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The effects of systematic desensitization with a phobic 15-year-old male with autism: A case study with measures of generalization

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Abstract
The purpose of this study was to assess the effects of an intervention program on a phobic 15-year-old male with autism who had a specific phobia for persons who coughed or expressed cold symptoms. This study explored how relaxation techniques such as diaphragmatic breathing exercises and hand-held stress reduction coupled with a step-by-step hierarchical desensitization intervention can be used to reduce social anxiety and aberrant behaviors. Both an ABABAB reversal design and a changing criterions design were used to evaluate the effects of a systematic desensitization the overall outcomes indicated that relaxation techniques were effective in reducing this phobia. The benefits of employing behavioral procedures with children's with autism are presented.

Keywords: Autism, adolescent, social phobia, systematic desensitization, functional assessment, generalization, ASD

Introduction

Childhood anxieties are often associated with avoidance from distressing situations; it's when avoidance affects daily functioning are they classified as a phobia. The main quality of a phobia is that it involves the belief of a high degree of risk in a situation that is relatively safe [1]. Phobic symptoms can Result in Frustrations that are capable of affecting the totality of the individual as well as his/her personality [2]. Among the hundreds of indexed phobias defined today, little research has been done regarding the subject of adolescent fears. It has been documented that approximately 2 to 7% of the population has a social phobia in a given year [4] and more than 12% of the population experiences a lifetime prevalence of social anxiety in communal situations [5]. Children display a variety of fears during the normal course of development [5, 6].

The fourth edition of the DSM-IV specifies the following criteria for a "specific" phobia [7, 8]: 1) marked and persistent fear that is excessive or unreasonable, cued by the presence or anticipation of a specific object or situation; 2) exposure to the phobic stimulus almost invariably provokes an immediate anxiety response; 3) the phobic situation(s) is avoided or else endured with anxiety; 4) in individuals under 18 years, the duration is at least 6 months, and 5) the anxiety or phobic avoidance are not better accounted for by another disorder.

One specific type of phobia is social anxiety; the fear of social situations that involve interaction with other people. In children, the anxiety may be expressed by crying, tantrums, freezing, or shrinking from social situations with familiar people, peer situations, and interactions with adults. Interestingly enough, autism spectrum disorder (ASD) has many comparable definitions and symptoms of social anxieties, such as the lack of social interest, eye avoidance, and the comprised ability to engage in shared interactions. Understanding the genetic etiology of disorders characterized by abnormal social interest, social communication (e.g., autism), or both may prove informative for social phobias [9]. More commonly, the severity of symptoms and impairments of ASD tends to fluctuate in relation to the stability of social Relationships [3].

A recent study [10] compared the phobias of children with ASD to chronologically-age matched children without any developmental disabilities. These authors found that children with ASD were reported to be more fearful of dark spaces, thunderstorms, large crowds, and closed places than the students without developmental disabilities. The children without disability were reported to be more fearful of failure or social criticism (social anxiety), as well as harm, injury, and punishment. These distinctions indicate that phobias and fears affect children who have developmental disabilities significantly differently than children who are typically developing.

While many phobic individuals suffer from social impairments, relatively few end up in treatment for their problems and less than 20% seek professional help [11, 12, 13]. Aside from the circumstances of socializing with an unfamiliar therapist about one's paralyzing fears, the whole social interaction process can be problematic in itself. There are several general classes of treatment for phobias ranging from exposure-behavior therapy and medication to cognitive-behavior therapy and desensitization. Foa and Kozak [14] used exposure treatment as a therapy in which an individual is exposed to a phobic stimulus in a safe and controlled setting. Morris and March [15] detailed a therapy developed by Kendall, Chansky, Kane, Kim, Kortlander, Ronan, [16] termed the "Coping Cat" strategy. This program begins with a skills acquisition phase, moves onto a practice phase, and ends with a generalization phase.

The fore mentioned treatment therapies have been shown to be successful treatments for adolescent phobias related to social anxiety. Although one cognitive-behavior therapy is frequently utilized above other treatments has been the classic phobia reduction method systematic desensitization. Wolpe [18] developed a graded series of real-life exposures to elicit fears ranging from the least to the most anxiety provoking

situations. Intricate to this exposure are prior coping strategies taught in managing fear. At each step in the hierarchy, desensitization minimizes phobic anxieties through the use of coping techniques, which ultimately allows the individual access to the phobia while practicing the learned stress reduction strategies.

