the U.S. each year involve behavior management restraints and countless injuries that include bites, damaged joints, broken bones, and friction burns.” (Fact Sheet, 2010)

According to a New Zealand study in 2005, the United States was the only country making a concerted effort to reduce the use of seclusion and restraint.



Restraints “often add more chaos and trauma to a child's already overstimulated system, and are associated with harm to the child, other children and staff, high costs, reduced care, and a mistrust between children, their families, and staff.” (Champagne, 2003)

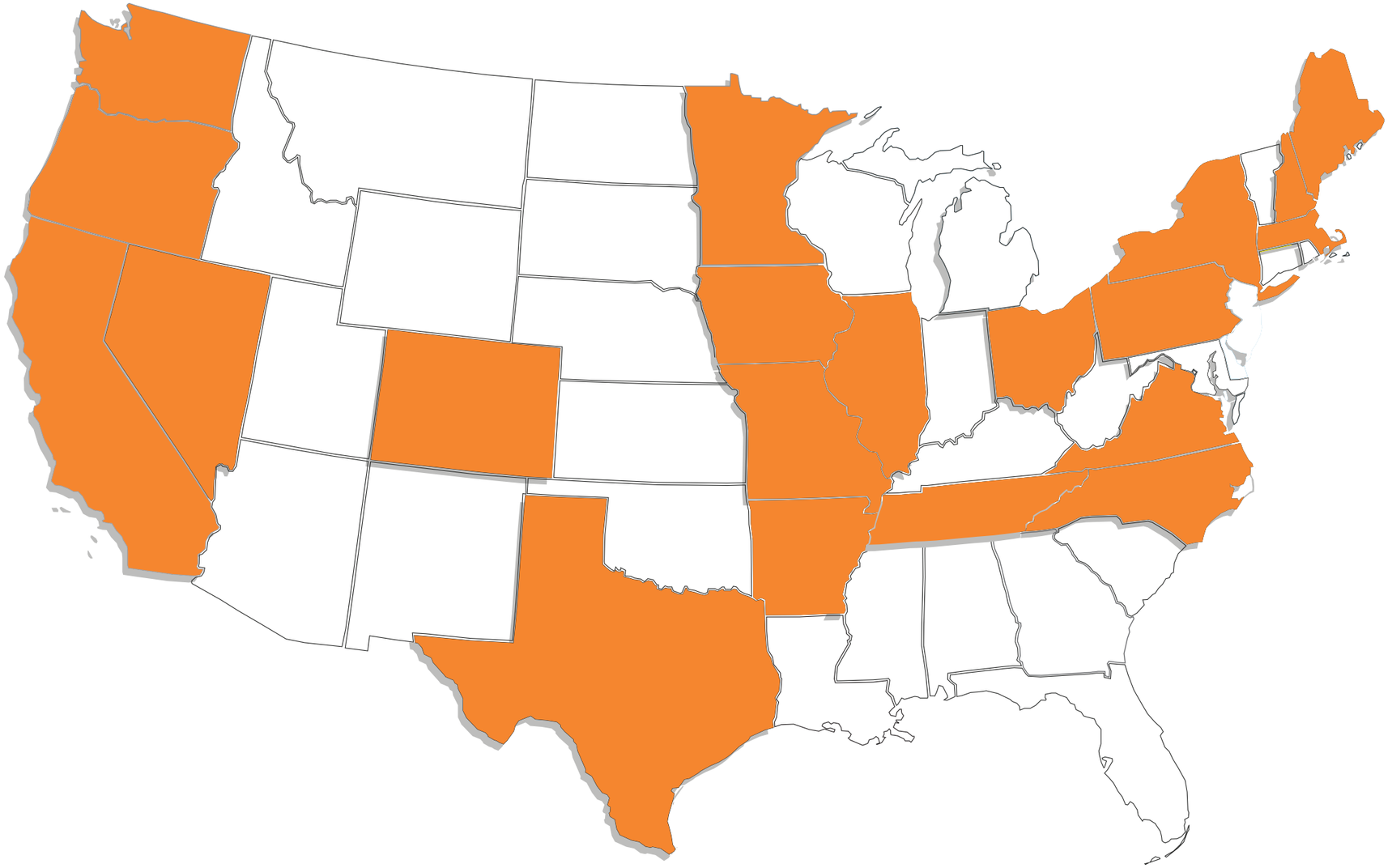
States with Legislation Against Seclusion & Restraint

STATES WITH RESTRAINT/ SECLUSION LAWS

California
Colorado
Connecticut
Florida
Iowa
Illinois
Massachusetts
Maine
Minnesota
Montana
North Carolina
New Hampshire
Nevada
New York
Ohio
Oregon
Pennsylvania
Rhode Island
Tennessee
Texas
Washington

STATES WITHOUT MEANINGFUL RESTRAINT/SECLUSION LAWS

Arkansas
Alabama
Arizona
Georgia
Idaho
Indiana
Kansas
Kentucky
Louisiana
Missouri
Mississippi
North Dakota
Nebraska
New Jersey
New Mexico
Oklahoma
South Carolina
South Dakota
Utah
Vermont
Washington D.C.
Wisconsin
West Virginia
Wyoming



Recent Legislation

NATIONAL

The *Preventing Harmful Restraint and Seclusion in Schools Act*, passed by the U.S. House of Representatives in March 2010, but was never voted on in the Senate, aimed to put significant restrictions on schools restraining children, confining them in seclusion rooms, and using aversive interventions. A 2008 Government Accountability Office study found hundreds of cases over the last two decades of alleged abuse and death from restraint and seclusion in public and private schools. The majority of students in the study were students with disabilities.

CALIFORNIA

In 2009, California school districts recorded over 14,000 cases of seclusion, restraint, and other emergency interventions. Rep George Miller, D-CA, ranking Democratic member of the House Committee on Education and the Workforce proposed this bill and I am trying to speak with him.

FLORIDA

Florida managed to pass legislation in 2010. Here is an excerpt from Making Schools Work regarding the new law:

"On June 4, 2010, Gov. Charlie Christ signed into law Florida's first regulations for the use of restraint and seclusion on public school students with disabilities. The law requires that a school prepare an incident report within a specified period after each occasion of student restraint or seclusion and that the school notify the student's parent or guardian if manual physical restraint or seclusion is used. It also prohibits school employees from using certain types of restrictions and restraints. These include forbidding a mechanical or manual restraint that restricts breathing, and prohibiting school employees from locking a disabled student in a room that fails to meet state fire marshal rules."

Note: There is no restriction from locking students with disabilities in rooms that do meet state fire codes.

Hypothesis/Direction Two

If a multi-sensory environment can help soothe and calm children early in the escalation cycle, the need for mechanical restraints and seclusion will be reduced, thereby reducing potential harm to children and staff.

Sensory Rooms:
Effective Alternative to Restraints & Seclusion

Quiet rooms, seclusion, and restraints should be used as last resorts and only to prevent injury to the child or others.

Sensory rooms have been found to be an effective alternative to restraints and seclusion. With a sensory room kids are given an ordered, safe environment to de-escalate. When a kid gets agitated during class it is the job of the teacher to recognize their mood swing and call a therapist before the child goes into full blown crisis mode. The therapist then takes the child to the sensory room where he can run and "get whatever is in him out," according to Valarie Campbell. There are toys for large motor play, releasing bottled up energy. The swing, tunnels, and other toys help the child self-modulate.

Since creating their multi-sensory de-escalation room (MSDR), Lincoln Child Center has found that violence against staff has greatly decreased. They also took all of the doors off their "quiet" rooms - they do not use seclusions anymore!

RESEARCH

Research has shown that the greatest benefits of sensory rooms are felt by people with the highest levels of distress prior to using the room. (Champagne, 2003)

The state of Massachusetts used National Association of State Mental Health Program Directors Best Practice Recommendations on positive behavior supports to reduce the use of restraints, resulting in a 72.9% decrease in episodes among children, a 47.4% decrease among adolescents and a 59% decrease among facilities with mixed groups of children and adolescents.

A New Zealand: study of adult inpatient psychiatric hospitals found the use of multi-sensory rooms had positive effects on 98% of patients. (O'Hagen, 2008)

SENSORY ROOMS REDUCE VIOLENCE AGAINST STAFF

Since creating their MSDR, Lincoln Child Center has found that violence against staff has greatly decreased. They also took all of the doors off their "quiet" rooms - they do not use seclusion anymore!

Design Opportunities: Crisis & De-escalation

TRUE MULTI-SENSORY ENVIRONMENT

Using sensory rooms for de-escalation is a new, innovative trend in therapeutic care. There are significant opportunities for products that are:

1) Shown to work. Kristin Wong, behaviorist at Lincoln tracks the schools use of restraints and the MSDR for de-escalation. She and the other therapists at Lincoln said they would be happy to try out toys and furniture and report back their thoughts and, if applicable, the affect on de-escalation.

2) Currently most multi-sensory toys and furnishings incorporate:

- Sight
- Vestibular
- Proprioceptive
- Touch

There are large holes in the sensory marketplace when it comes to smell, taste, and hearing sensory products. There is an even larger hole in sensory products that incorporate multiple senses.

