Staff Training for Community Swimming Instructors: Supporting Children with Autism in Local Recreational Settings

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Today

- Exercise and ASD
- Community recreation and ASD
- Swimming and ASD

- My Research
- Future Directions

- Research participants
- Volunteer research assistants from Capilano University ABA-Autism program
- Joanna Nguyen (Research Assistant)
- Pat Mirenda, Joe Lucyshyn, Shannon Bredin
- SSHRC and Autism Research Training

Physical Activity and ASD

- Individuals with ASD participate in lower levels of physical activity than their nondisabled peers (Draheim, Williams, & McCubbin, 2002; Lang et al., 2010; Pan, 2008)

- Increased exercise may be related to corresponding improvements in physical health, as well as motor skills and social behaviour (Sowa & Meulenbroek, 2012)

Community Recreation and ASD

- Benefits:
  - Physical health, mental health, affect
  - Social skills & friendship (Lang, Koegel, Ashbaugh, Regester, Ence & Smith, 2010)

- Little research available re: how to facilitate the participation of individuals with ASD in community recreation activities (Fennick & Royle, 2003; Lam, Wong, Leung, Ho, & Au-Yeung, 2010)

Why Swimming?

- Age appropriate throughout the lifespan
- Can be considered both an individual sport as well as an opportunity for social interaction
- Safety skill (Myers, 2012; Rogers, Hemmeter, & Wolery, 2010)
- Parents want their children to learn swimming skills (as well as have fun in the water) (Lee, Harrington, Chang, & Connors, 2008; Mactavish & Schleien, 2000)
- Vigorous physical exercise that may have corresponding health benefits

Swimming and ASD

- Few studies have evaluated methods for teaching swimming with this population
  - Use of constant time delay; Halliwick method

- ***No*** research has focused on how to teach community-based swim instructors to work with children with ASD in community settings
  - In all studies, instructors were either researchers or graduate students (Best & Jones, 1974; Pan, 2010, 2011, 2012; Rogers, Hemmeter & Wolery, 2010; Yilmaz et al., 2010; Yilmaz, Mehmety, Bunyamin, & Bumin, 2004)

Rationale

- Families value swimming (fun, health, safety)
- Community staff want more training
- There is a need *to empower community staff* to effectively serve the needs of children with autism
- Might lead to more effective access for children with ASD to a variety of recreational opportunities

Research Question #1

- Will an instructional package consisting of a training workshop + in-pool coaching increase the ability of community swimming instructors to demonstrate key skills for supporting children with ASD during swimming lessons?

Research Question #2

- Is there an association between an increased use of key skills by swimming instructors and child cooperation and/or skill acquisition?

Research Question #3

- How do swimming instructors, parents, and aquatics supervisors rate the training in terms of its efficiency, effectiveness, and appropriateness for a community recreation setting?

Participants: Instructors

- Recruited through Aquatics Coordinators at two community pools in the Lower Mainland
  - Fully qualified to teach swimming, with the following credentials: Lifesaving Instructor (LSI), National Lifeguard Service (NLS), Water Safety Instructor (WSI), I Can Swim (ICS), Aquatic Emergency Certification (AEC) or Standard First Aid (SFA), and CPR – Level C
  - Agreed to the time commitment required for the study
- 6 met eligibility criteria and participated in the research

Recruitment: Children with ASD

- Recruited through local service providers
  - 16 children screened; 3 excluded because of scheduling conflicts
- 13 children included as participants
  - 4-12 years old
  - Diagnosis of autism spectrum disorder
  - Receptive language age of at least 2 years (Preschool Language Scales 4th Edition, Zimmerman, Steiner, & Pond, 2002; Clinical Evaluation of Language Fundamentals, 4th edition, Semel, Wiig, & Secord, 2003)
  - Able to enter a pool independently (i.e., with no fear of water)
  - Able to tolerate physical prompting

Participants: Children with ASD

- Participants were assigned to one of two groups:
  - 8 in SWIM group: participated in baseline and intervention phases as the target children in the study
  - 6 in TRAIN group: participated only in the instructor training sessions; no outcome data collected

Time Series Design

Participant	Phase		
	Baseline	Training (Train Group)	Intervention
Instructor 1	I_1 I_2 I_3 I_4 I_5	X	I_1 I_2 I_3 I_4 I_5
• Swim Group Child 1	C_1 C_2 C_3 C_4 C_5	X	C_1 C_2 C_3 C_4 C_5
Instructor 2	I_1 I_2 I_3 I_4 I_5	X	I_1 I_2 I_3 I_4 I_5
• Swim Group Child 2	C_1 C_2 C_3 C_4 C_5	X	C_1 C_2 C_3 C_4 C_5
Instructor 3	I_1 I_2 I_3 I_4 I_5	X	I_1 I_2 I_3 I_4 I_5
• Swim Group Child 4	C_1 C_2 C_3 C_4 C_5	X	C_1 C_2 C_3 C_4 C_5
• Swim Group Child 5	C_1 C_2 C_3 C_4 C_5	X	C_1 C_2 C_3 C_4 C_5
• Swim Group Child 6	C_1 C_2 C_3 C_4 C_5	X	C_1 C_2 C_3 C_4 C_5

Baseline Video

Independent Variable: Staff Training Workshop + Live Coaching

- Combination of a 3-hour workshop and 2.5 hours of in-pool coaching

Staff Training Workshop

- Didactic instruction
  - Brief overview of ASD
  - *Description of 7 key skills*
- Video review (positive and negative exemplars)
- Role plays
- Opportunity to practice creating visual schedules

7 Key Skills

- Clear instructions
- 3-second prompt
- Praise
- Rapport
- Visual supports
- Wait until ready
- Arms length

Antecedent Supports

- **Rapport Building Activities**
  - At the **beginning of each session**, the instructor engaged in a fun activity with the child for 3-5 minutes (e.g., went down the slide, played on the raft, etc.)
  - At the **end of the session**, the instructor engaged in a fun activity with the child for 3-5 minutes (e.g., went in the hot tub, played water basketball, etc.)

Visual Supports

- The instructor prepared a pictorial schedule to show the sequence of planned activities for the entire lesson
  - Before each activity, the instructor showed the child the picture of the skill
  - After each activity was finished, the instructor removed the related picture, pointed to the next picture, and told the child what would come next

Attending Skills

- **Arms Length**
  - The instructor only issued verbal requests/directions when he or she was **within one metre** (i.e., one “arms length”) of the child

- **Wait Until Ready**
  - The instructor issued instructions when the child’s **ears were above the water**, and the child **was not talking or playing** with a toy. The child did *not* need to be looking at the instructor

Instructional Skills

- **Clear Instructions**
  - The instructor used **short, declarative statements**, and did not issue the instruction in the form of a question (e.g., “Can you show me your frog kicks?”)

- **3-Second Rule**
  - The instructor provided a prompt if the child did not respond to a verbal instruction **within 3 seconds**. The prompt had to be **a physical prompt** whenever possible; if a physical prompt was not possible (e.g., blow bubbles), the instructor **modeled** the response for the child to imitate.

Learning Loops

Instruction → (Help) → Action → Feedback

Consequence Strategies

- **Praise**
  - The instructor provided **verbal praise** to the child after each instruction that he or she **attempted correctly**, *regardless* of whether or not the response was preceded by a prompt or model.
    - **Note:** The child did not need to perform the motor skill with 100% accuracy in order for it to be considered correct. As long as the child *attempted* the instruction (e.g., tried to blow bubbles, tried to kick feet), the instruction was considered correct and acknowledged.

Live Coaching

- 2.5 hours total, across 5-10 training lessons (depending on centre's schedule)
- Researcher was in the pool or on the pool deck
- Initial lessons: modeling of the use of key skills
- Later in the training phase: verbal feedback (acknowledgement for skills used correctly, clarification/direction for errors)
- Written feedback based on live observations and video review: provided at different intervals, depending on the scheduling of the lessons

Dependent Variables

- **All lessons were filmed** by trained research assistants
- Instructor use of key skills
- Child cooperation
  - Cooperation on the 1st Attempt = Child attempts the instruction the first time it is presented
  - Cooperation on the 2nd Attempt = Child attempts the instruction after one repetition
- Child skill acquisition
  - Attempted (needed prompts), Emerging, Established (independent 90%, correct 80%)
- Social/Ecological validity
  - Instructors, parents, aquatic coordinators
  - 1-5 Likert scale

Observer Training

- 33% of lessons (selected at random) were also coded by a research assistant (RA)

- Initial training used videotapes collected from swimming lessons outside of the current study
  - The RA was provided with a scoring manual containing operational definitions, examples and non-examples of the target behaviors, and a scoring protocol
  - Training was provided until the RA achieved 90% accuracy (compared to researcher codings) over three consecutive videotapes

Observer Retraining

- The RA and the researcher met twice during the study as each new set of participants began in baseline
  - During these meetings, the RA and researcher independently coded one new participant lesson together, in order to ensure that they were still coding the dependent variables consistently
  - The videos that were coded during these meetings were not used in the final calculations for inter-observer agreement

Interobserver Agreement

	Mean	Range
Clear Instruction	86%	79-90%
3-Second Prompt	84%	78-89%
Praise	83%	77-89%
Rapport	100%	N/A
Visual Supports	96%	91-100%
Arms Length	96%	91-99%
'Wait Until Ready'	97%	92-99%
Child Cooperation	87%	79-95%
Child Skill Acquisition	92%	87-100%

Overall mean = 91.2%

Results: Group Data

Instructor Skill Acquisition, Child Cooperation

Instructor Skill Acquisition

Key Skill	Baseline (%)	Intervention (%)	Test	Statistic	*p*
Clear instruction	63.38	92.13	Paired samples t	t = -5.13	.01
3-Second prompt	9.88	80.50	Paired samples t	t = -17.35	.001
Praise	31.25	69.88	Paired samples t	t = -3.53	.01
Rapport	41.25	78.75	Wilcoxon*	Z = -2.55	.01
Visual supports	0	96.5	Wilcoxon*	Z = -2.55	.01
Wait until ready	99.13	99.63	Wilcoxon*	Z = -1.63	.10
Arms length	95.13	98.13	Paired samples t	t = -2.90	.02

