Treatment Integrity Within Applied Research Settings

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Introduction & Rationale

- The field has been challenged by the need to produce rigorous empirical research documenting the outcomes of services & supports.
- Support for the creation & continuation of behavioral services has been historically anchored in both a theoretical & legislative rationale.
  - Consistent documentation within intervention studies affording precise replication & implementation of the independent variable (IV) remain elusive (Gresham, 1989; Gresham, Gansle, & Noell, 1993; LeLaurin & Wolery, 1992; Wolery, 1994; Yeaton & Sechrest, 1981).

Introduction & Rationale

- Researchers are challenged to engage in systematic inquiry that is both highly systematic & measurable.
- Changes in the IV are no longer sufficient; research studies must demonstrate functional relationships between variables & are evaluated relative to their efficacy, efficiency, feasibility, & acceptance (University of South Florida, 2002).
- For this reason, researchers have commented that the state of the field has not expanded far beyond model demonstrations (Smith & Fox, 2003), & have advocated for an emphasis in the development, research, implementation, & replication of evidence-based programs & practices (Blase & Fixsen, 2003).

Baer, Wolf, & Risley (1987)

- "Fidelity to original procedures is recommended because those procedures have been studied & are known to be effective; their variations & alternatives usually have not been studied, so nothing can be said about their effectiveness…
- What is the range of variation of a program's procedures that still allows sufficient effectiveness? If it is large enough, flexible application can be encouraged, & the program's survival in diverse settings may well be enhanced. If it is narrow, fidelity will be required, or what survives will not be effective (p. 321)."

Benefits to the Field

1. Link assessment to intervention
2. Promote generalization across settings
3. Strive to achieve meaningful lifestyle changes & individual/family quality of life
4. Enhance rigor of scientific research driving law & policy for federal entitlement programs (e.g., IDEA)

Reason #1: Linking Assessment to Intervention

- The ability to accurately document the implementation of the IV is a fundamental aspect of accountability.
  - This makes it possible to link assessment to intervention (Carta, 2002; Costello-Ingham & Riley, 1998; Gable, Hendrickson, & Van Acker, 2001).

Reason #2: Promoting Generalization Across Settings

- Measurement of IV implementation in one setting facilitates generalization in others (Halle, 1998).
  - Critically important!
  - The ultimate utility of an intervention is largely dependent upon an individual's ability to generalize a skill flexibly to new contexts & stimulus exemplars.

Reason #3: Meaningful Lifestyle Changes/Quality of Life

- There is a growing interest in achieving meaningful lifestyle changes & social outcomes impacting both individual & family quality of life (Turnbull & Turnbull, 2000).
  - Experts have argued that both meaningful social outcomes & scientific rigor can be achieved through measurement of acceptability, utility, integrity, & effectiveness (Peterson & McConnell, 1993).
  - The field would appear to directly benefit from a thorough analysis of its ability to incorporate, assess, & document replicable evidence of change in the IV.

Reason #4: Enhance Rigor of Scientific Research

- By its own nature, the system of care includes services & supports provided by multiple agencies, each with its own unique laws & policies (e.g., education, health, & public health).
  - Scientific research is used to affect & shape existing law & policy, thereby relying on a high degree of rigor & precision.
  - Such standards demand that research studies demonstrate a clear & functional relationship between the implementation of the IV & changes in dependent variables.

Barriers Impacting Utility

- The field presently lacks consistent practices of labeling, defining, measuring, & reporting the extent to which the IV is implemented as intended.
- Lack of consensus agreement on terminology & definition.
  - Ex. "Procedural fidelity" vs. "treatment integrity"
  - Concerns with not only terminology, but with multiple definitions for the same concept

Terms Reported in EI/ECSE Research Synthesis (Duda, 2004)

- Fidelity
- Fidelity of Treatment
- Independent Variable Measurement
- Procedural Fidelity
- Procedural Integrity
- Procedural Reliability
- Treatment Fidelity
- Treatment Integrity
- Accuracy of Treatment Implementation
- Adherence
- Implementation
- Integrity
- Intervention Integrity
- Parent's Use of Strategies
- Procedural Adherence
- Trainer Implementation
- Treatment Adherence
- Verification of the Independent Variable

Barriers Impacting Utility

- The field lacks both a consistent means of measuring IV implementation & has historically failed to report it within published intervention studies.
- Gresham, Gansle, & Noell (1993): Literature review of *Journal of Applied Behavior Analysis (1980-1990)*
  - Found only 25 of 158 (16%) experimental studies reported integrity of IV implementation (p. 260).