The purpose of this study was to assess the effects of a systematic desensitization intervention program on a phobic 15-year-old male with ASD. Exploration on how relaxation techniques such as diaphragmatic breathing exercises and hand-held stress reduction coupled with a step-by-step hierarchical intervention served to reduce social anxiety and aberrant behaviors with in the family structure. Specifically, this research was designed to allow a young male's family access to one another in his presence where the adolescent would seem comfortable with his phobia, his aunt.

2. Method

2.1 Participant and Settings

Tony, who had been diagnosed with ASD and exhibited many of the common characteristics associated with that identification, was the participant in this study. He was 15-years-old, male, and raised in a middle-class family in the Pacific Northwest. At the time of the study, Tony was experiencing difficulties in school and home settings. Specifically, he engaged in aggression, destruction, and elopement in the presence of persons who coughed, had a cold, or had a history of displaying symptoms of a cold in his presence. Of great concern, Tony would no longer be present in the same room or social setting with his aunt, who had displayed cold symptoms in front of him five years prior to the investigation. This caused much distress for his family because he could not attend social gatherings that his aunt attended.

The intervention took place in several settings. Initially, observation visits took place at Tony's mother's house. Alternative settings included his father's house, his middle school, and the Gonzaga Center for Applied Behavior Analysis located at Gonzaga University [18]. Initially, Tony's behaviors were problematic across each setting. Subsequently, his elopement and non-compliance resulted in the cancellation of two different observation appointments occurring at Gonzaga. After several sessions, his problem behavior displayed the lowest levels in his dad's house; thus, a majority of our observations were conducted on a bi-weekly basis in this setting. As the need for generalization occurred, observations were also conducted at his aunt's home.

2.2 Response Definitions

Tony's responses that served as target behaviors included appropriate and aberrant behaviors. Appropriate behaviors were defined as Tony's participation when requested by the therapist. Examples of these behaviors included Tony watching a video after being directed to do so, answering questions, and looking at pictures. During the last stages of desensitization, appropriate behaviors included talking with Aunt Karen on the phone, visiting her home, and talking with her in person. These behaviors were defined as compliance with therapist demands which included 1) sitting or lying down quietly and participating in what the therapist requested, 2) practicing diaphragmatic breathing, or 3) practicing handheld stress reduction techniques. Aberrant behaviors were defined as non-compliance while participating in therapy. These behaviors included 1) physically rocking back in forth when seated, 2) avoiding eye contact, 3) verbal threats, 4) tantrums, 5) elopement, 6) saying "No, and/or 7) not answering questions. Observations ranged between 15-90 minutes in duration and 2-12 sessions were conducted each day. Observation duration varied based on behavioral outcomes. For example, if Tony was fully compliant, his observations would last between 15-30 minutes. If he was non-compliant, sessions would generally take twice as long due to requested breaks, multiple instances of practicing his calming techniques, and off-task de-escalation chats.

2. 3 Data Collection

Data on appropriate and aberrant behaviors were collected using a 6-second partial interval research system during 5-minute sessions. Aberrant behavior took precedence when scoring; if at any time during a 6-second interval, Tony displayed aberrant behavior (regardless if appropriate behavior was demonstrated for the majority of the interval), it was scored as a negative.

2.4 Reliability

To determine reliability, a second observer kept a simultaneous, but independent, record of Tony's behaviors. Interobserver agreement was assessed during 61% of the 5-minute sessions. The percent of interobserver agreement was calculated by dividing the number of agreements divided by the number of agreements plus disagreements and then multiplied by 100. The percent of reliability was 93% (range: 83-100%). To determine relaxation technique integrity, we probed the first 5-minutes of 23% of treatment observation days. Although Tony did not need to engage in relaxation training during all probes, a trend was observed were he initially needed relaxation breaks often (70% of the session) which decreased to a level of 10% of a session on the last day of treatment.

2.5 General Procedures and Experimental Design

The investigation took place across five stages: a preference assessment, baseline, individual training, systematic desensitization, and finally generalization to his Aunt's house. Both an ABABAB reversal design and a changing criterions design [19, 20] were used to evaluate the effects of a systematic desensitization (SD) on the subject's phobic reactions during aversive situations. Baseline data was taken first, then steps 1-3 of the 15-step hierarchal intervention was implemented. A total of 24 observations were taken for the length of the investigation with two additional sessions of follow-up to show maintenance skills at one week and generalization skills at two weeks after the completion of the study.