*Normality assumption violated per Kolmogorov-Smirnov and Shapiro-Wilk tests

Child Cooperation

	First Attempt*		Second Attempt**	
Child	Baseline (%)	Intervention (%)	Baseline (%)	Intervention (%)
Sara	30	63	27	73
Arthur	33	77	33	59
David	51	91	47	73
Carter	53	81	44	59
Chris	47	91	29	83
Jeff	34	72	23	65
Luke	40	91	36	88
Oscar	26	61	22	48

*t = -15.24, p = .001; **t = -7.03, p = .001

Dyad Data

Instructor Skill Acquisition

Child Cooperation

Child Skill Acquisition

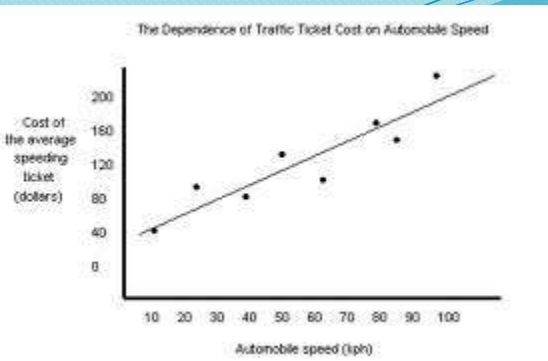
Intervention Video

Visual Analysis

- Basic effect (Horner, 2010) = “a change in the data pattern following manipulation of the independent variable”

1) Level
2) Immediacy of effect
3) Trend
4) Variability
5) Overlapping data

Split Middle Technique (Kazdin, 1982)

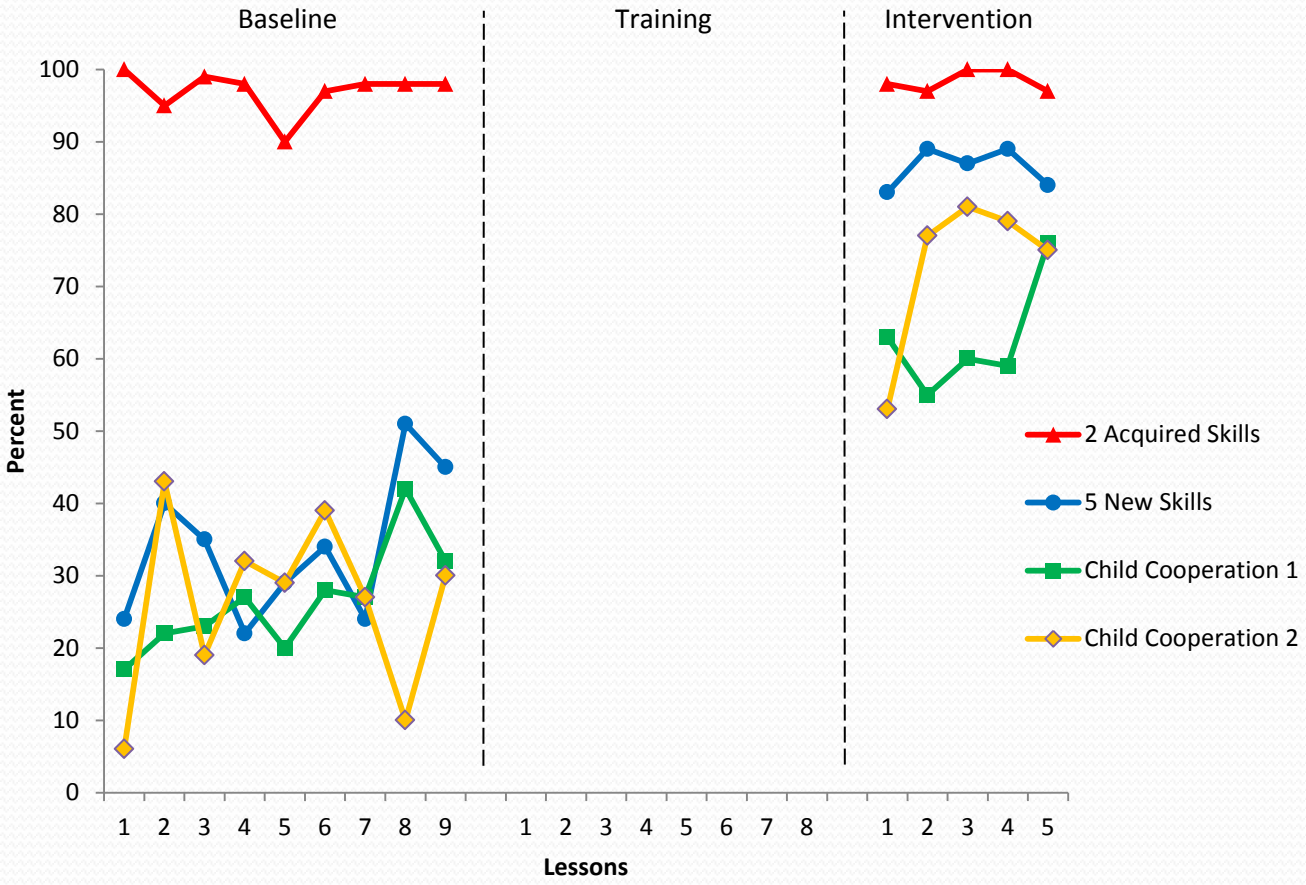


- Used to compare observed patterns in the data against what would be expected if the independent variable had no impact
  - i.e., the data from the baseline phase are extrapolated into the intervention phase and the expected pattern of data is then compared against what was actually observed.

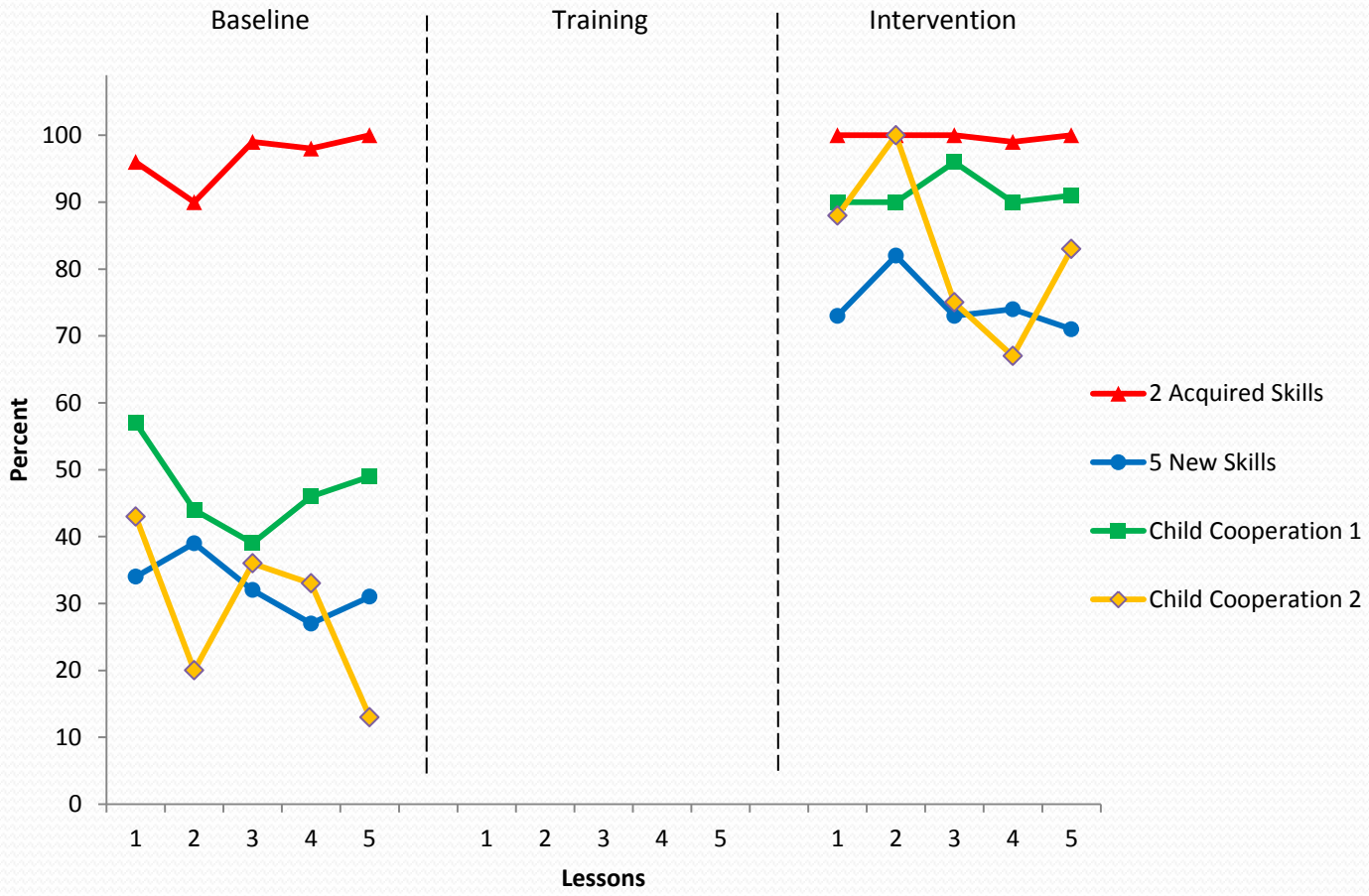
Summary of Basic Effects

Dyad	Instructor 2 Acquired Skills	Instructor 5 New Skills	Child Cooperation: First Attempt	Child Cooperation: Second Attempt
Alison (I) and Sara (C)	No	Yes	Yes	Yes
Katie (I) and Arthur (C)	No	No	Yes	No
Patty (I) and David (C)	No	Yes	No	No
Julie (I) and Carter (C)	No	Yes	Yes	No
Sam (I) and Chris (C)	No	Yes	Yes	Yes
Kristina (I) and Jeff (C)	No	Yes	Yes	No
Kristina (I) and Luke (C)	No	Yes	Yes	Yes
Kristina (I) and Oscar (C)	No	Yes	No	No