Summary

- There is a strong rationale for more precise & accurate measurement & implementation of the IV:
  1. Ensures proper documentation & accountability; linking assessment to intervention
  2. Facilitates generalization to other settings
  3. Enhances meaningful lifestyle changes & social outcomes impacting both individual & family quality of life
  4. Strengthens both a study's practical application, as well as its ability to directly or indirectly influence education- or health-related law & policy.
- Without consideration of IV implementation-related factors, the potential exists for consumers of research to misinterpret findings
  - Ex.: Conclude that a particular intervention is effective, when in reality, there is not enough information to properly arrive at such a conclusion.
- In order to verify such a hypothesis, researchers need to accurately report the degree to which an intervention was implemented as it was intended.

Measuring Fidelity in Single-Subject Case Studies: *Illustrations of measures, analyses & outcomes in PBS research*

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Advantages of collecting fidelity data in single subject case studies

- **Measuring fidelity of intervention provides:**

- information about consistency & accuracy of intervention implementation
- level of intervention implementation
- opportunity to compare measures of fidelity with other empirical data collected (i.e., child behavior)
- Review support plan if intervention fidelity is low

Gregory

Case Study 1 Example: PBS intervention with 24-month old (Greg)

Greg's Problem Behaviors: Aggression, physical resistance, temper tantrums throughout daily activities, excessive screaming & crying

Medical Concerns:

Multiple ear infections/Tubes inserted

Diagnosis: Receptive/Expressive Language Delay

Intervention Agent: Mother

Selected Routines:

1. Diaper change
2. Bathtime
3. Transition from play

Methodology

Single-subject design

Concurrent multiple baseline across routines

Dependent Variables:

Challenging Behavior: *Aggression, resistance, property destruction, elopement, screaming, crying*

Engagement: *Following directions, participating in activity appropriately for majority of interval*

Independent Variable: PBS process

Supplemental Data

Intervention Fidelity: Checklist of intervention components

Duration of diaper change routine: Length of time

Child Communication Lexicon: Frequency/Different words spoken

Adult Interactions: Positive & negative interactions

Social Validation: Parents ratings of procedures & outcomes

Intervention Fidelity Measure developed from Greg's support plan for each routine

1. Identified & defined each intervention component utilized
2. Each component step broken down to allow data collector to determine and score if component was accurately implemented by mom
3. Fidelity collected & displayed as percentage of steps completed per session
4. Fidelity data reviewed prior to next intervention session to assess consistency, accuracy & level
5. If fidelity was low, or certain steps were not being implemented, discussed with intervention agent

Hypothesis Statement:

Greg displayed challenging behavior in an attempt to escape from home routines that were unpredictable or nonpreferred

Parent Responses

- Clear instructions
- Redirect & ignore
- Praise
- Provide choice
- Materials ready

Skill Building

- Active participation
- Walk independently
- Choice
- Teach gesture for hug

Prevention Strategies

- Visual cues/schedule
- Choice chart
- Preferred items
- Modified materials
- Remove distractions