2.5.1 Baseline 1: Prior to the intervention, Tony did not attend most family functions by tantruming, elopement, or locking himself in a room away from Aunt Karen or any person(s) who had exhibited symptoms of a common cold within the last few years. These behaviors generalized to everyday situations including school, family, and social life. A baseline assessment was conducted in the family room at his mother's home that lasted approximately one hour. During baseline, Tony played with toys of his choosing and answered general questions asked by the therapist. Initially, he was unaware that

Aunt Karen was coming for dinner. Following a period, he was told of her visit. Subsequent to Tony being told, we attempted to discuss un-aversive situations with him; this took place for 25 minutes. After his Aunt arrived, baseline was continued for 10 minutes and the session ended.

2.5.2 Preference assessment (PA): This assessment was conducted over one observation visit to determine the hierarchy of Tony's preferred activities and was can read out in two phases. First, we informally interviewed his mother to identify various activities and tangibles that she believed Tony preferred. The PA was conducted in a forced choice format [21, 22]. Two items (black & white computer generated pictures of tangibles) were paired concurrently; it was up to Tony to pick his preferred item. Small 3-4 minute breaks were given when he requested to stop.

2.5.3 Training sessions: Prior to intervention, Tony participated in a single, 1-hour training session to practice relaxation techniques. These coping skills were taught for use in response to his phobia-induced problem behaviors associated with Aunt Karen. The first anxiety reduction strategy used was a diaphragmatic breathing exercise, also known as "belly breathing." This method included 1) sitting or lying down on a couch, 2) placing one hand on his chest and the other on his stomach, 3) inhaling through his nose and feeling his belly expand, 4) exhaling through pursed lips and feeling his stomach contract, and 5) rest, then repeat. This exercise was done ranging from 10-20 breaths and at completion; Tony was offered another set of breathing drills if needed, or to move onto the next step in intervention. The second anxiety reduction strategy was a handheld stress reduction method, also known as "squishy ball." This method included 1) sitting or lying down on a couch, 2) placing a small ball in hand, 3) squeezing, tossing, or catching the ball, 4) switching hands if necessary, and 5) rest, then repeat. This exercise was done for a pre-specified amount of squeezes, tosses, or catches as determined by Tony and at completion, he was offered another set of squeezing drills if needed, or we moved onto the next step in intervention.

2.6 Additional baseline sessions

Additional returns to baseline occurred within situations in which Tony was exposed to uncontrollable factors prior to the scheduled observation. Specifically, session 12 (return to BL2) occurred at Gonzaga University following a sneeze by his father on the way to clinic. Session 18 (return to BL3) occurred again at Gonzaga University, which was now associated with his father's sneeze.

2.7 Interventions

2.7.1 Systematic desensitization (SD) steps. An established, 15-step hierarchy of Tony's avoidance was arranged in regards to aunt Karen with gradual step-by-step exposure (see Table 1). If Tony displayed aberrant behaviors, therapy would cease and his calming strategy of choice was practiced. Movement to the next hierarchal step was discussed with Tony prior to each step being introduced. For example, at step 1, Tony was instructed to sit and quietly think of aunt Karen and her physical characteristics. Step 2 included him visualizing Karen and verbally discussing her appearance, memories, and so forth. In step 3, Tony looked at photos of his aunt by herself and accompanied by other family members. If at any time he began displaying aberrant behaviors ("No," avoidance, etc.), the therapist stopped the visualization and instructed him to practice a calming technique of his choice. When asked if he was ready to continue and complied, therapy resumed, this time introducing photographs of aunt Karen. Again, if Tony exhibited aberrant behaviors (avoiding eye contact, tantrums, etc…), therapy was stopped to resume his calming technique of choice.

As therapy continued, Tony progressed to viewing home videos of Karen (step 4). The primary goal of the treatment was for Tony to use these skills in his aunt's home. Step 5 included video footage traveling from Gonzaga University to the exterior of his Aunt's house; this was the beginning step of re-introducing her home while practicing his anxiety-reduction techniques. At step 6 we introduced verbal interactions, as he was asked to talk to Karen on the phone for 30 sec-1 minute intervals. Next, Tony moved onto viewing interior video footage of Karen's home (step 7), followed by visiting her home while she was not present (step 10). At step 12, Tony was able to sit in the same room with his Aunt and maintain his appropriate behaviors while practicing his stress-reduction techniques if needed. Finally, Tony was able to maintain his appropriate behaviors at Karen's home in the absence of his therapists (step 14) and generalize the same behaviors to his own home during a family dinner with his aunt at step 15.