3) Products that incorporate music or sounds need to have volume control that children can access. Kari and Jazmin both said that they use sound sparingly because they have had children react poorly to sounds they thought were too loud.

4) A turnkey environment for de-escalation. Only Experia Inc. offers a package for de-escalation rooms, however at $6,995 it is too pricey for many centers.

5) Plug and play de-escalation. Valarie Campbell, intake coordinator at Lincoln, said that there were a few things they would like to change in the room - like a bench - which could be unsafe. She said that the room was a continuing work in progress. There are opportunities to develop toys to evolve existing rooms.

6) Natural materials - similar to the play therapy room - the therapists expressed a desire to offer toys and furnishing made of natural products even if they are not played with or used. They felt that the presence of more natural choices could have an impact on the milieu. In particular, they would like to incorporate water - even if it is a bowl that children could reach their hands into.

User Scenario

JAKE & THE MSDR

Jake is a 10 year developmentally disabled boy who experienced severe neglect and trauma. After being removed from the custody of his biological parents, he bounced through several foster homes. His anger and feelings of rejection turned outwards in the form of aggression and violence. He was referred to a group care facility, where he struggled to contain violent outbursts against staff. He has responded well to play therapy sessions, but has frequent outbursts in class. In the “quiet room”, Jake would urinate on the walls and floor and get more angry with his seclusion. When he would emerge, he frequently attacked staff and other children.

Today, Jake is watched closely by his teachers and staff. When his emotions flare up he is quickly taken out of class, away from the aggravating situation, before it escalates into a full blown crisis. He meets his therapist in the new sensory room, where he will run and jump into the bean bag. He will crawl through the tunnel, exercising his gross motor muscles and getting his energy out. Moving his body helps calm Jake down. While he is crawling and jumping he discusses the situation with his therapist. They decide what happened, talk about what he can do in the future, and come up with a plan to get him back into class that day. Jake feels empowered because he has controlled himself - not resorting to violence like before - and now has greater confidence in his ability to regulate his emotions.

Edgewood

San Francisco, CA

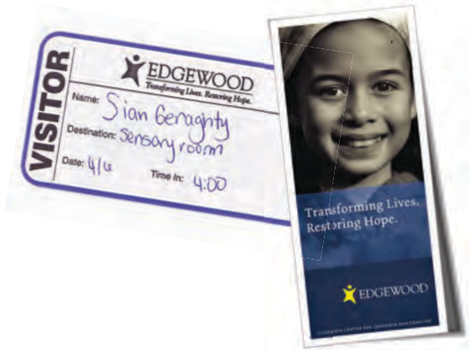
Edgewood Center for Children and Families serves students with severe behavioral and emotional problems. Edgewood's students "have been unsuccessful in public school because of a history of extreme and chronic maladaptive behavior patterns including aggression, fear and anxiety, and self-destructive tendencies." Often youth come to Edgewood from shelters, psychiatric hospitalization, or juvenile detention. The goal of Edgewood is to "work closely with each student and family in an individualized manner to foster the emotional, social, and academic skills necessary to transition from Edgewood to a less restrictive school."

Edgewood installed their sensory room 4 months ago. It has been in such high demand that play and occupational therapists must sign their students up ahead of time. Because of this, the room is primarily used for therapy, rather than de-escalation, and consequently they still have quiet rooms.

According to Robin Acker, clinical director, the teachers at Edgewood have been resistant to the idea of using the sensory room for de-escalation because they view it as a reward, rather than a tool to help children in crisis. Robin was very interested to hear that Lincoln was able to take the doors off their quiet rooms as a result of using their sensory room for de-escalation. She said it was definitely something they would look into!

INDUSTRY EXPERTS: MY CONTACTS

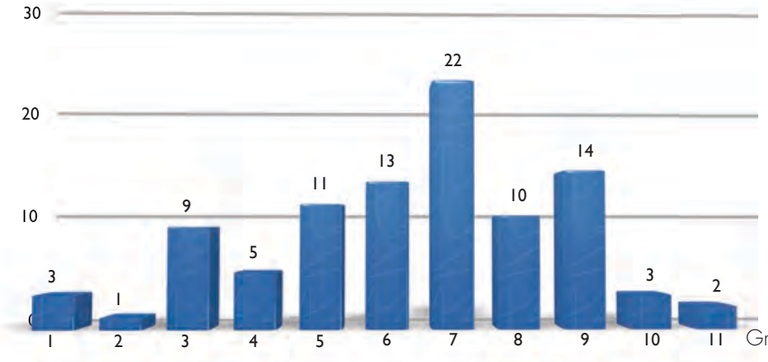
Robin Acker, *Clinical Director*
Jessica Anderson, *Play Therapist*



Statistics

- 91 students
- Up to 20 residential students
- 80% Socioeconomically disadvantaged
- 100% students with disabilities
- 80 - 90% male
- Ages 6 to 16
- Students from San Francisco
- Medical & psychiatric care offered on site
- Founded in 1851 as an orphanage to help children abandoned in the gold rush
- Provides health, wellness, and kinship services to 5,000 families each year

Number of Students: Grades 1 - 11



Edgewood

EDGEWOOD'S SENSORY ROOM

Budget: $1,200

- Installed by existing maintenance staff
- Structural support for swing already in place, thereby reducing costs

SWING

Versatile swing:

- Can lay across swing for therapeutic exercises, like reaching across the body to grab toys off the ground - this encourages kids to cross the midline of their bodies, an essential developmental milestone necessary for reading.
- When sitting, swing can wrap around, forming a cocoon

SENSES INTEGRATED

- Vestibular
  - Swing
- Proprioceptive
  - Body Sacks
- Touch
  - Faux Fur Wall
- Sight
  - Faux Fur Wall
  - Rug

SENSES MISSING

- Smell
- Taste
- Hearing
- Integrated sensory experiences

NEUROSEQUENTIAL MODEL

Robin Acker recommended Dr. Bruce Perry's book, *The Boy Who was Raised as a Dog.* She said that Edgewood's decision to create a sensory room was heavily influenced by Dr. Perry's innovative therapeutic model - the neurosequential model of therapeutics. She said that Edgewood's goal is to meet children "where they are at developmentally."

MODULATING ANXIETY

Kristin, Heather, and Michael Remondino, a "big brother" to a 10 year old boy at Edgewood, all said that a swing was a critical component of therapy and sensory rooms. They each mentioned children who, when stressed or wanted to relax, would go into the swing and stay there sometimes for hours. This was a way for the child to modulate his or her anxiety. They said the sensation or rocking is something that these children most likely never got as babies. Swings, along with weighted blankets, provide comfort that relates to all children's needs during infancy.

User Scenario

JOHN & THE SENSORY ROOM

John is a 6 year old boy who was born on multiple drugs. He was placed in foster care, reunited with his parents, and then placed back in foster care. He has multiple disabilities and anxiety, particularly before school. He is highly sensitized to stress, overreacting to minor events. He is frequently pulled out of class because of conflicts with other students and his teachers

Today, John and his therapist visit the sensory room each day before class. He immediately goes to the swing - moving fast at first, and then more slowly. He is comforted by the motion. Rhythmic sounds, set at 80 beats per minute, play softly in the background. He then works on exercises, such as crawling, climbing, and reaching that help him reorganize his brainstem.

Once calm, his therapist helps him make a plan for the day. He enters class with much less anxiety than before, and while his behavior is not perfect, he has consistently improved.

TOTS
Total Occupational Therapy Services

After touring Edgewood's sensory room they put me in touch with Jazmin Elek, the occupational therapist and consultant who helped them set up their sensory room. Jazmin invited me to her "play labs" at Total Occupational Therapy one Saturday. In these labs she has kids with autism play with kids without it. Autism is a complex developmental disorder. It affects different people in different ways, such that is referred to as the Autism "spectrum". It typically presents before a child is 3 years old and early detection and treatment significantly impacts future quality of life.

Rather than just observing I got to dive in and help out with two play groups. The first group was 5 boys ages 5-7 - all high functioning and verbal. They enjoyed the body sox, a stretchy sack that they climbed into. They ran around, pretending they were ghosts, chasing each other and trying to scare me. While the fabric looks opaque from the outside, it is actually quite easy to see through once stretched out. The body sox develop their proprioceptive sense - their spatial awareness. Because the sack has a four way stretch, it allows them freedom of movement. At the same time, whatever direction they stretch, they can feel pressure against their skin - feedback that helps them know where their body is in space.

Jazmin had filled an extra large body sox with plastic balls and the kids climbed into it. One or two would get into it and throw balls out. This was such a popular game that when it was the end of the group and time to clean up, I spent most of my time removing one of the kids from the bag and while my back was turned another one would jump in.

TOTS
Total Occupational Therapy Services

The kids also loved the sand tray (below), which was filled with beans and lentils instead of sand. The contents are changed to keep it fresh and to offer a new tactile and visual experience to the kids.