Fidelity Checklist

DIAPER ROUTINE *Intervention Steps* Was step/procedure implemented? Circle Yes or No
1. Turn off all audio or visual distractions.
2. Provide a clear instruction that it is time for diaper change.
3. Present visual schedule of routine.
4. Discuss steps of diaper routine with Greg
5. Walk into bedroom to changing area. Do not mark "yes" if Greg is carried.
6. Modify area of diaper change to floor.
7. Have Rolle Polle Ollie rug as cue.
7. Have diaper materials in close proximity to changing area
8. Have toy in close proximity to changing area
9. Allow Greg to play with preferred toy during diaper change
10. Redirect & ignore inappropriate behavior by showing Greg schedule & redirecting to immediate activity.
11. Offer Greg opportunity to help in routine (i.e., pulling up pants, putting feet up, throwing diaper away)
12. Assist Greg with standing up
13. Talk about routine and/or toy during activity
14. Praise & physical affection to Greg for appropriate behavior or for each step completed.
15. Announce to Greg when change is complete, "all done"
16. Provide physical affection or acknowledgment of good behavior.
17. At end of routine give Greg option of next activity.

Intervention Fidelity Checklist for Bath Routine

BATH ROUTINE *Intervention Steps* Was step/procedure implemented?Circle yes or no
1. Turn off all audio or visual distractions.
2. Provide a clear instruction that it is time for bath.
3. Provide a picture and/or preferred toy following instruction for bath.
4. Walk into bathroom independently.
5. Give Greg opportunity to participate with transition into bath (putting toys in tub, bubbles, dress).
6. Provide opportunities for Greg to participate while in bathtub.
7. Provide preferred activities during bathtime (mirror, paint soap, crayons).
8. Use shower extender, watering can or plastic bottle to wash & rinse Greg's hair.
9. Let Greg know when bath is done & allow Greg to indicate he would like to continue playing.
10. Ignore problem behavior & redirect to activity & preferred toy.
11. Provide praise/physical affection when Greg is following steps of routine.
12. Announce to Greg, "All done in bath, time to get out" (paraphrased).
13. Assist Greg with getting out of tub & standing on bathmat.
14. Greg is given picture book during ear cleaning, tooth brushing, and/or hair brushing
15. Give Greg opportunity to participate in hygiene activity
16. Praise & physical affection to Greg for appropriate behavior or for each step completed.
17. Announce to Greg, "All done, let's get your pjs".

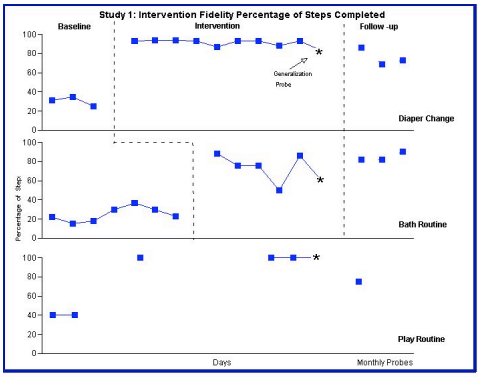
Intervention Fidelity Checklist for Diaper Change

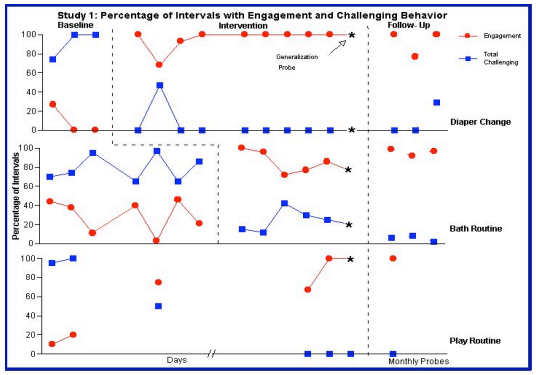
DIAPER ROUTINE Intervention *Steps* Was step/procedure implemented? Circle Yes or No
1. Turn off all audio or visual distractions.
2. Provide a clear instruction that it is time for diaper change.
3. Present visual schedule of routine. Provide Greg with verbal statement of what he can obtain once in bedroom.
4. Discuss steps of diaper routine with Greg
5. Walk into bedroom to changing area. Do not mark "yes" if Greg is carried.
6. Modify area of diaper change to floor.
7. Have Rolle Polle Ollie rug as cue.
7. Have diaper materials in close proximity to changing area
8. Have toy in close proximity to changing area
9. Allow Greg to play with preferred toy during diaper change
10. Redirect & ignore inappropriate behavior by showing Greg schedule & redirecting to immediate activity.
11. Offer Greg opportunity to help in routine (i.e., pulling up pants, putting feet up, throwing diaper away)
12. Assist Greg with standing up
13. Talk about routine and/or toy during activity
14. Praise & physical affection to Greg for appropriate behavior or for each step completed.
15. Announce to Greg when change is complete, "all done"
16. Provide physical affection or acknowledgment of good behavior.
17. At end of routine give Greg option of next activity.