Table 1: Systematic Desensitization Hierarchy for Tony

S. No.	Hierarchy
1.	Tony sits and silently thinks about Karen until comfortable with image(s)
2.	Tony discusses Karen (physical characteristics, memories, etc…)
3.	Tony looks at a picture(s) of Karen
4.	Tony watches a video(s) of Karen
5.	Tony watches video footage traveling from Gonzaga to Karen's house (footage was of exterior home only)
6.	Tony speaks to Karen on phone
7.	Tony watches interior video footage of Karen's home (she narrates as well as appears in video w/ her husband)
8.	Tony repeats Step 6 and Step 7 during same session
9.	Tony repeats Step 7 and discusses visiting Karen's home (the house will be empty)
10.	Tony visits Karen's empty house
11.	Tony watches video footage of him visiting Karen's empty house
12.	Tony visits Karen's home w/ her in the same room
13.	Tony watches video footage of him visiting Karen's house w/ her in same room
14.	Tony visits Karen's home w/out therapist present *
15.	Karen visits Tony's home for family event (dinner)*

Note: Asterisks indicate maintenance (step 14) and generalization (step 15) follow-up.

3. Results

Results for the treatment are shown in Figure 1. As shown in the first two 5-minute sessions, no discriminative stimulus was provided and Tony engaged in zero rates of aberrant behavior. Conversely, during sessions 3-7, the discriminative stimulus of his Aunt's impending arrival was introduced and his aberrant behaviors increased to 100% by session 7. It should be noted that during session 7, he eloped to his bedroom to escape and did not emerge until after his Aunt left the house. During

session 8, Tony's relaxation techniques (RT) were introduced and we continued to evaluate the environmental context without a discriminative stimulus. Zero rates of aberrant behavior occurred. Over the next 10 sessions, a treatment-baseline-treatment-baseline sequence of sessions was conducted. As shown, zero rates of aberrant behavior took place when RT was in place. In addition, we were able to introduce the first three steps of the systematic desensitization (SD) treatment training. Sessions 11, 15, and 16 had high percentages of non-compliance (avoidance and elopement) when Tony was shown photos of Karen. During baseline, the two return to sessions (12 and 18) and session 18's return to baseline at Gonzaga's clinic, his aberrant behavior increased. We re-introduced a condition in which no discriminate stimuli were placed on him during sessions 19 through 27. During this time, we did not discuss any subject related to Karen, and Tony's appropriate behaviors were above 90% for nine consecutive sessions. SD steps 1-3 were reintroduced beginning with session 28 and gradually increased to step 4 with minimal aberrant behaviors through session 46. It should be noted that in session 33 Tony's elopement behaviors spiked to 52%. Anecdotally, we believe this behavior was prompted from an interaction earlier that day regarding his bus routine and a peer who had a cold weeks before. RT (breathing exercises) was practiced and the session ended without further escalation. During sessions 47-50, Tony's aberrant behaviors (mean = 56%) indicated that skipping from viewing videos of Karen to visiting her home did not allow a gradual desensitization sequence. We reviewed the hierarchal steps and broke them down into smaller incremental phases (5 additional steps). This allowed Tony to experience success and furthered his treatment progress. Interestingly, when these stages were added, Tony's aberrant behaviors maintained virtually zero rates of aberrant behaviors from sessions 51-75. For follow-up session 76, Tony was able to maintain appropriate behaviors while in the presence of his Aunt and without the presence of his therapist. During follow-up sessions 77-79, Tony was able to generalize his relaxations skills from his Aunt's home to his mother's house, even though a small percentage of aberrant behaviors (avoidance) were recorded.

4. Discussion

Social anxiety disorders are common, impairing, and responsive to treatment, yet remain under recognized (15, 4). In the current investigation, the effects of a systematic desensitization intervention program were evaluated. Results suggest that the procedure used to treat social anxiety phobias in individuals may also be effective with adolescents diagnosed with ASD.