The second play lab had 4 girls and one boy. They were low functioning and predominantly non-verbal. While they speak generally less than 20 words, they understand significantly more. According to Jazmin they were in the play lab to work on their social skills. They loved the swing - they would help push the person in the swing and waited patiently until it was their turn. The swing was so popular that it was used from the beginning of the play lab until the end.

Jazmin also talked about how sensory integration benefit all aspects of a child's development. **"Improving a child's motor skills, like crawling or running, can help their speech - it's all connected!"**

Design Opportunities: Sensory Integration

Sensory rooms have just begun to crop up at residential and group care facilities in the U.S. Both Lincoln and Edgewood installed their rooms within the past six months.

1) Centers without sensory rooms are opportunities for "turnkey" solutions

2) Centers with sensory rooms, like Lincoln and Edgewood, are looking to evolve their rooms to offer more variety and more multi-sensory toys.

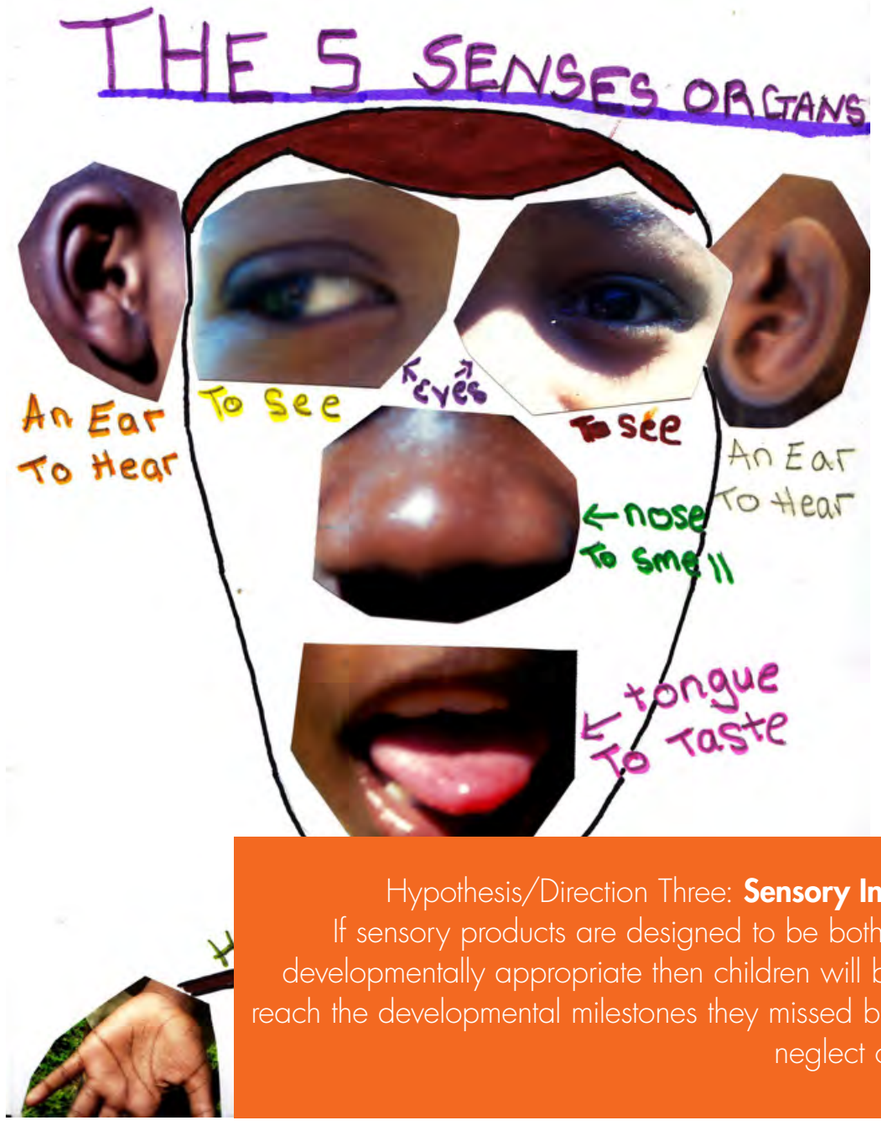
3) Jazmin Elek had the support structure for her swings custom made. The existing supports on the marketplace have only one or two places to attach swings. Her structure has many loops to attach swings and ropes. This gives her more variety in the setup.

DESIGN THAT IS AGE & DEVELOPMENTALLY APPROPRIATE FOR CHILDREN

In a similar way to how psychologists have changed their thinking regarding quiet rooms, psychologists have also changed the way they think about young children's resilience. They have recognized that kids do not just "bounce back" from neglect and trauma. Instead they suffer from PTSD and need treatment. A national study found higher rates of PTSD - 21% in adult "foster care alumni" than in U.S. war veterans. (Pecora, 2003)

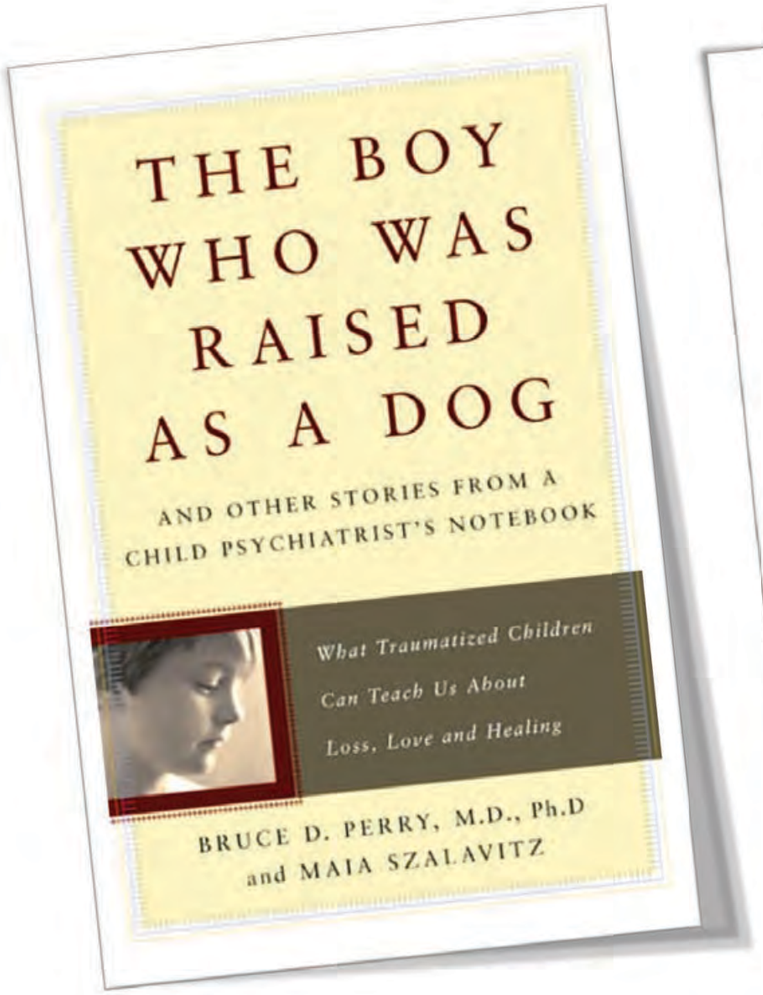
A new neurosequential model for helping these children has recognized the importance of going back to the earliest developmental stages a child missed due to neglect or trauma and working forward to achieve normal developmental milestones. For example, children that do not learn to crawl - often miss the developmental milestone of being able to cross the midline of their body. This problem manifests later in the way they read. They will often get to the center of the page of a book and start back at the beginning. Or, if they can read to the end of a line, they don't comprehend each side well. Older kids with this problem must go back to learn or relearn the developmental milestone.