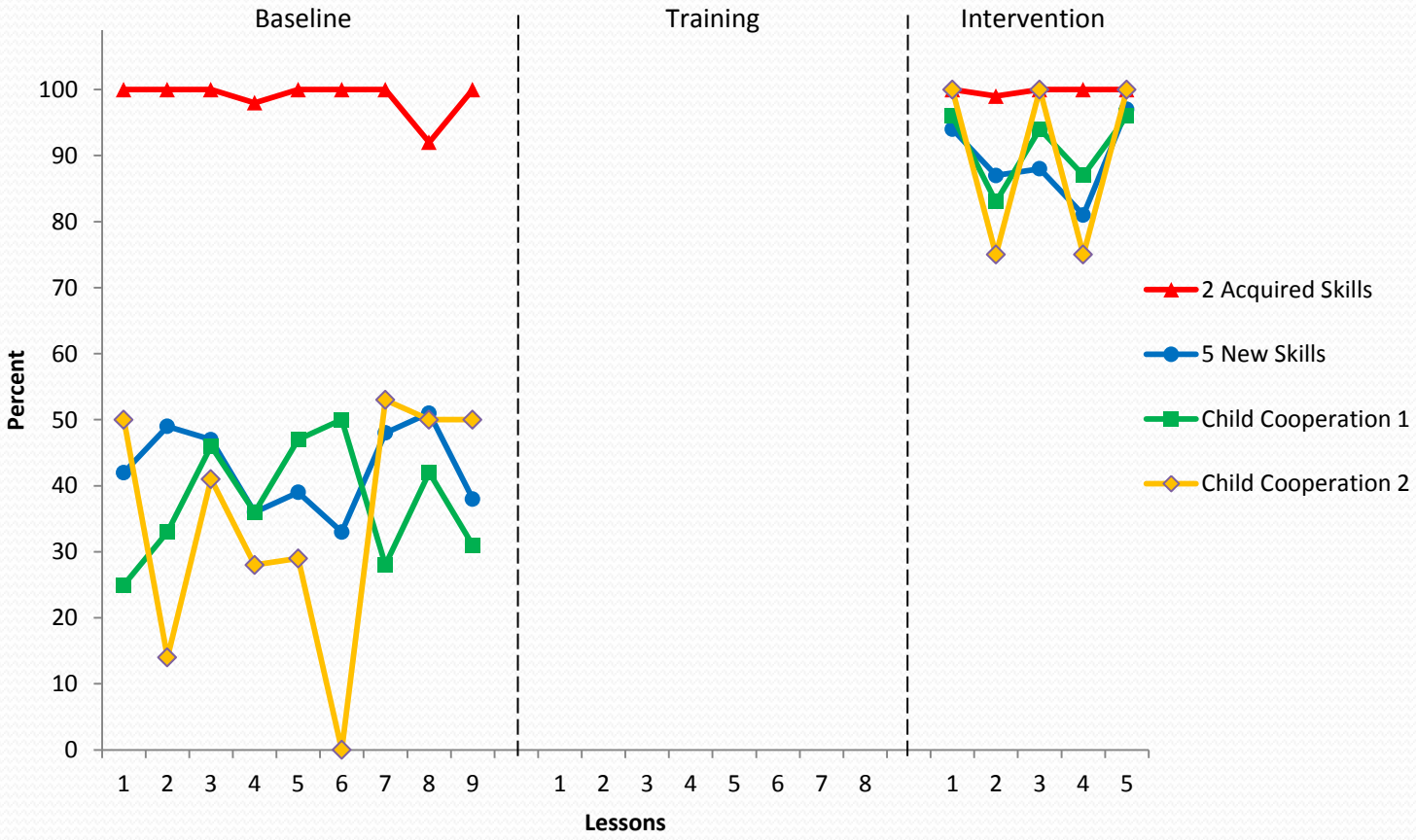
Allison & Sara: 3 Basic Effects



Sam & Chris: 3 Basic Effects

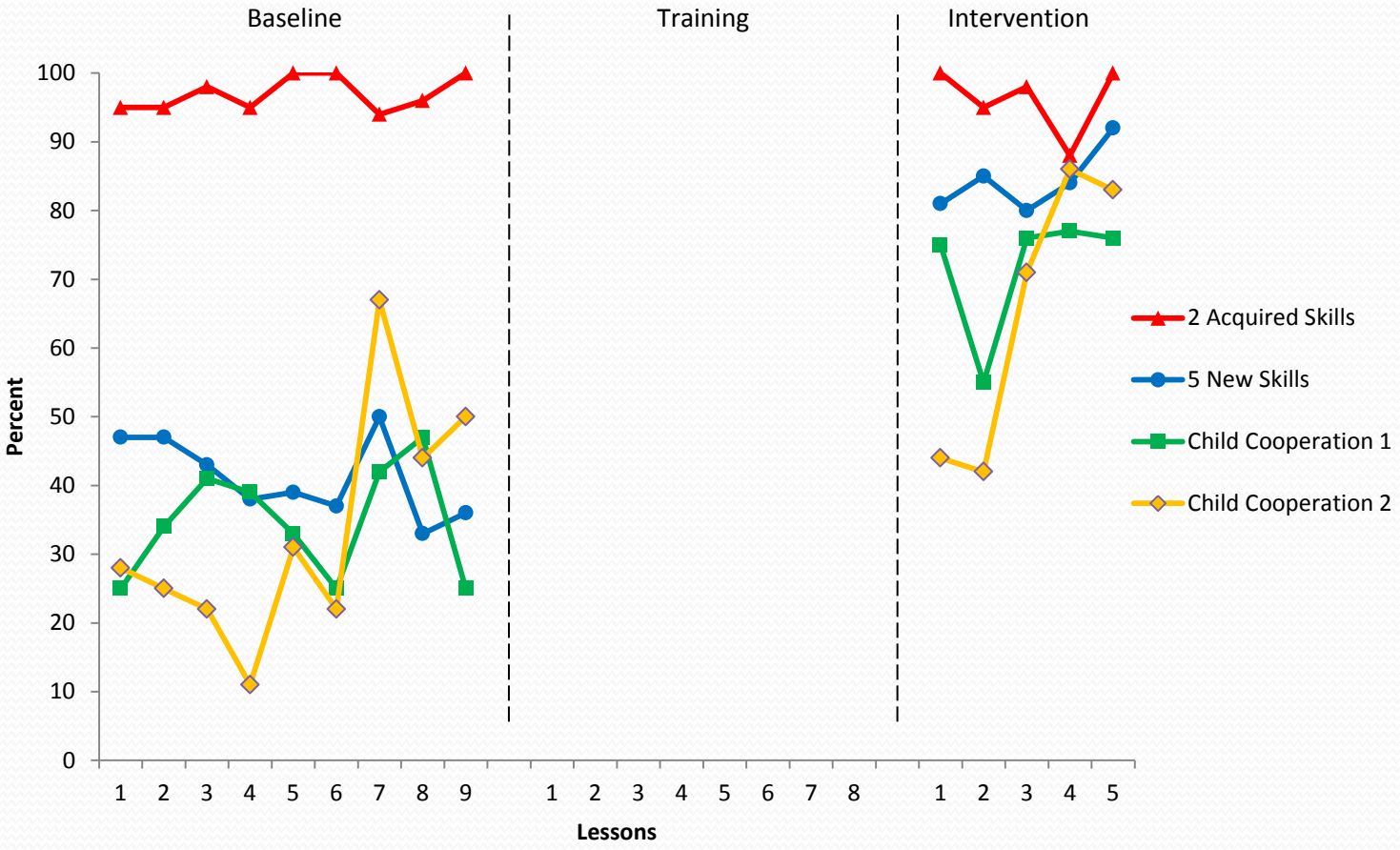


Kristina & Luke: 3 Basic Effects

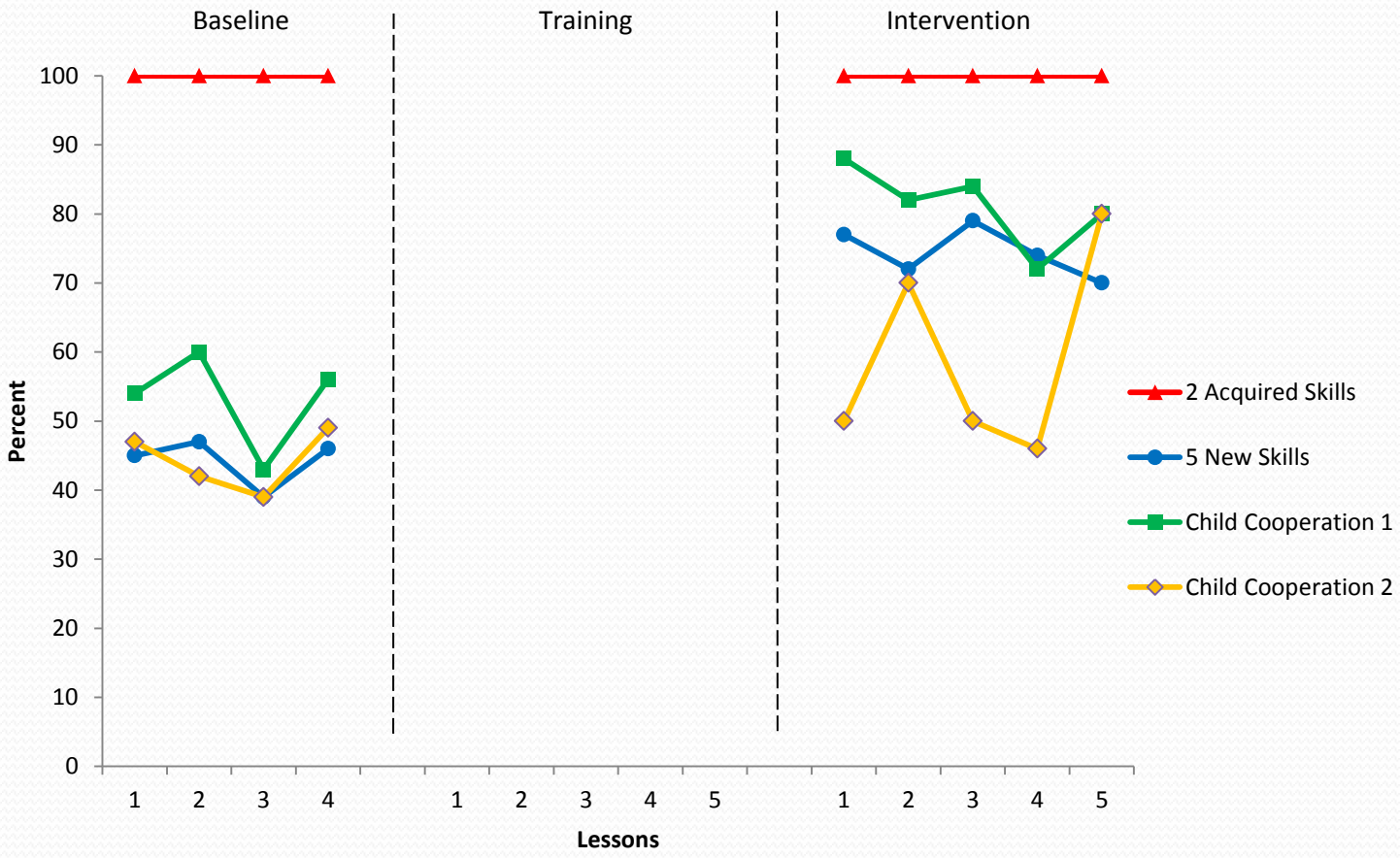


Kristina & Jeff

2 Basic Effects: Instructor New Skills & Child Cooperation 1st Attempt