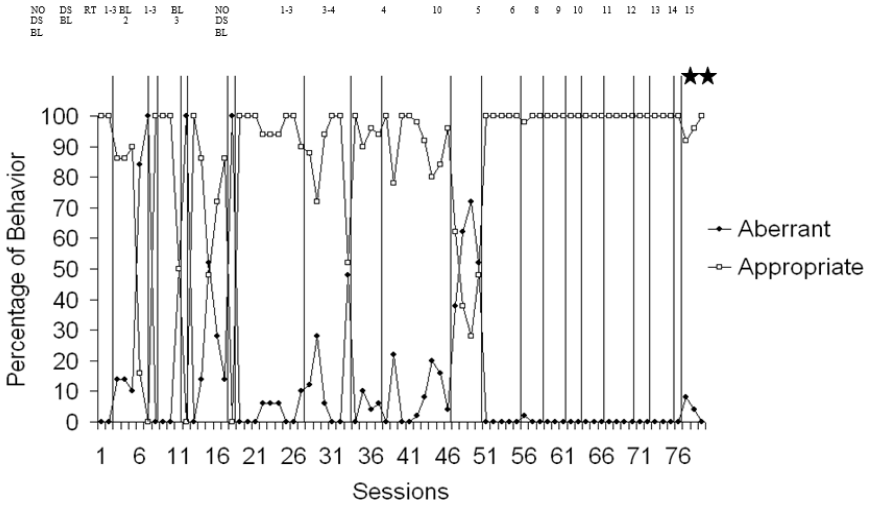

Fig 1: Tony's behaviors across discriminative stimulus baselines (DS BL), baselines (BL), relaxation techniques (RL), and systematic desensitization hierarchy steps during sessions. Stars indicate maintenance (step 14) and generalization (step15) and follow-up.

Given the fact that Tony reacted aggressively early on during baseline and discriminative stimulus sessions, it's suggested that hierarchy steps be analyzed at the beginning of each observation for possible strengths and weaknesses. It was found that Tony's desensitization hierarchy needed to be altered, specifically; step-by-step sessions were added and elongated to accommodate the introduction of new stimuli while experiencing success. With the addition of these new steps, the efficacy of intervention produced near zero levels of aberrant behavior. Therefore, the treatment allowed Tony to be part of his family again and appropriate behaviors were maintained and generalized to settings outside his Aunt's house. At eight weeks follow-up, Tony maintained and displayed appropriate behaviors while in the presence of his discriminative stimulus in multiple settings with his family.

This study presented one limitation of concern regarding the lack of available information on the etiology of his phobia. Previous findings with children with ASD suggest that these children are reported to be more fearful than other children. This increased anxiety depends, in part, on the nature of the fears being assessed [23]. As with many phobias, pinpointing the exact cause is difficult to determine. Typically, when individuals who have experienced an incident are confronted with a stimulus situation comparable with the original incident, they suddenly feel overwhelmed by anxiety-eliciting memories [24] Tony's parents speculated that his phobia originated five years ago when his Aunt displayed common cold symptoms (sneezing and coughing). After years of reinforcing aberrant behaviors such as allowing him to escape when in uncomfortable settings and tantruming, this would

explain Tony's noncompliance and elopement responses during his initial discriminative stimulus introduction. It can also be suggested his behaviors were further reinforced at school. Katz and McClellan [25] and Walker, Homer, Sugai, Bullis, Sprague, Bricker, and Kaufman, [26] determined if serious behavior problems are not addressed before age 8, the child is likely to have long-lasting conduct problems throughout school, often leading to suspension or dropping out. Tony's large stature, verbal threats, and physical aggression towards peers and teachers allowed him to escape any situation he found to be aversive. Not only did his phobic responses give way to social isolation, but his multiple school disturbances and suspensions eventually led to a school transfer. It can be hypothesized that these events resulted not only in desensitization step-by-step setbacks, but a longer treatment time frame.

It should be noted that Tony's medications, Bu Spar (anti-anxiety), Fluoxetine (anti-depressant), and Risperdal (anti-depressant), were adminstered daily throughout the research. Four months into the study, Tony was taken off Risperdal over a two-week period and introduced to Abilify. This did not seem to alter Tony's responses to treatment as his aberrant and appropriate behaviors were similar before and after the medication substitution.

Finally, future research might examine the effects of systematic desensitization treatments for younger children as opposed to adolescents. For example, the current single-subject study utilized a 15-year-old male with an unusual phobia to common cold symptoms over the course of a seven month period. Future research might vary the ages of both males and females to asses similar isolated phobias, interventions, treatment schedules, maintenance, and generalization. Also, it would be useful to study the consequences of phobias on family dynamics, school settings, and peer relations.

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