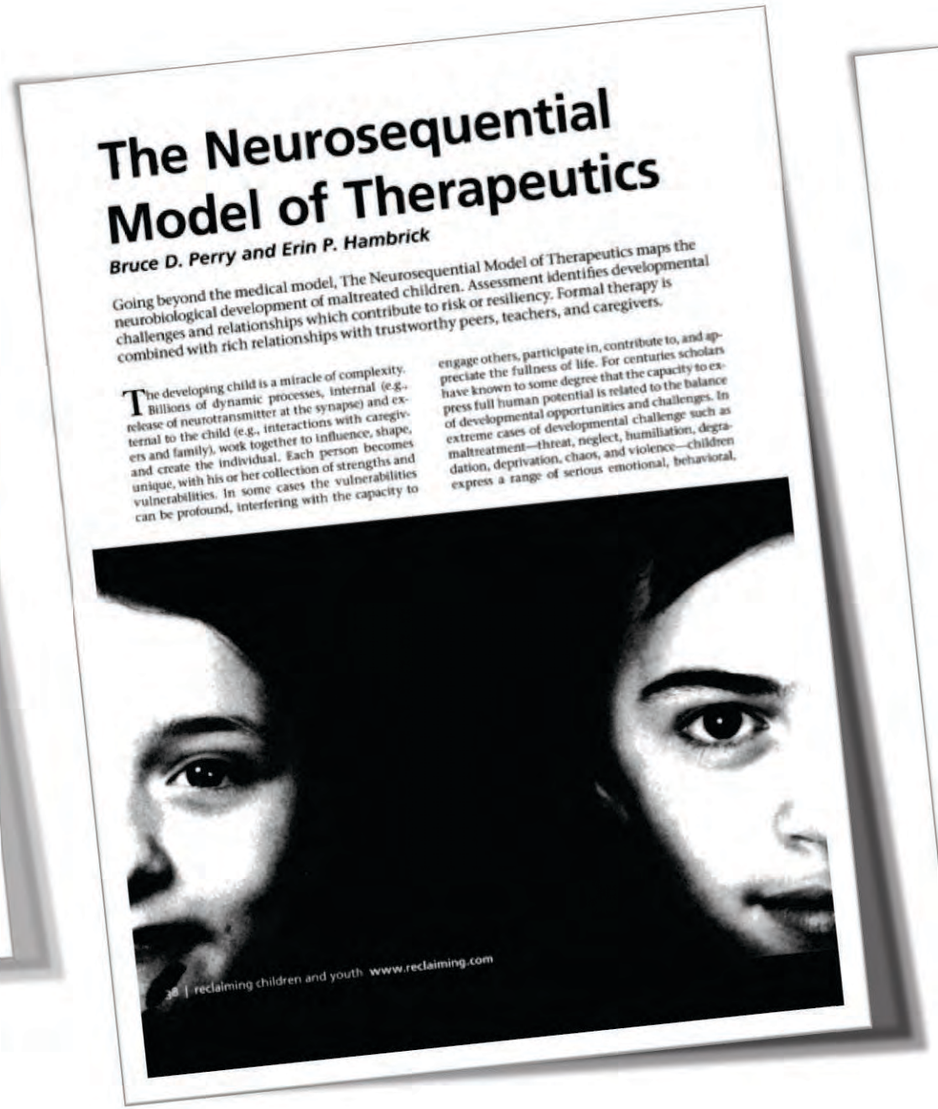
The neurosequential model of development presents an interesting problem for designers. Children who are 7 or 10 years old need to integrate senses that may be associated with infants or toddlers. So **creating toys and furniture that are age appropriate as well as developmentally appropriate is a big design challenge.** Older kids do not want to play with "babies' toys" yet that may be where they are at developmentally.

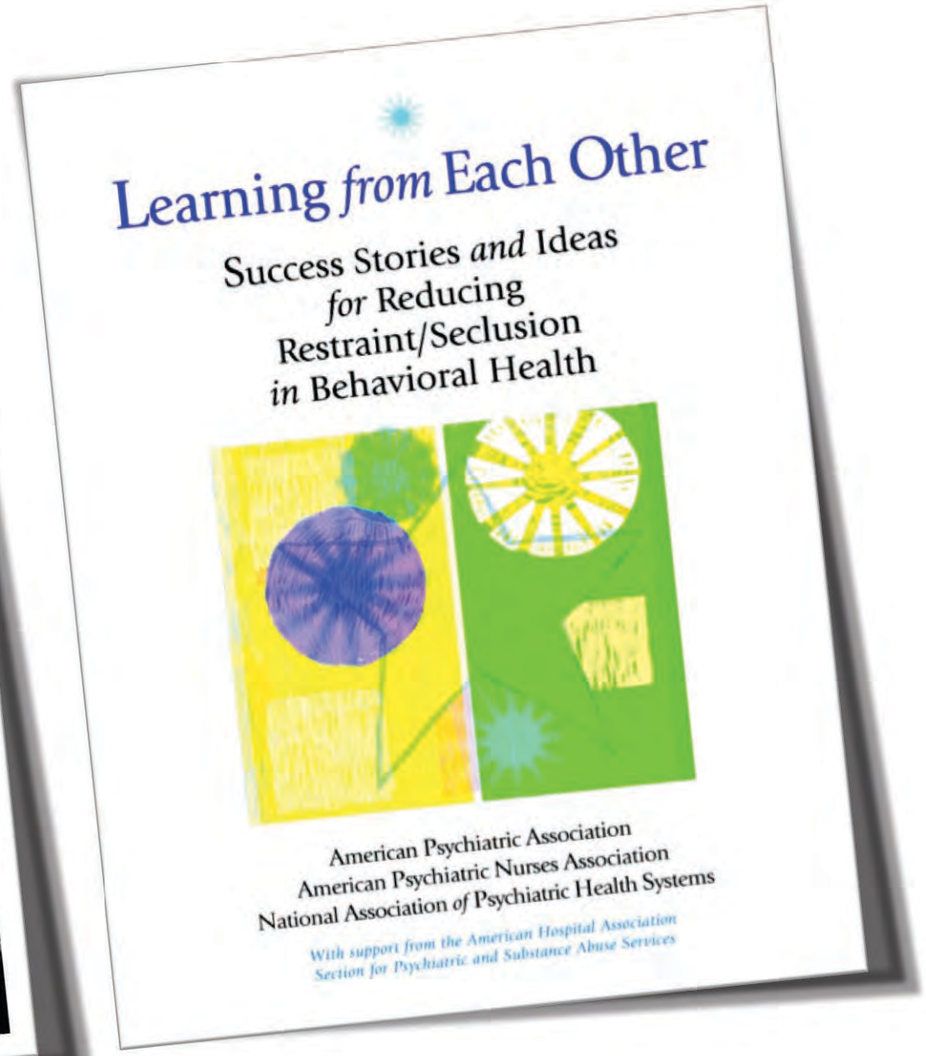


Hypothesis/Direction Three: **Sensory Integration**
If sensory products are designed to be both age and developmentally appropriate then children will be able to reach the developmental milestones they missed because of neglect or trauma.

Neurosequential Model of Therapeutics







Neurosequential Model of Therapeutics

The Neurosequential Model of Therapeutics (NMT), by Dr. Bruce Perry, is a "developmentally informed approach to working with at-risk children. It is a way to organize the child's history and current functioning to optimally inform the therapeutic process." (Perry, 2009)

The brainstem plays a critical role in NMT. The brain develops from the bottom to the top. The brainstem is the first responder: it controls the fight or flight response and is the gatekeeper to higher thinking in the frontal cortex. Trauma and neglect disrupt the organization of the brainstem. If it is disorganized, and set to a continual state of fear and alarm, every mode of thinking above it will also be in that state. This includes the way the brain regulates hormones and functions in the body.

One example given by Dr. Perry was from the children who survived the Branch Dividian in Waco Texas. These children, aged 1 to 12, were in constant fear of David Koresh, their group's leader. When they were released into uncertain circumstances at the beginning of the 50 day standoff, the trauma and damage to their brainstem manifested itself in physical and psychological symptoms. The brainstem controls stress reactions, including heart rate. A child's normal heart rate is less than 100 beats per minute. One little girl's heart rate, while asleep several days later, was 160 beats per minute. If trauma can affect children physically - imagine what it is doing psychologically!