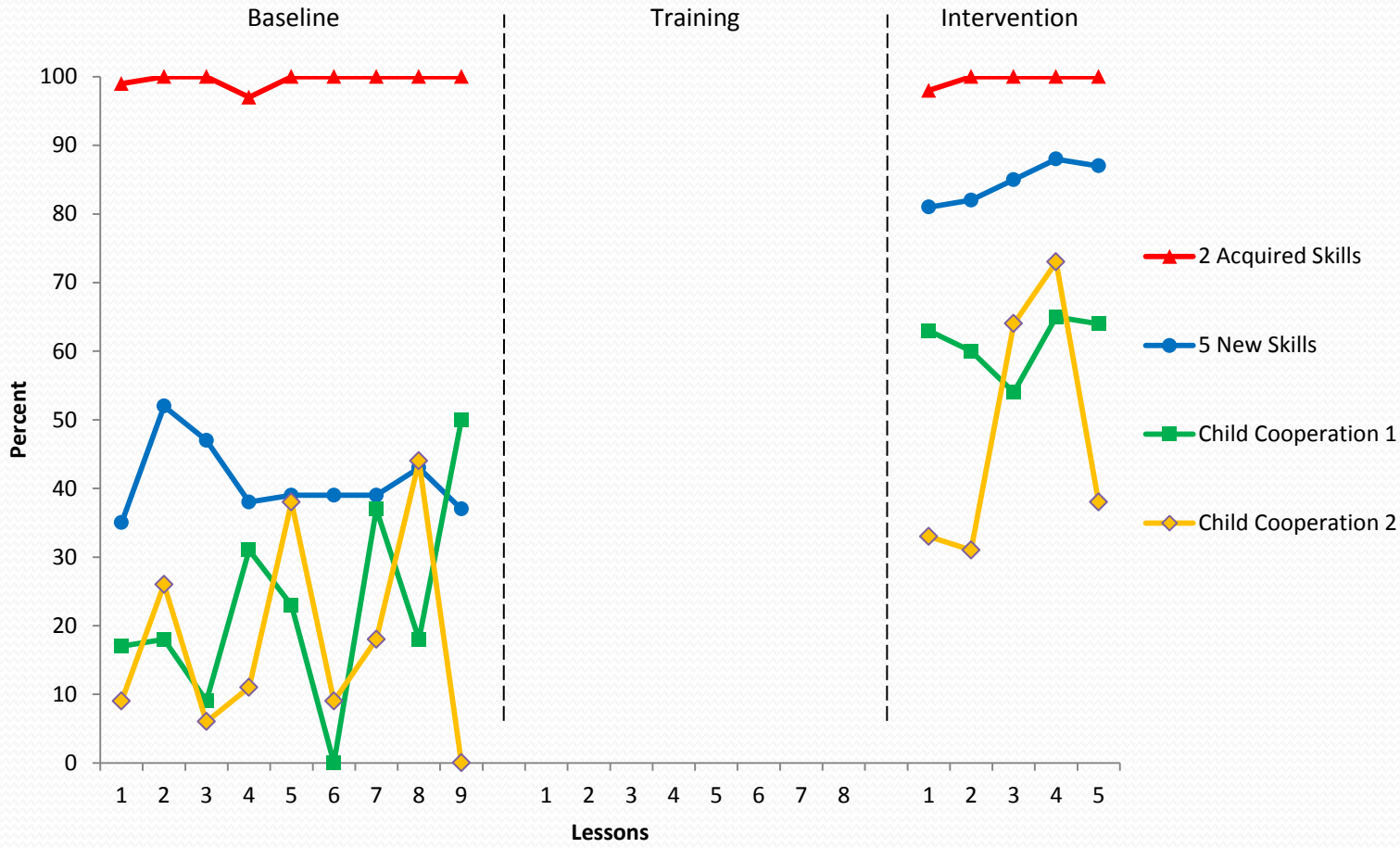


Julie & Carter: 2 Basic Effects



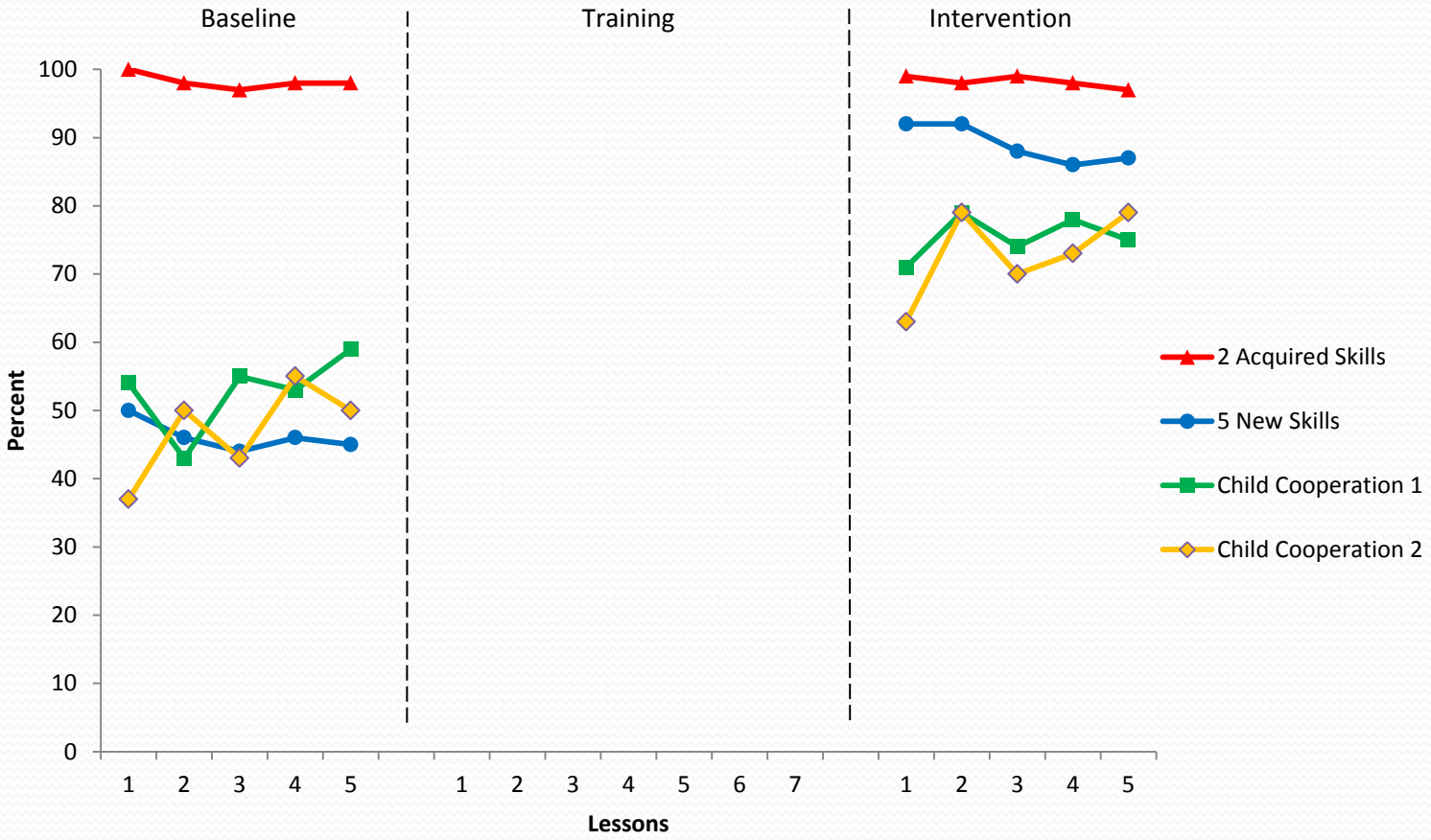
Kristina & Oscar

Basic Effect: 5 New Instructor Skills



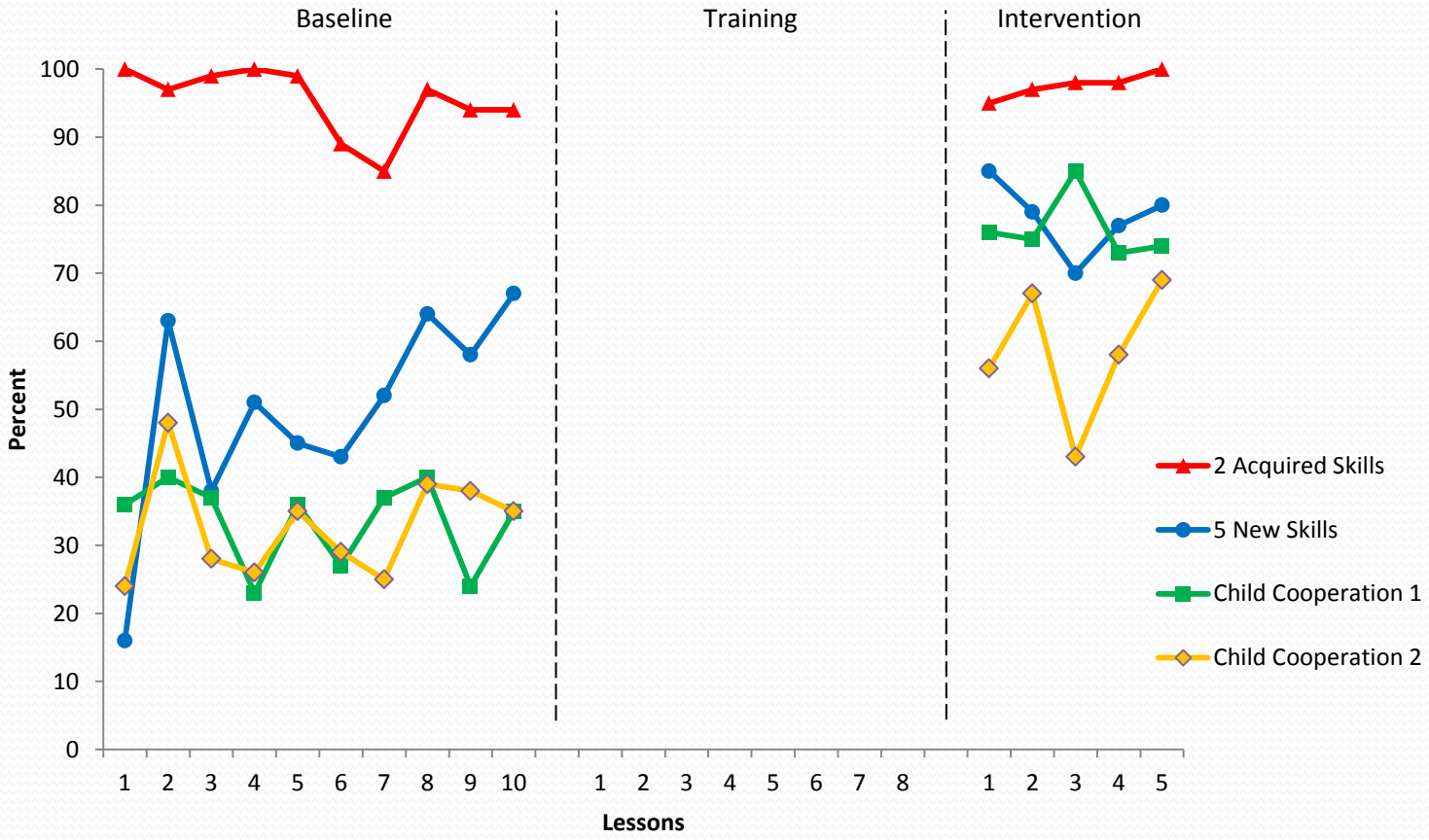
Patty & David