Intervention Fidelity Checklist for Play Transition

Fidelity Checklist

PLAY TRANSITION ROUTINE Intervention Steps Was step/procedure implemented? Circle yes or no
1. Provide a clear instruction that it is time to transition from outside play. (ie., "Greg, it's time to go in the house.").
2. Provide Greg with verbal statement of what he can obtain, once he goes inside (i.e., "Let's go inside so we can get some juice.", "Do you want to play with bubbles at bath?") and/or option of next activity.
3. Provide a picture and/or preferred toy following instruction for transition.
4. Walks into house independently. Do not mark "yes" if Greg is carried or physical guidance is used (picked up).
5. Praise and/or physical affection directed to Greg for appropriate behavior or for completed routine.





How did we calculate

- Each behavior support plan was task analyzed into simple observable steps
- A research team member would code for fidelity via video tape & score "yes" "no" or "N/A" for each session
- "N/A" would be used only if a step was not observable (i.e. camera angle)
- Once session was completed then number of steps completed/total number of steps in that session was computed & expressed as a percentage

Conclusions from Intervention Fidelity Measures in Study 1

-Some intervention component steps were already occurring in baseline

-Mother implemented intervention components with high levels of fidelity following baseline

-Mother spontaneously generalized support components to second routine (transition from outdoor play) prior to directed intervention phase

-Bath routine was complex, & required modifying support plan components throughout intervention phase

-Fidelity measures were lower during monthly follow-up due to change in child maturation level

Mindy

Case Study 2 Example: PBS intervention with 12 year-old girl in school setting (Mindy)

Mindy's Challenges/Medical Concerns:

- Hyperthyroidism, dysmorphic syndrome, asthma, visual impairment, hypotonia
- **Problem Behaviors**: Self-injurious behavior, noncompliance, physical resistance, aggression
- **Diagnosis:** Autism Spectrum Disorder
- **Intervention Agents**: Typical peers
- **Selected Routine:** Daily Physical Education Routine

Methodology

Single-subject design: A-B-A-B Withdrawal Design

Dependent Variables:

Challenging Behavior: *Self-injurious behavior, noncompliance, falling to floor, aggression, screaming, elopememt, masterbation*

Engagement: *Following directions, participating in activity appropriately for majority of interval*

Positive Affect: Percentage of intervals with happy behavior

Independent Variable: PBS Process

Intervention fidelity measure developed from Mindy's support plan for PE routine

1. Identify & define each intervention component utilized
2. Each component step broken down to allow data collector to determine and score if component was implemented by PE buddies
3. Fidelity collected & displayed as percentage of steps completed per session
4. Fidelity data reviewed prior to next intervention session to assess consistency, accuracy & level
5. If fidelity is low, or certain steps are not being implemented discuss with intervention agents

Hypotheses Statements:

Mindy engaged in challenging behavior in an attempt to:

1. To escape from activity that was difficult due to poor motor skills & medical issues

2. To escape from activity that was not predictable

3. To escape from activity that was nonpreferred

Routine Expectations & Intervention Components

PE Routine

1. Transition from computer
2. Put on socks & shoes
3. Stand up & walk to outside track area
4. Walk track
5. Walk into locker room, play for 10 minutes
6. Walk back to class