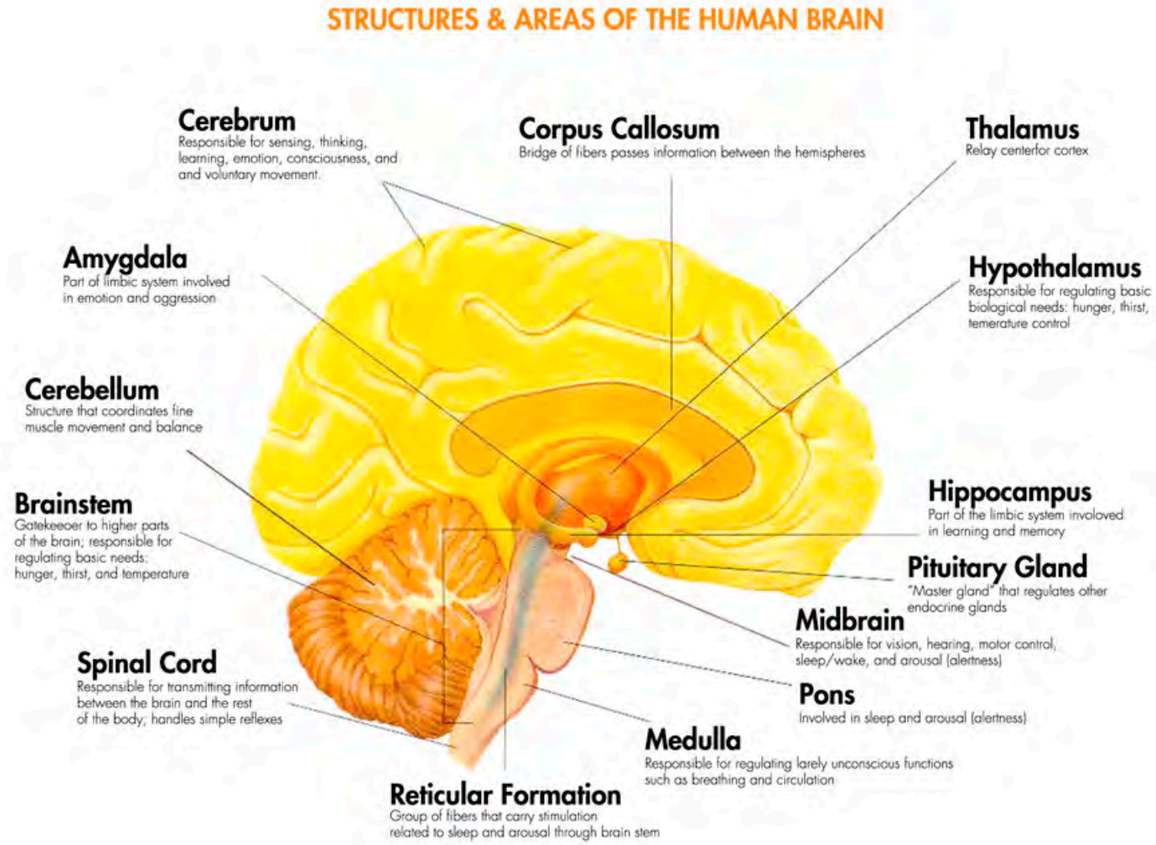
REORGANIZING THE BRAINSTEM

According to Jessica Anderson, play therapist at Edgewood, the brainstem is typically "organized" or developed during the first year of life. When children crawl the nerves and muscles receptors used in their shoulders and arms are activated. These nerves are crucial in proprioceptive development - they tell your body where your arms are in space. These signals are then sent to the brainstem, organizing neural networks.

Therapeutic activities that engage the brainstem, such as crawling, climbing, and swinging, as well as dancing, yoga, and listening to music, create positive associations in the neural networks. When these positive associations outnumber those associated with trauma, then the continual state of alarm and fear begins to dissipate.

Thanks, Brainstem!

It is the brainstem that controls reflexes. When you instantly recoil from momentary contact with the heat of a whistling teapot, you have your brainstem to thank for your quick reaction. If you had to take the time to consciously think about how to react to the pain of heat, your burn would be much worse! - Perry



Neurosequential Model of Therapeutics

Excerpts from Dr. Bruce Perry's *The Amazing Brain & Human Development*

RESETTING THE BASELINE

"If a child has been raised in an environment of persistent threat, the child will have an altered baseline such that the internal state of calm is rarely obtained. The traumatized child will have a "sensitized" alarm response, over-reading verbal and non-verbal cues as threatening. This increased reactivity will result in dramatic changes in behavior in the face of seemingly minor provocative cues. Often, over-reading of threat will lead to a "fight or flight" reaction and impulsive violence. The child will view his violent actions as defensive.

Children exposed to significant threat will "re-set" their baseline state of arousal such that even when no external threats or demands are present, they will be in a physiological state of persistent alarm. As external stressors are introduced (e.g., a complicated task at school, a disagreement with a peer) the traumatized child will be more "reactive." Even a relatively small stressor can instigate a state of fear or terror.

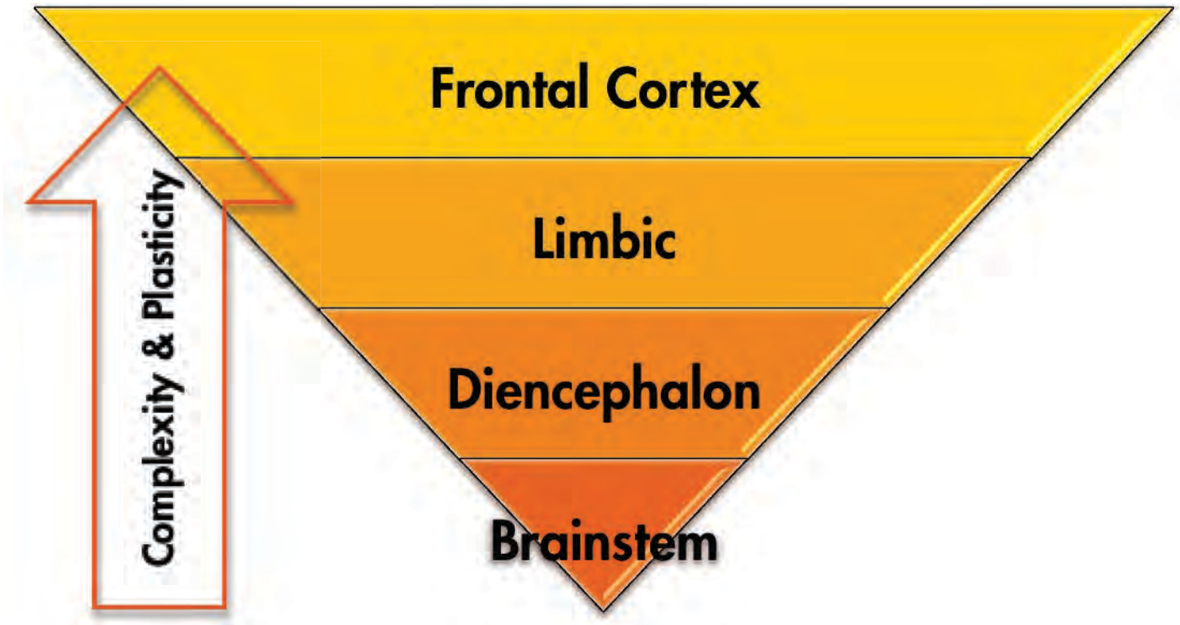
This principle is critically important in understanding why a traumatized child -- in a persistent state of arousal -- can sit in a classroom and not learn. The brain of this child has different areas activated -- different parts of the brain controlling his functioning. The capacity to internalize new verbal cognitive information depends upon having portions of the frontal and related cortical areas activated, which in turn requires a state of attentive calm. Sadly, this is a state that the traumatized child rarely achieves."

USE-DEPENDENT BRAIN DEVELOPMENT

Neurons are uniquely designed to change in response to activity. Therefore, neural networks change in a "use-dependent" fashion. Because patterned, repetitive activity shapes and changes the brain, chaotic experiences that occur during sensitive times in the child's development create chaotic, developmentally delayed dysfunctional organization. Neural systems, and thus children, can change with dedicated amounts of focused repetition. For example, a neural system cannot be changed without activating it, just as one cannot learn how to write by just hearing about how to write without practicing. Moreover, therapeutic efforts must activate the neural systems that mediate that particular child's symptoms.

To date, most therapeutic interventions do not achieve this goal. **Because the brain is organized in a hierarchical fashion, with symptoms of fear first arising in the brainstem and then moving all the way to the cortex, the first step in therapeutic success is brainstem regulation.**

The process of administering repetitive experiences that allow a neglected or traumatized child to regain functioning is not time-limited. It is long, frequent, and requires a global understanding of development. Children must receive care that is developmentally appropriate, but also not age-inappropriate (or at a minimum age-acceptable), and therefore the balance can be difficult to achieve, especially as children age.



Because the brain is organized in a hierarchical fashion, with symptoms of fear first arising in the brainstem and then moving all the way to the cortex, the first step in therapeutic success is brainstem regulation - Perry

Neurosequential Model of Therapeutics

Excerpt from Dr. Bruce Perry's The Amazing Brain & Human Development

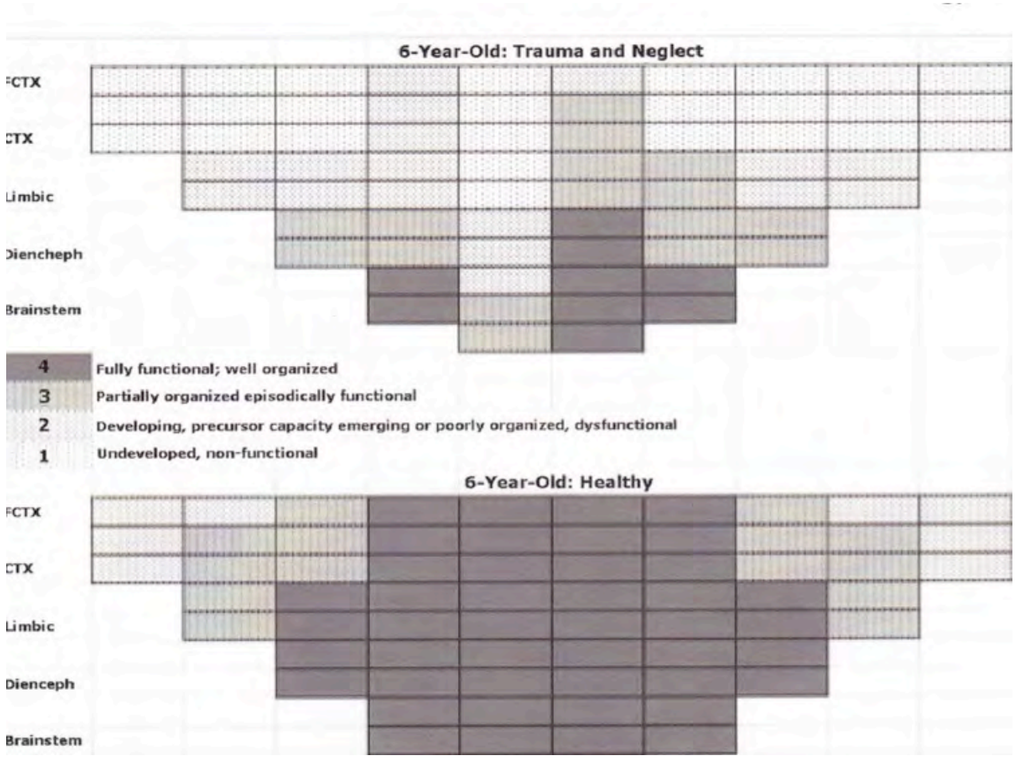
Right: NMT Functional Brain "Map": Six-year-old traumatized and neglected child vs comparison child (normal development). This map is generated from an interdisciplinary staffing process examining the presence and functional status of various brain-mediated functions. Each rectangle in the brain triangle diagram indicates a specific brain function. Each rectangle is shaded to indicate functional status.