Basic Effect: 5 New Instructor Skills



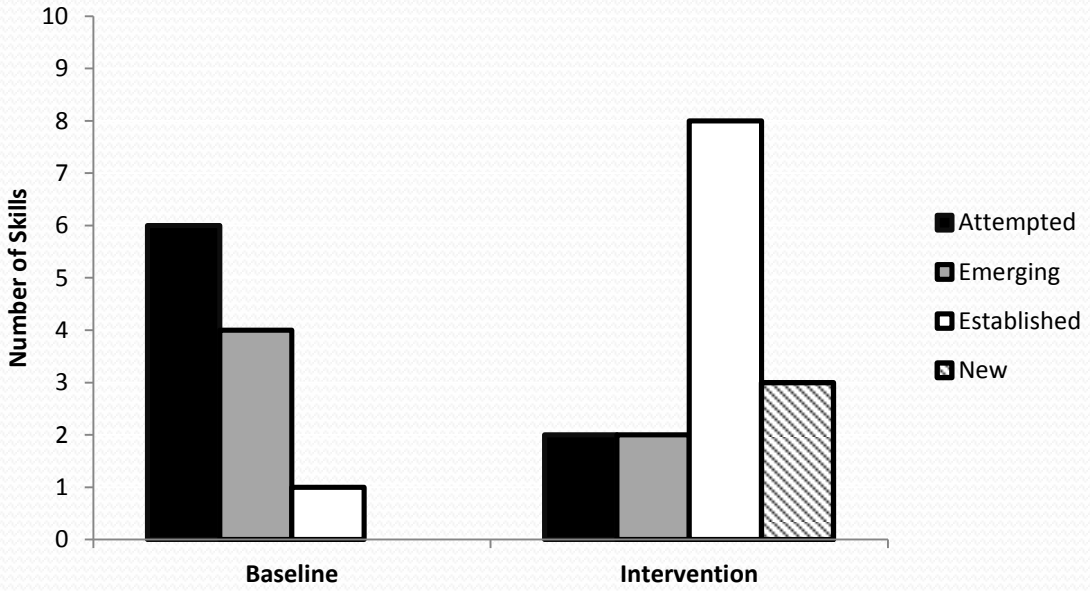
Katie & Arthur

Basic Effect: Child Cooperation 1st Attempt

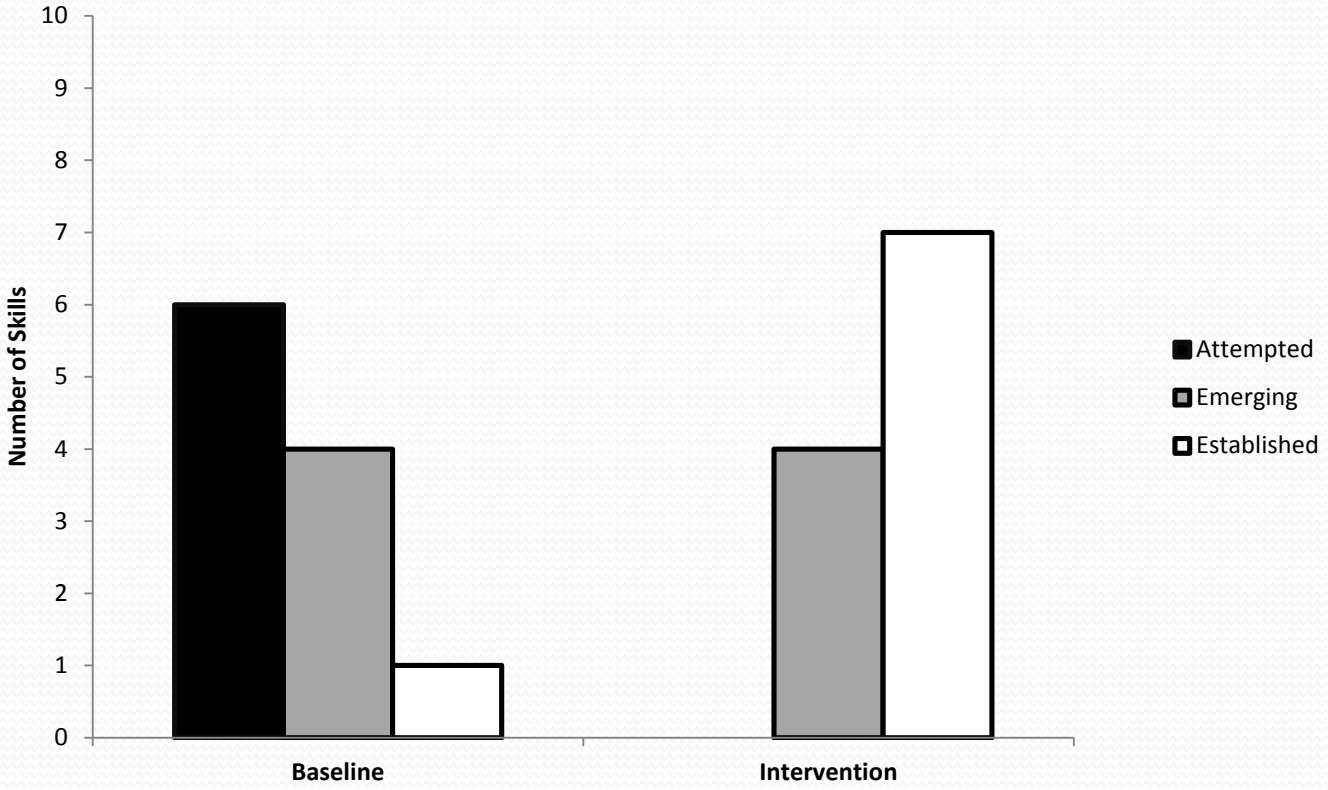


Child Skill Acquisition

Many skills shifting to established: Sara