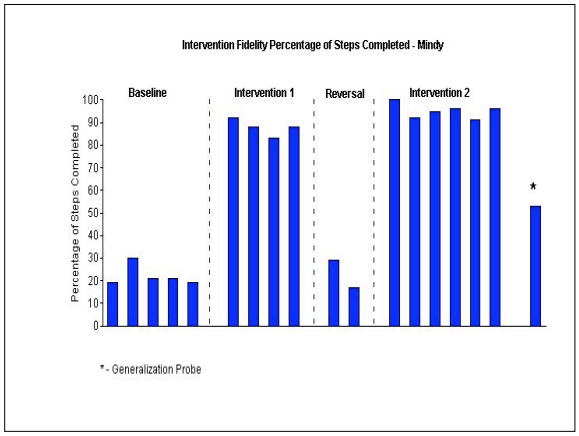
Intervention Components

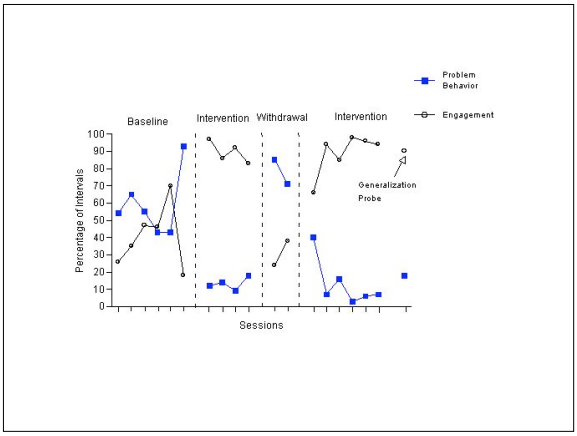
Prevention Strategies
Preferred items
Choice of activities
Add breaks
Visual cues/schedule

Peer Responses
Modified pacing
Physical affection
Rotation of materials
Praise

Replacement Skills
Initiate breaks
Express choice

PE Intervention Steps Was step/procedure implemented? Yes or No	Circle
1. Minimize distractions	
2. Preferred peer to assist	
3. Provide picture schedule	
4. Preferred "Winnie" socks	
5. Clear instruction "It's time to walk"	
6. Preferred activity (tape player)	
7. Preferred item (e.g. plastic lid)	
8. Rotate materials	
9. Grab bag accessible	
10. Dropping – clear redirection, turn off music, etc.	
11. Provide music, praise & attention, when M starts walking	
12. Provide praise & attention	
13. Instruction to go to locker room	
14. Preferred activity (i.e. water play)	
15. Transition out-music, pref transtoy	
16. Praise M during walk back to class	





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- Once session was completed then number of steps completed/total number of steps in that session was computed & expressed as a percentage

Conclusions from Intervention Fidelity Measures in Study 2

- Some intervention component steps were already occurring in baseline
- Peer buddies implemented intervention components with high levels of fidelity following baseline
- Peer buddy dyads
- Documented withdrawal of intervention components during reversal condition
- Fidelity measures compared intervention sessions with generalization probe during different activity

The Role of Fidelity & Dosage in the Implementation of Evidence-Based Strategies in a Special Education Setting

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Project Goal

Goal was to increase the use of evidence-based strategies by special education teachers by using a collaborative approach; & to develop an economical fidelity measure.

Effective Strategies Guides

Effective Strategies Guides

http://cfs.fmhi.usf.edu/Policy/RMRT

Participants

- 87 Students Participated in Outcome Investigation
  - 57 SLD (65.5%)
  - 13 ED (15.0%)
  - 17 EMH (19.5%)
  - 64.4% Male, 66.7% White, 14.6 Average Age
- 14 Teachers Participated in Implementing Guides
  - 9 Middle School - 5 High School

Research Results

Five outcome areas captured over 1½ school years for 87 students

1) Attendance
2) Discipline Referrals (office referrals, in-school & out of school referrals)
3) Academic Achievement – Reading
4) Academic Achievement – Math
5) Time in general education – level of inclusion

Research Results

1) **Reading Achievement** – Increased scores over time for all students
2) **Time in Special Ed** – Decreased time spent in special education settings for all students
3) **Out-of-School Suspensions** – Decreased number over time for all students

   Office Referrals – No change over time
4) **Math Achievement** – No change over time
5) **Absences** – No change over time

Fidelity Measure

Developed an observational checklist to measure level of implementation (fidelity) of the four guides.