Brain functions (e.g., regulation of heart rate: Brain stem; speech and language: CTX; attunement: Limbic) are "localized" to the brain region mediating the core aspects of the specific function (this oversimplification attempts to assign function to the brain region that is the final common mediator of the function with the knowledge that almost all brain functions are influenced and mediated by complex, trans-regional neural networks).

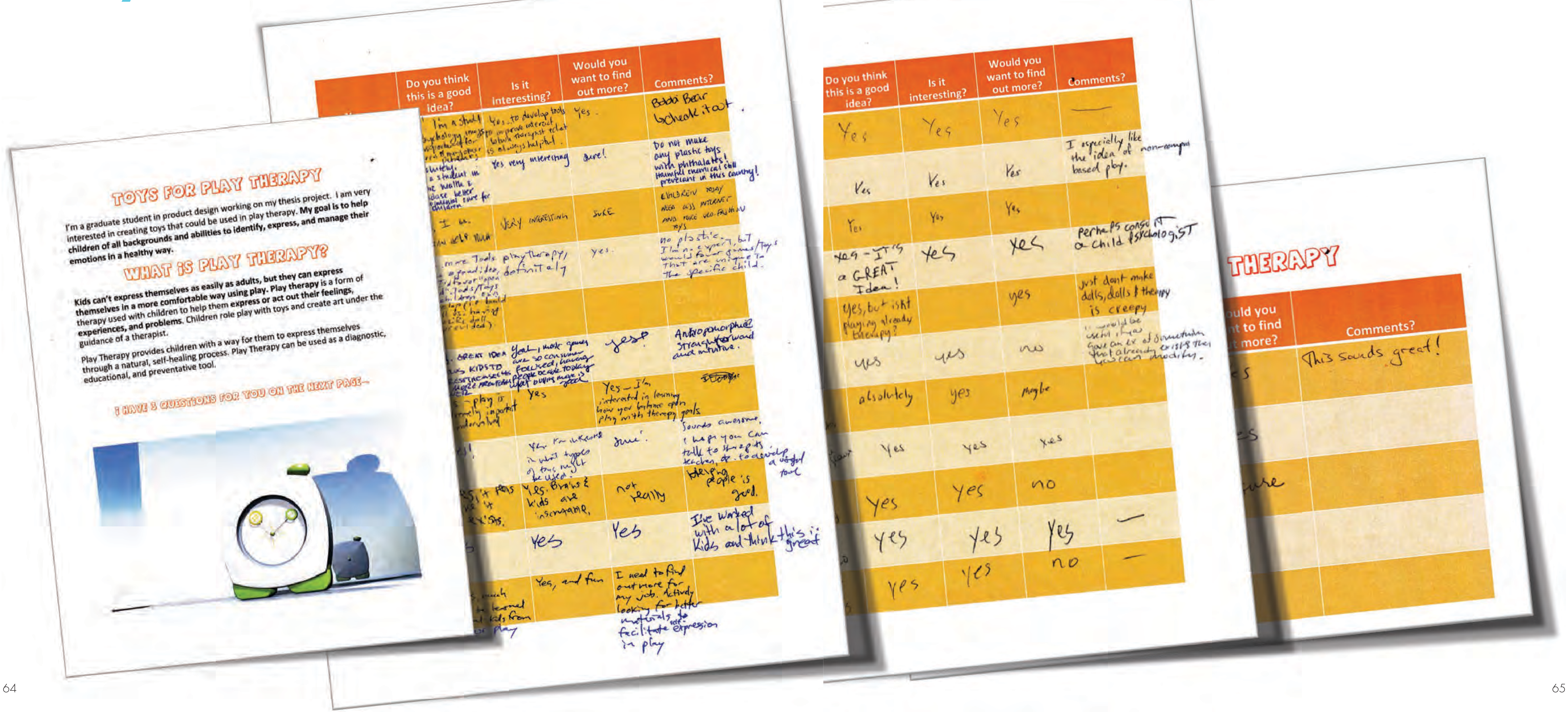
This approximation allows a useful estimate of the developmental/functional status of the child's key functions, helps establish the "strengths and vulnerabilities" of the child, and helps determine the starting point and nature of enrichment and therapeutic activities most likely to meet the child's specific needs. Most important, this functional map helps to document progress and to create a developmentally sensitive sequence to the enrichment, educational, and therapeutic work.

In a child who has experienced chronic threats, the result is a brain that exists in a persisting state of fear. These trauma-invoked, repetitive alterations have made the child's stress response oversensitive, over reactive, and dysfunctional because of over utilization of brainstem driven reactions

Clinicians map the child's developmental milestones. They use MRIs to measure different regions of the brain. They also interview the child and caregivers to identify the time line of abuse or neglect, which can provide clues as to gaps in development.



Survey Results



Verification

In addition to industry experts, I talked to over 75 people about my project and had overwhelmingly positive feedback. Here is a small sampling:

"Your thesis sounds really interesting, and I'd love to help in whatever way I can."

"I think you would have a stable, far-reaching market base."

"I've worked with a lot of kids and I think this is great."

"I thought this was excellent... There are lots of opportunities here."

"This sounds great!"

"I really liked this... and definitely there is a need."

Verification

Also, all 4 sites I visited said that they would help me test my products!