Luke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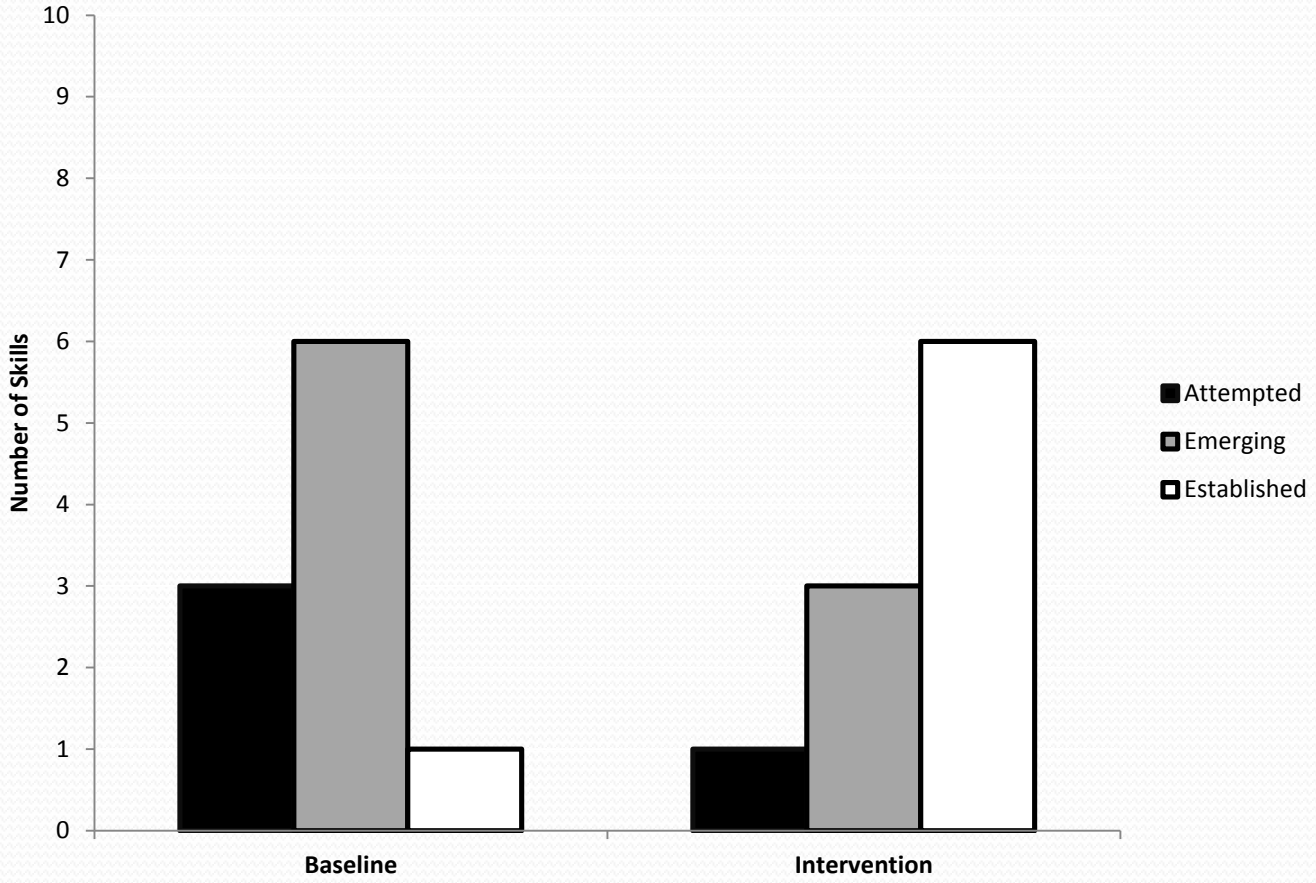
Jeff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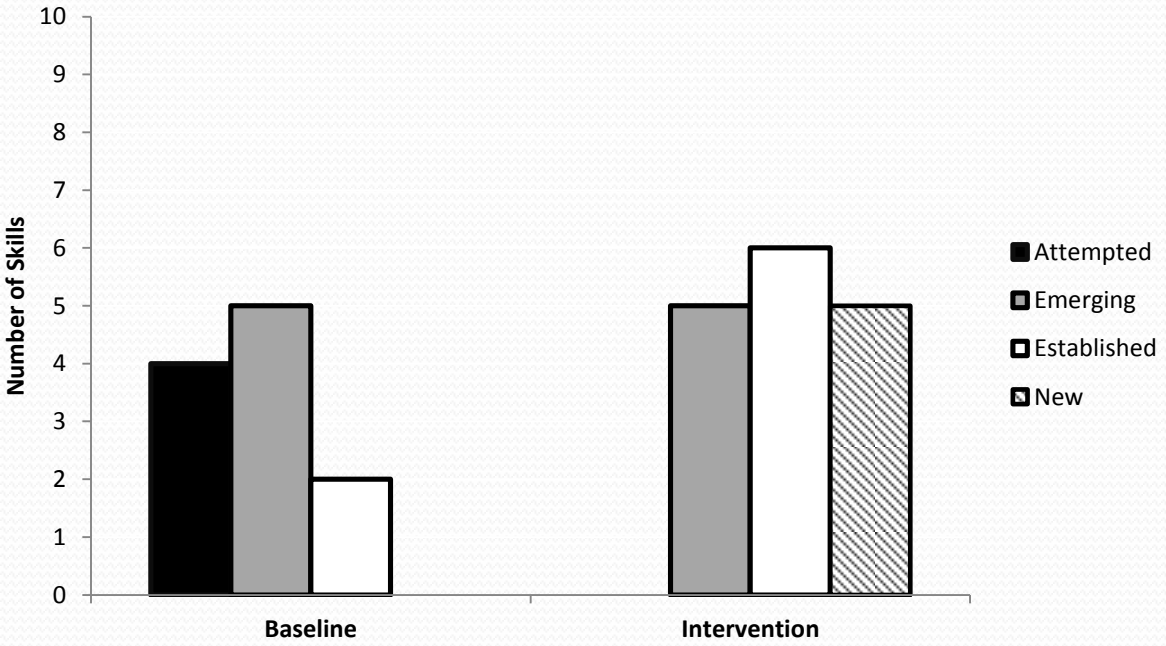
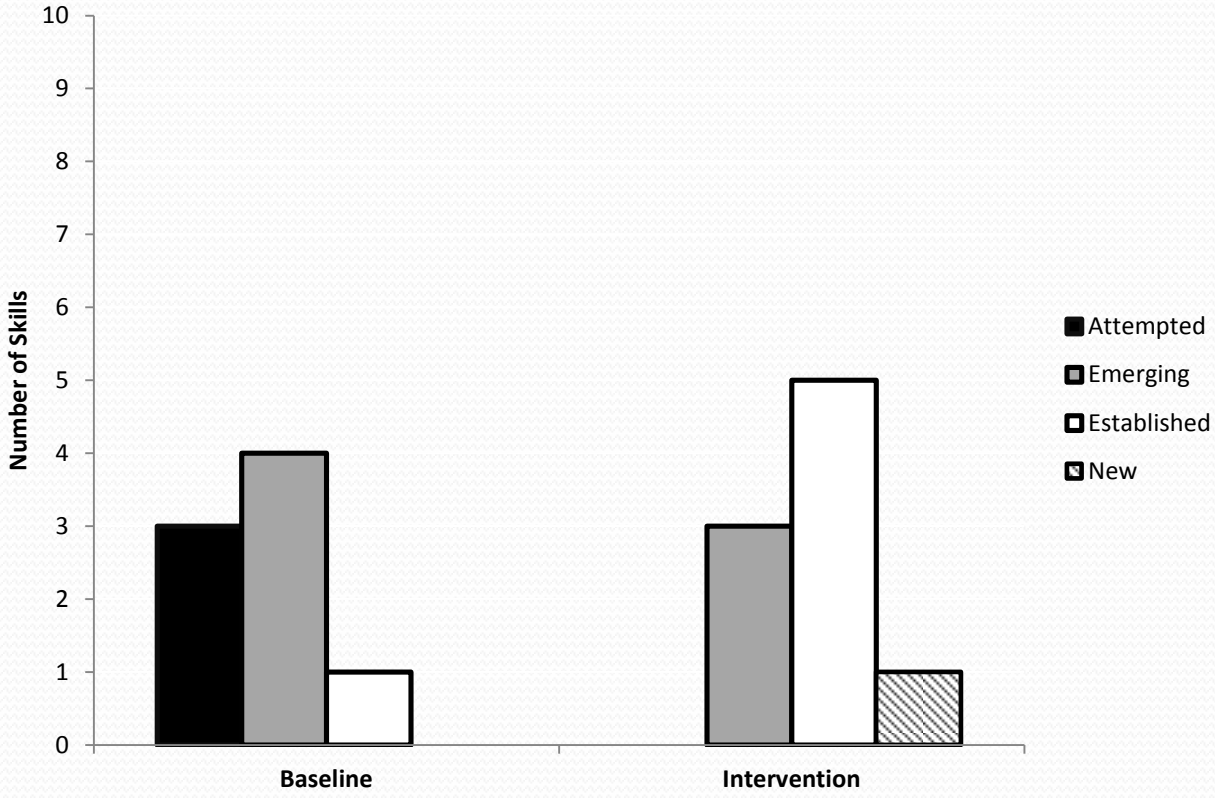
Many skills shifting to emerging or established and new skills introduced: Carter