- Determined behaviors that were critical in each manual
- Conducted validity & reliability studies
- Resulting fidelity checklist for each area could range in score from 0 (no strategies used), to 10 (all strategies used)

Fidelity Instrument

Criteria	Interview question	Score "1" if:	Circle One	
31) Posts schedules in a prominent place in the classroom, informs students of schedule changes, and provides individual schedules when appropriate	31) Are daily schedules posted in your classroom (i.e., bell and lunch schedules)? How do your students find out changes in the daily schedule (i.e., assemblies)? Are students provided with individual schedules when needed (i.e., for individual therapies or counseling)?	31) Teacher provides evidence of : • schedules posted where students will see them • informing students of daily schedule changes • individual student schedules on desks or in planners, if appropriate	1	0
32) Posts classroom/school rules and refers to them frequently	32) Are classroom and/or school rules posted in your classroom where students can see them? If yes, ask: How often do you refer to them?	32) Teacher provides evidence of • rules posted where students will see them and • indicates reference to them at least once a day.	1	0
33) Arranges desks and instructional areas in a manner that maximizes on-task behavior and minimizes distractions	33) How do you determine placement of desks and instructional areas? • Proximity to teacher • Proximity to other students • Proximity to distractions • Instructional areas	33) Provides evidence of thoughtful arrangement of desks and instructional areas.	1	0
34) Arranges instructional materials i n a manner that maximizes on -task behavior and minimizes distractions	34) How do you determine placement of instructional materials?	34) Provides evidence of thoughtful placement of instructional materials for student use.	1	0

Dosage

For each participating student, we calculated:

Amount of contact with each teacher X Fidelity Score of each teacher using manuals

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(% of day with Teacher A)

X

(Teacher A's **T**otal **F**idelity **S**core)

Can range from 0 to 40

Dosage Formula

For <u>each</u> student:

(% of day with Teacher A) X (Teacher A TFS)

\+

(% of day with Teacher B) X (Teacher B TFS)

\+

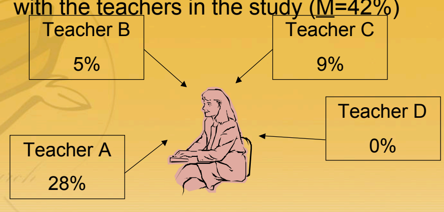
(% of day with Teacher C) X (Teacher C TFS)

=

Dosage Score

Exposure Example

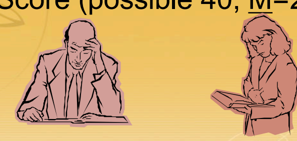
Students spent between 0% & 75% of their day with the teachers in the study (<u>M</u>=42%)



This student spends 42% of his day with teachers in the study

Dosage

Individual teachers ranged from 13.0 to 33.0 on their Total Fidelity Score (possible 40; <u>M</u>=24.4)



Dosage Correlations

Higher dosage scores related to:

- Improved <u>math</u> scores for students in the EMH & ED categories (EMH, r=.455; ED, r=.394)
- Fewer <u>absences</u> for students in the EMH category (r=.439)
- Fewer <u>absences</u> for all students at the high school (r=.349)
- Fewer discipline referrals for all students at the high school (r=.237)

Conclusions

✓ Fidelity & Dosage – Critical for understanding the results of the intervention

✓ Measuring dosage is challenging but is an important effort
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Final things to Consider

- By measuring treatment integrity, the researcher has…..
  - The ability to talk about effectiveness of intervention
  - Multiple ways to collect data in innovative ways that is not burdensome to the researcher/practitioner or to the consumer

Questions/Discussion

Thank You!

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