Since 1877 JFCS east bay

& the Family Justice Center

Since LINCOLN CHILD CENTER 1883

BELIEVE IN SF CHILDREN EDGEWOOD

TOTS

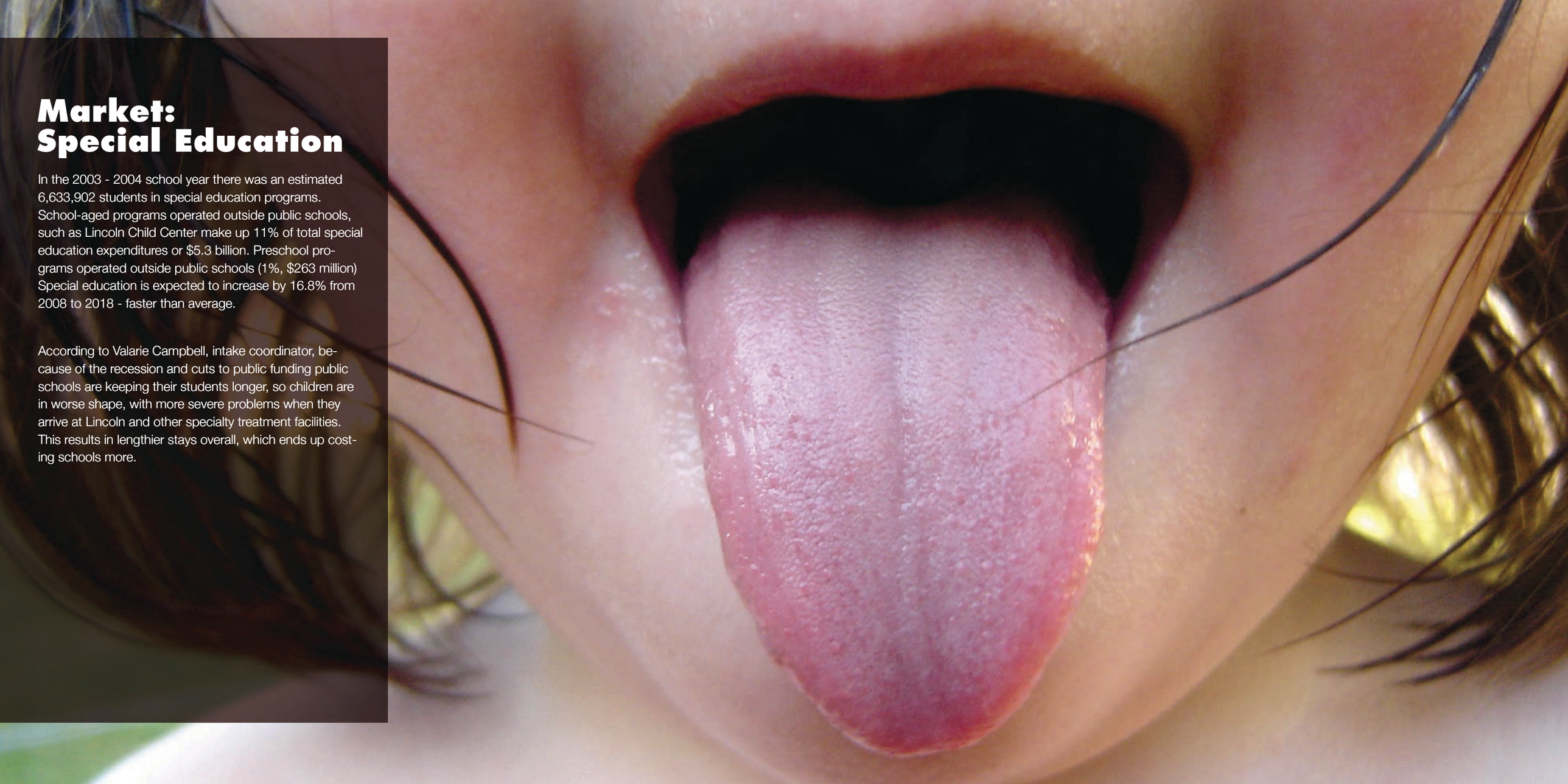
Total Occupational Therapy Services

•Assessment • Treatment • Consultation

Market: Special Education

In the 2003 - 2004 school year there was an estimated 6,633,902 students in special education programs. School-aged programs operated outside public schools, such as Lincoln Child Center make up 11% of total special education expenditures or $5.3 billion. Preschool programs operated outside public schools (1%, $263 million) Special education is expected to increase by 16.8% from 2008 to 2018 - faster than average.

According to Valarie Campbell, intake coordinator, because of the recession and cuts to public funding public schools are keeping their students longer, so children are in worse shape, with more severe problems when they arrive at Lincoln and other specialty treatment facilities. This results in lengthier stays overall, which ends up costing schools more.



Market: Special Education

Special education is mandated under the Americans with Disability Act. The cost of education all students with disabilities is estimated to be $50 billion per year.

Special education services include:

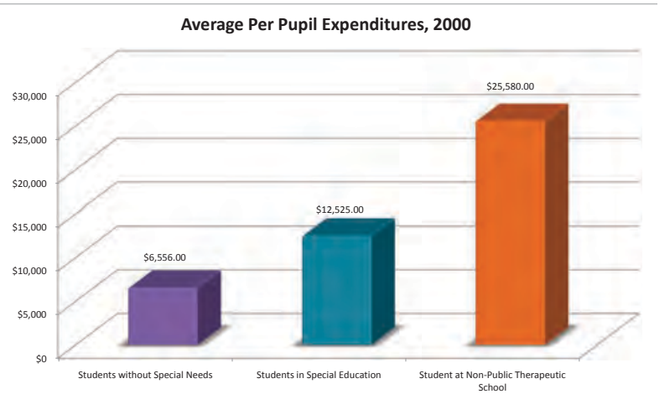
- Special education classes
- Resource specialists
- Community-based training
- Extended time services
- Summer school

In a Special Education Expenditure Project report (Chambers, 2003) the average per pupil expenditure on regular and special education services for special education students is $12,525, or 91 percent more than the amount being spent on the typical public school student.

Expenditures are highest for students with disabilities placed in non-public schools (such as the Lincoln Center) the average expenditure is $25,580—twice the cost of average special education students and 3.9 times the expenditure for regular education students.

NON-PUBLIC SCHOOLS

In California residential and group care facilities as well as foster care group homes are required by law to be non-profit organizations. Schools run by non-profits are called “non-public schools.”

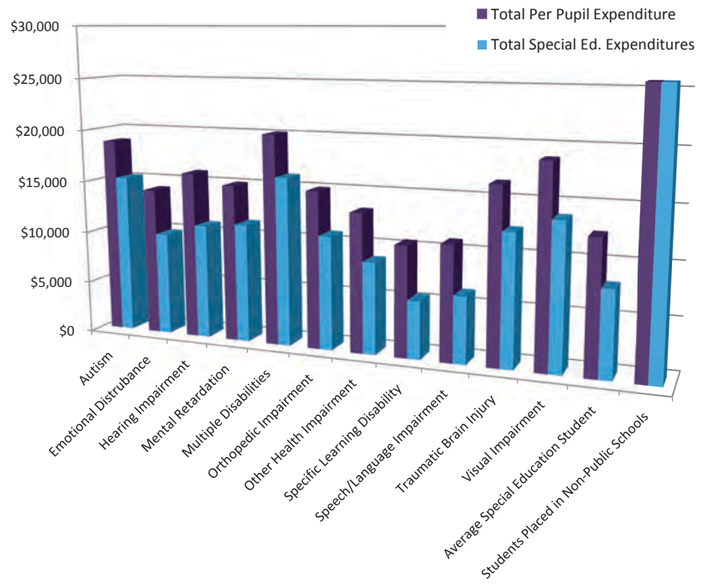


COST OF RESIDENTIAL TREATMENT PROGRAMS

Edgewood	$500/day
Psychiatric Hospital	$1,300/day
Juvenile Hall	$200/day
Jail	$80/day

IN U.S.

Number of Private Rehabilitation Centers	30,000
Number of Occupational Therapists in Education	13,000



Disability Category	Total Per Pupil Expenditure	Total Special Ed. Expenditures
Autism	$18,790	$15,219
Emotional Distrubance	$14,147	$9,885
Hearing Impairment	$15,992	$11,006
Mental Retardation	$15,040	$11,393
Multiple Disabilities	$20,095	$16,098
Orthopedic Impairment	$14,993	$10,888
Other Health Impairment	$13,229	$8,754
Specific Learning Disability	$10,558	$5,507
Speech/Language Impairment	$10,958	$6,334
Traumatic Brain Injury	$16,542	$12,459
Visual Impairment	$18,811	$13,796
Average Special Education Student	$12,525	$8,126
Students Placed in Non-Public Schools	**$25,580**	**$25,580**

Sensory Rooms

Sensory Room for Special Education Class in Massachusetts, Julia's House & Dorset Children's Hospice

southpaw enterprises® INC.

Competitive Analysis:

There are four large retailers offering toys and furniture for children with special needs. Southpaw is the market leader in this category.

- Southpaw is **the** place to buy frames
- Southpaw developed their own line of products in addition to selling other lines
- Low Cost
- Durable and colorful
- Marketplace embraces fun & new
- Opportunities for multi-sensory products
- Privately held company with under 50 employees

Steamroller
$349

Mantis Portable Suspension Frame
$3,150

Body Sox
$47 to $66

Swing
$199

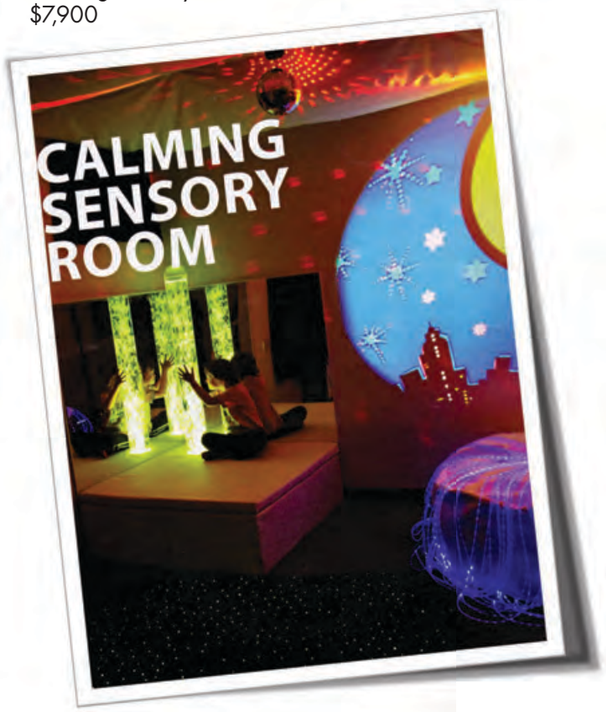
experia
innovation in every sense

Competitive Analysis:

- Experia provides high end visual and tactile sensory products. They are out of the price range of typical residential treatment centers.
- Experia puts a lot of emphasis on products that work in low lighting. However, 3 of the 4 sensory/play therapy rooms I visited had big windows and a lot of natural light. Experia's products would not work for them.

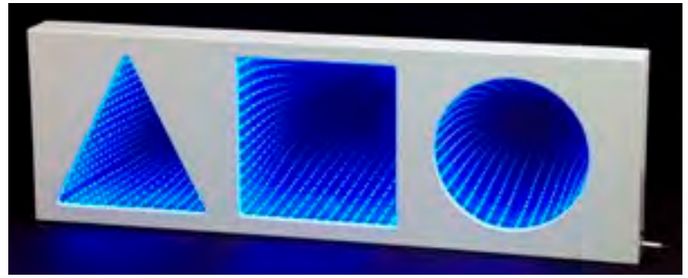
Iris LED Bubble Tube
$2,895

Calming Sensory Room Bundle
$7,900



Mood Light
$789

Superactive LED Infinity Tunnel
$2,995



LED Interactive Ball Pool
$3,595

Competitive Analysis:

- Similar to Southpaw but without their own retail product line.
- Low Cost
- Durable and colorful
- Marketplace embraces fun & new
- Opportunities for multi-sensory products
- Privately held company with under 50 employees

See Me Connecting Tunnel
$36

Bobles Fish 6 Layer
$109

Walk On The Moon
$599

Super Mondo Inside-Out Ball
$9

Around About Swing
$2,369

Crash Mat
Starting at: $119

Achievement Products for Special Needs

Competitive Analysis:

Vestibular swing sets only have one or two connection points, so more complex set-ups, like at Total Occupational Therapy, could not be accommodated.