Chris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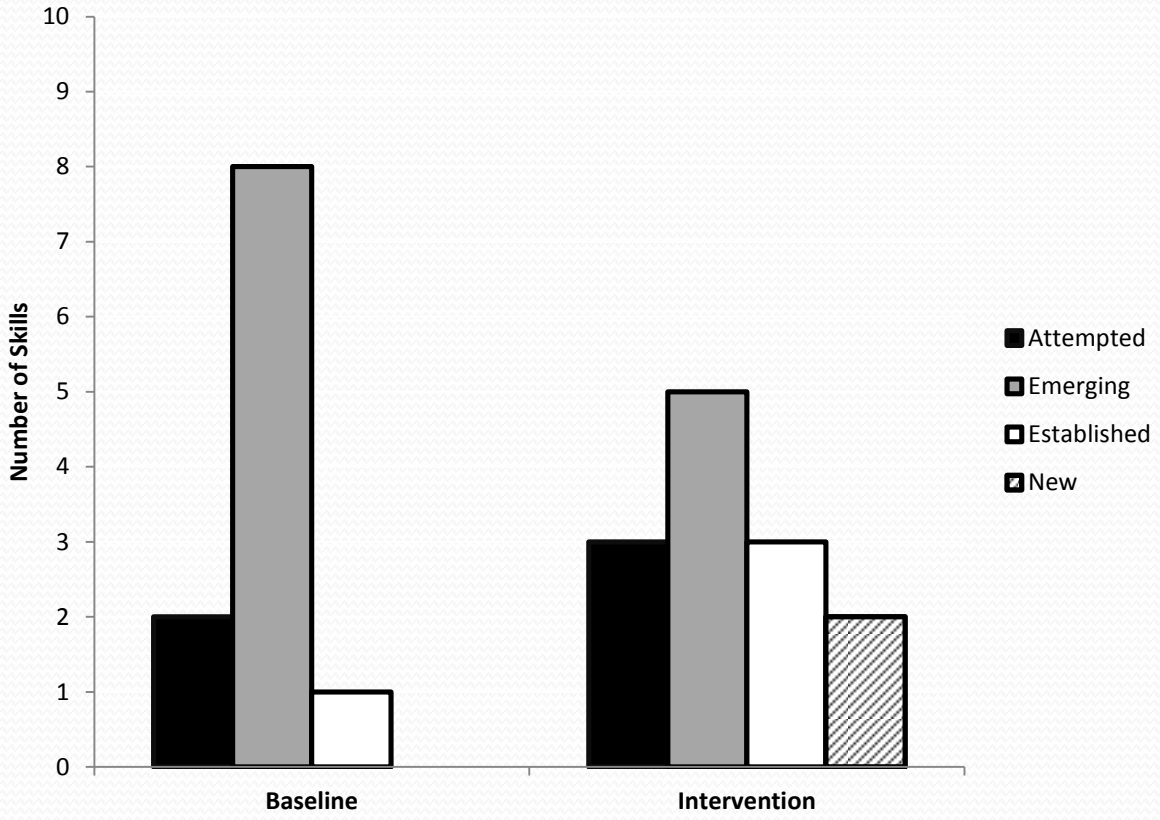
Arthur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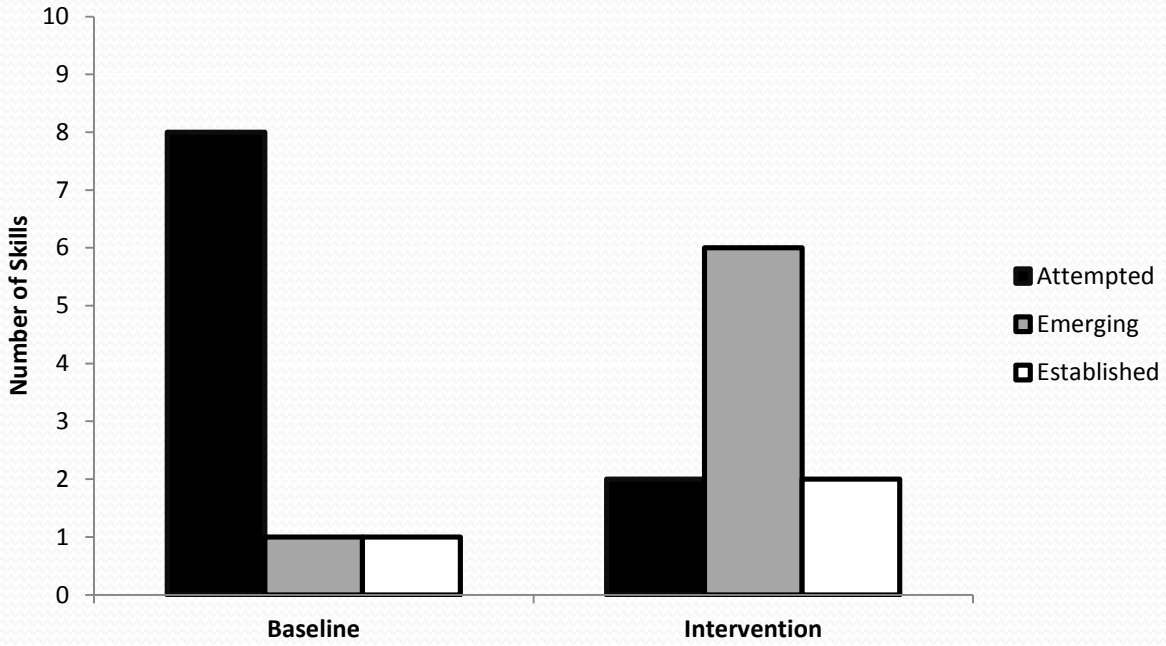
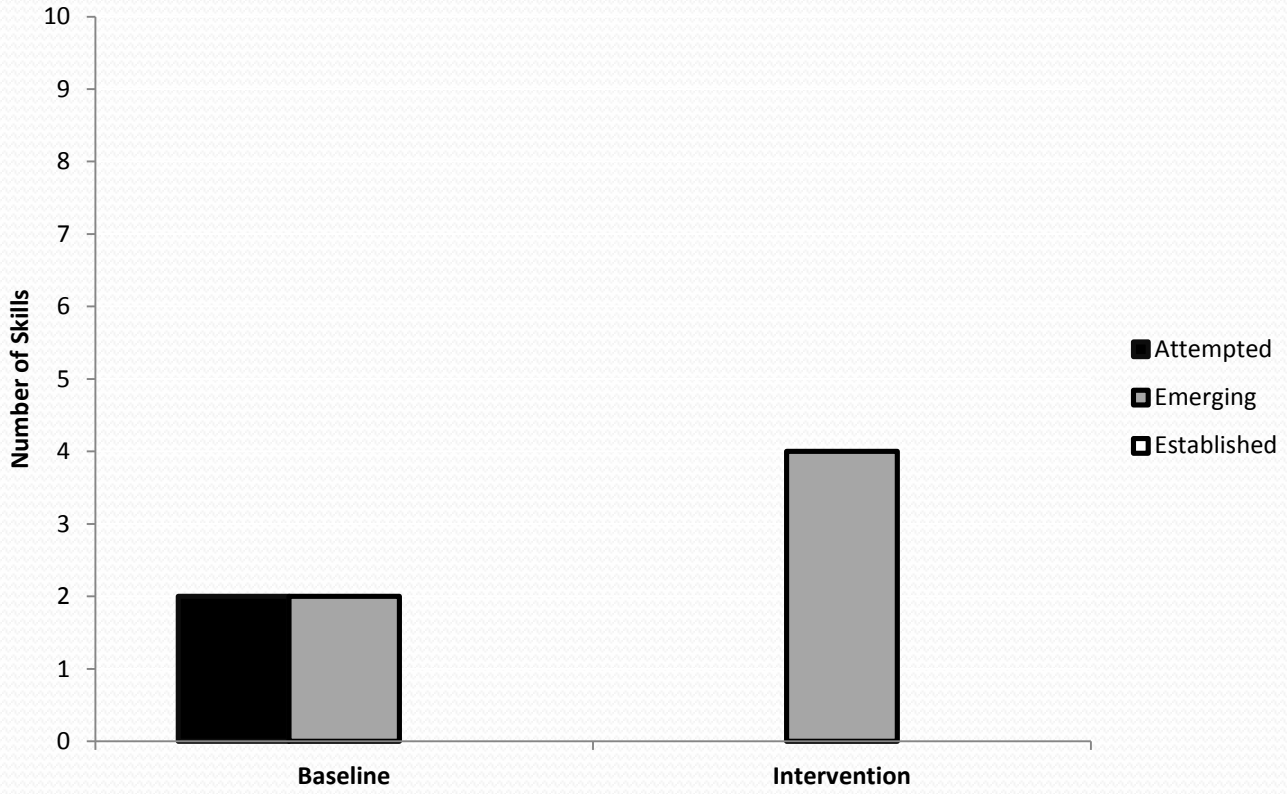
Increase in emerging skills:

Oscar



David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Established

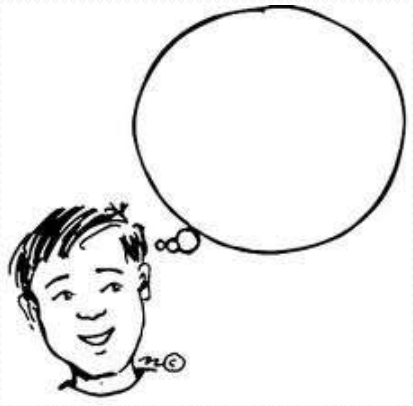
Social and Ecological Validity

Instructors, Parents, Aquatics Coordinators

Social and Ecological Validity

- Social validity is defined as the evaluation of the research goals, procedures, and outcomes by consumers (Wolf, 1978).