Tortoise Shell Rocker & Ball Pit
$569

Vestibular Swing
$1,696

See Me Tunnel
$27

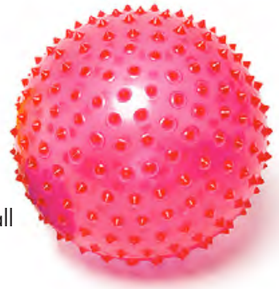
Weighted Blanket - 6lbs
$57

Vestibular Swing Frame
$2,595

Environments

Competitive Analysis:

Environments serves all children, but has an extensive offering of products for children with special needs.



Tactile Ball
$12

Cardboard Blocks
$39

Sand Tray
$219

18″ Cushy Cushion Set
$78

Baby Bumps
$495

Time Line

SUMMER

- Volunteer at Total Occupational Therapy with Jazmin Elek; Learn more about sensory integration.
- Tour SF General's Children's Therapy Center with Jazmin Elek & Francisco Rocco
- Continue follow up with Lincoln & Edgewood

FALL

- Design Research
- Association for Play Therapy Conference, Oct 14 -16th

Research

American Psychiatric Association. *Learning from Each Other, Success Stories and Ideas for Reducing Restraint/Seclusion in Behavioral Health*

Bandy & Moore. (2011). *What works for promoting and enhancing positive social skills: Lessons from Experimental Evaluations of Programs and Interventions.* Child Trends Fact Sheet. Pub #2001-07.

Boyd Webb, Nancy. (2006) *Traumatized Youth in Child Welfare. Applying Principles of Neurodevelopment to Clinical Work with Maltreated and Traumatized Children*

Bratton S, Rhine T, Jones L. (2001). *The effectiveness of play therapy: responding to the critics.* International Journal of Play Therapy; 10:85-108.

Bratton, S. & Ray, D. (2000). *What the Research Shows about Play Therapy*. International Journal of Play Therapy, 9(1), 47-88.

Chambers, Shkolnik, Pérez. (2003). Total Expenditures for Students with Disabilities, 1999-2000: Spending Variation by Disability

Champagne, T. (2006). *Creating sensory rooms: Environmental enhancements for acute inpatient mental health settings.* Mental Health Special Interest Section Quarterly, 29(4), 1-4.

Champagne, T., & Sayer, E. (2003). *The effects of the use of the sensory room in Psychiatry*. www.ot-innovations.com/sensoryrooms.html

Child Welfare League of America. (2011) Fact Sheet: *Behavioral Management and Children in Residential Care.*

Drewes, MA, PsyD, RPT-S. *(2006) Play Therapy Techniques Across the Ages*. The Astor Home for Children

Drewes. (2009). Blending Play Therapy with Cognitive Behavioral Therapy: Evidence-Based and Other Effective Treatments and Techniques. John Wiley & Sons, Inc. New Jersey

Dutta & Mehta. (2006). *Child-Centered Play Therapy in Management of Somatoform Disorders* J. Indian Association, Child Adolescence Mental Health 2006; 2(3): 85-88

Goldstein & McGinnis. (1990). Skill Streaming in Early Childhood: Teaching Prosocial Skills to the Preschool and Kindergarten Child. Research Press Company, Illinois

Gopnik. (2009). The Philosophical Baby. Farrar, Straus and Giroux, New York

Juvenile Detention Alternatives Initiative (JDAI) Annual Report Results

O'Hagan M, Divis M, Long J. (2008). *Best practice in the reduction and elimination of seclusion and restraint; Seclusion: time for change*. Auckland: Te Pou Te Whakaaro Nui: the National Centre of Mental Health Research, Information and Workforce Development

Perry. (2009) *Examining Child Maltreatment through a Neurodevelopmental Lens: Clinical Applications of the Neurosequential Model of Therapeutics*. Journal of Loss and Trauma 14:240-255

Perry & Szalavitz. (2006). The Boy who was Raised as a Dog. Basic Books, Philadelphia, PA.

Reddy, T. Hall, & C. Schaefer. *Empirically-Based Play Interventions for Children*, American Psychological Association, In Press.

Rosenberg, Bellonci, Cooney, and Bray. (2007). *Stories from Residential Treatment: New Pathways to Family Support*. Residential Group Care Quarterly, 8(1), 1-4

Safe Passages. (2006). *Promoting Children's Literacy and Social-Emotional Development for School Readiness: Final Evaluation Report*. Early Learning Opportunities Act.

Sroufe, L. Alan. *The organization of emotional life in the early years*. Emotional Development. Cambridge University Press

United States Government Accountability Office. Testimony before the Committee on Education and Labor, House of Representatives. Residential Programs: Selected Cases of Death, Abuse, and Deceptive Marketing. Statement of Gregory D. Kutz, Managing Director Forensic Audits and Special Investigations, Thursday, April 24, 2008

Wells NM.(2000) At home with nature: effects of "greenness" on children's cognitive functioning. Env Behav; 32:775–795. 134.

Me, my brother & sister

About Me

I have a career background in marketing communications for the medical and financial services industries. My undergraduate degree was in rhetoric from the University of California, Berkeley.

If you would like to find out more about my thesis project, please visit my website at siangeraghty.com or email sian@siangeraghty.com.

Design Ignites Change

Our Goal: to redesign dining tables for refugee families in the San Francisco Bay Area.

Why: the dining room table is a central point for families to gather, celebrate, and connect.

An Added Challenge: to use donated, re-purposed materials to build furniture that will be beautiful and last.

Our Design Direction: After meeting the families,our group - Roberta Martins, Christy Chang, and myself - decided to focus our design on the feeling of connectedness. One of the biggest challenges refugee families face is to stay connected — with each other in the maze of their new country, and with family left behind who could not afford the plane ticket needed to get to their new home.

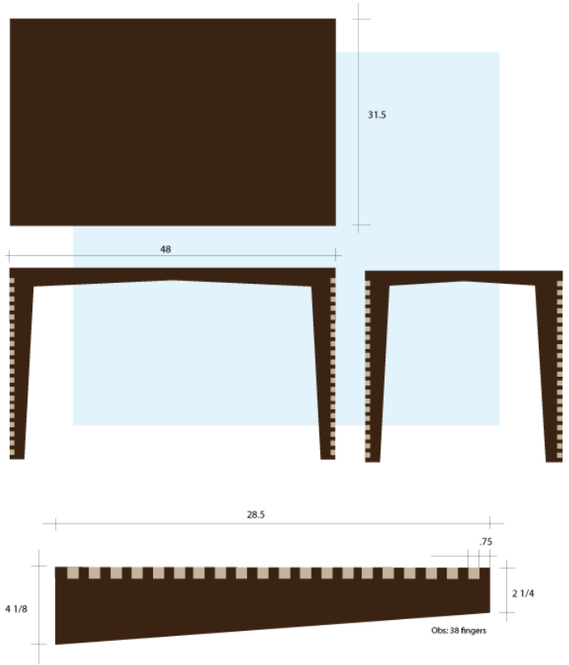
The families also must work to establish connections with their new home, creating roots and building a new life. Using this theme, our group designed and built six tables and delivered them to each family.

Prototype 2

Prototype 1

Design Ignites Change

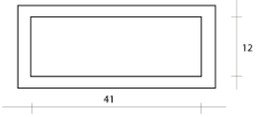
Final Design



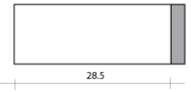
Design Ignites Change Roberta, Sian and Christy Spring 2010

LEGS

1) Cutting the Raw Material

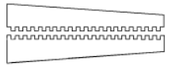


2) Cutting the wood into leg size



3) Cutting the angled legs

4) Finger Joints

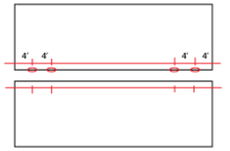


Obs: Cut a pair onto dado blade

Obs: The finger joints need to be glued together in 90

TABLE TOP

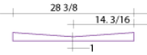
1) Sand edges and biscuit the 2 pieces every 4 inch



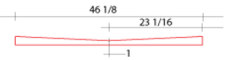
. Glue them together and let it overnight;
. Once it is glued, flip it over to make the support marks;

BOX SUPPORT

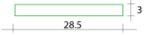
1) 2 Cross-section pieces

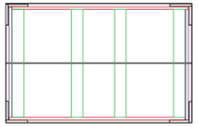


2) 2 Longitudinal pieces



3) 4 Center Pieces





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