- Ecological validity can be described as addressing real-world problems in natural settings with typical intervention agents (Carr et al., 2002).



Parents

Statement 1 = strongly disagree, 3 = neither agree nor disagree, and 5 = strongly agree	Mean score
The instructor made the lessons fun and interesting for my child.	4.8
My child was happy/excited to come to the pool for swimming lessons (or seemed happy/excited when we arrived).	4.8
The instructor used prompting that was helpful for my child.	4.8
My child enjoyed swimming lessons.	4.7
The instructor provided lots of encouragement and praise to my child.	5
My child learned new swimming skills.	5
The instructor was able to get my child's attention and keep him/her involved during the lesson.	5
Watching my child participate in these lessons has encouraged me to take my child swimming.	4.8
The instructor used visual supports that were helpful to my child.	4.8
Watching my child participate in these lessons has encouraged me to try enrolling my child in other community recreation activities.	5

Instructors

Statement 1 = strongly disagree, 3 = neither agree nor disagree, and 5 = strongly agree	Mean Score
The in-pool coaching was supportive and positive for me.	5
I received enough in-pool coaching to become confident using the skills that were presented during the workshop.	4.6
I was able to continue to use the skills I learned during training without the support of the researcher/coach.	4.8
The skills I was taught are critical for instructors who teach swimming to children with ASD.	5
The time that I spent at the workshop and receiving in-pool coaching was worthwhile.	5
The children in our adapted program will benefit from what I learned during this training experience.	5
I felt like I had enough time to learn the skills before I was asked to do them on my own.	4.7
I think that I am more prepared to teach children with ASD than other instructors who have not received the training.	5
I think that other swim instructors in this community centre should also have this training.	5
I felt overwhelmed by the number of strategies I needed to use, even by the *end* of the intervention phase.	1.2

Social Validity: Aquatics Coordinator

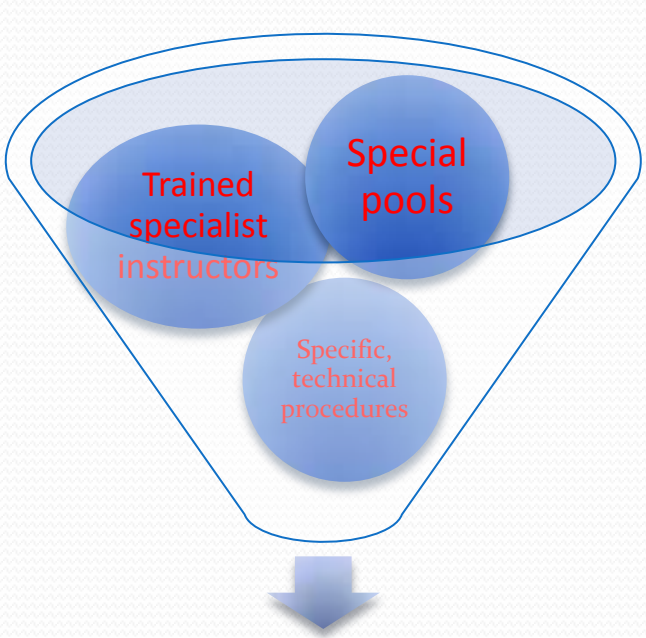
Statement 1 = strongly disagree, 3 = neither agree nor disagree, and 5 = strongly agree	Mean score
The skills that were taught seem useful for any instructor to know if they teaching a child with autism.	5
The skills that were taught are critical for instructors who teach swimming to children with autism.	5
The time that the instructors spent at the workshop and receiving in-pool coaching was worthwhile.	4
The children in our adapted program will benefit from what the instructors learned during this training experience.	4
The workshop and coaching were do-able within our current program.	5
I think that these instructors are more prepared to teach children with ASD than others who have not received the training.	5
I would be interested in repeating this training with another group of instructors.	5

Discussion

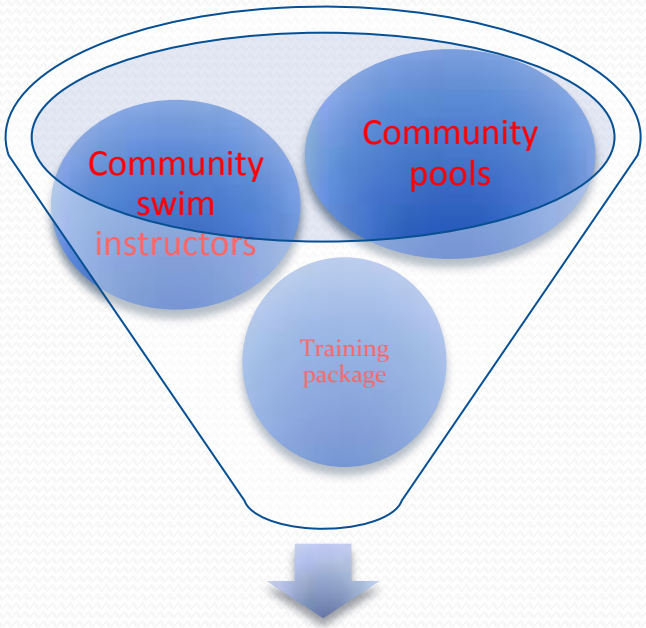
Limitations

Directions for Future Research

Unique Contribution



Child Skills



Instructor skills

Child skills
(cooperation and swimming)

Training Package

- Multiple Training Techniques
  - Didactic instruction
  - Video examples (positive and negative)
  - Role play
  - Modelling
  - Feedback (praise, corrective, written, verbal)
- Multiple Exemplars
  - Skills, Instructions, Schedules, Rapport Building with Train Group
- Programming Common Stimuli
  - Setting, Materials, Visual Supports common to Train and Swim Group

Internal and External Validity

Threats to *internal validity* are unlikely:

- History, maturation, instrumentation

External Validity:

- Diverse group of children (racial/ethnic background, gender, language ability, swimming ability)
- Diverse group of instructors (age, educational background, previous experience with children with autism, initial skill profile)
- Lesson structure (scheduling and size)

Limitations

- Quasi-experimental design
- Small number of participants
- Not possible to know relative impact of various skills
- Not possible to know relative impact of different training techniques
- No follow-up data

Directions for Future Research

- Research design that allows for documentation of experimental control
- Component analysis: which skills?
- Parametric analysis: how much coaching?
- Include follow-up measures to assess long-term learning
- Group lessons

Thank You!

Number of Opportunities

Key Skill	Baseline	Intervention	Increase or Decrease?	Why?
Clear instruction	382	327	↓	Fewer instructions issued
3-Second prompt	163	86	↓	↑ Coop on 1st attempt
Praise	132	252	↑	↑ Cooperation
Rapport	N/A		2 opportunities for rapport per lesson	
Visual supports	33	46	↑	More skills attempted
Wait until ready	Same as clear instruction			
Arms length	Same as clear instruction			

Percent Change Scores

Skill	Baseline	Intervention	Percent Change
3-Second Prompt	9.88 (*SD* 4.79)	80.50 (*SD* 12.21)	714.78%
Praise	31.25 (*SD* 15.46)	69.88 (*SD* 19.37)	123.97%
Rapport	41.25 (*SD* 9.91)	78.75 (*SD* 12.46)	90.91%
Clear Instructions	63.38 (*SD* 14.19)	92.13 (*SD* 4.26)	45.36%
Arms Length	95.13 (*SD* 4.12)	98.13 (*SD* 1.64)	3.15%
Wait until Ready	99.13 (*SD* 0.99)	99.63 (*SD* 0.52)	0.5%

•Note: Visual supports baseline score = 0%, intervention score = 96.5 (*SD* 3.34).

Percent change = (Baseline mean – Intervention mean)/Baseline mean x 100

Percent Change Scores: Child Cooperation

Child Cooperation	Baseline	Intervention	Percent Change
1st Attempt	39.25 (*SD* 10.11)	78.38 (*SD* 12.34)	99.69%
2nd Attempt	32.63 (*SD* 9.24)	68.5 (*SD* 13.33)	52.36%

Coding: Instructor Use of Key Skills

- **Visual Supports**
  - Coded as present or not present *at start of lesson* (present 100% of intervention and 0% of baseline lessons)
  - Coded as present or not present for *each activity*

- **Rapport**
  - Coded as present or not present at the *beginning and end* of each lesson

Coding:
Instructor Use of Key Skills

- **Clear Instruction, Arms Length, 'Wait Until Ready'**
  - Coded as present or not present *for each instruction*
- **Praise**
  - Coded for each instruction where there was a child attempt
- **3-Second Prompt**
  - Coded for any instruction following a non-attempt

Child Cooperation

- Coded as present or not present *for each instruction*
  - Cooperation on the 1st Attempt = Child attempts the instruction the first time it is presented
  - Cooperation on the 2nd Attempt = Child attempts the instruction after one repetition

- Note: The child did not need to perform the action 100% correctly for cooperation to be coded; however, the child's attempt had to bear some topographical resemblance to the action that was requested by the instructor

Child Skill Acquisition

- **Attempted skills**: skills that the child tried to perform but that required full prompting from the instructor on every trial
- **Emerging skills**: skills that the child demonstrated on an inconsistent basis, and/or did not perform well enough to meet the criterion for mastery, as described on the skill list
- **Established skills:** skills that the child performed correctly, consistently, and independently
  - Child performed the skill to mastery criteria on at least 80% of trials on the first attempt and did not require physical prompting from the instructor on more than 10% of trials

Social Validity

- Series of statements on a Likert-type scale from 1-5 and open-ended questions.

Who	When	What
Swimming instructors	After intervention phase	Training and its effectiveness
Parents: Swim group	After intervention phase	Child's progress and instructor's effectiveness
Parents: Train group	After training phase	Child's progress and instructor's effectiveness
Aquatics Coordinators	After intervention phase	Training, child and instructor outcomes