

EVALUATION THE EFFECTS OF THE ACT MATRIX ON VALUES-ALIGNED
BEHAVIORS OF PARENTS OF AUTISTIC CHILDREN

by

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DEDICATION

I dedicate this dissertation to Melanie, for keeping me humble through this entire process and inspiring me to keep at it.

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LIST OF ABBREVIATIONS

Acceptance and Action Questionnaire (2 nd edition)	AAQ-II
Applied Behavior Analysis.....	ABA
Acceptance and Commitment Therapy	ACT
Attention Deficit Hyperactivity Disorder	ADHD
Autism Spectrum Disorder	ASD
Behavioral Observation Record	BOR
Behavior Skills Training.....	BST
Cognitive Behavior Therapy	CBT
Difficult Child	DC
Early Intensive Behavior Intervention.....	EIBI
Intellectual Disability	ID
Individual Educational Plan	IEP
Interobserver Agreement.....	IOA
Mindfulness-Based Stress Reduction	MBSR
Neurotypical	NT
Parent-Child Dysfunctional Interaction.....	P-CDI
Parental Distress	PD
Pervasive Developmental Disorder-Not Otherwise Specified	PDD-NOS
Percent of Nonoverlapping Data	PND
Parent Stress Inventory – Short Form (4 th edition).....	PSI-4-SF
Parent Training	PT
Randomized Controlled Trial	RCT
Relational Frame Theory	RFT
Regression to the Mean	RTM
Total Stress	TS

ABSTRACT

EVALUATION THE EFFECTS OF THE ACT MATRIX ON VALUES-ALIGNED BEHAVIORS OF PARENTS OF AUTISTIC CHILDREN

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The current study examined the effect of the ACT Matrix on values-aligned parenting behaviors for parents of autistic children. It also assessed secondary measures of parenting stress and psychological flexibility for participants. Results of daily behavior observations indicate a functional relationship between the ACT Matrix and increased values-aligned parenting behaviors. Pre- and post-test measures of psychological flexibility indicate that a brief, 45-minute engagement in the ACT Matrix increased psychological flexibility across all participants. Pre- and post-test measures of stress had variable results. These findings have implications for interventionists supporting parents of autistic children in increasing their values-aligned parenting behavior and psychological flexibility.

Keywords: Parenting, autism, stress, psychological flexibility, acceptance and commitment therapy

CHAPTER ONE

Becoming a parent is a uniquely challenging and rewarding experience. Americans view parenting as a fulfilling journey that enhances wellbeing (Hansen, 2012); however, a large body of research documents significant negative impacts on psychological wellbeing for parents when compared to their age-matched nonparent peers (Nelson et al., 2014). These negative impacts include higher levels of depression, parenting stress, and negative emotions, such as anger and anxiety (Nelson et al., 2014). The financial responsibility of raising a child (Ganz, 2007) and lack of leisure time (Sawyer et al., 2010; Sharpe & Baker, 2007) are some of the many variables thought to contribute to increased stress among parents.

Research points to mediating factors that predict whether, and to what degree, parents will experience stress related to parenting (Falk et al., 2014). These mediators include financial strain (Gyamfi et al., 2008), parenting self-efficacy (Jackson & Huang, 2000; Raikes & Thompson, 2005), and sleep disturbance (Meltzer & Mindell, 2007). Considering that these mediators are often exacerbated when raising an autistic child, it is not surprising that parenting an autistic child is associated with even greater increases in stress than parenting a neurotypical child.

Parenting an autistic child involves increased financial strain, time burdens, and social isolation when compared to parenting a neurotypical (NT) child (Abbeduto et al.,

2004; Hassan et al., 2021; Kogan et al., 2008). These unique stressors are thought to contribute to the added stress and decreased wellbeing of parents of autistic children (Abbeduto et al., 2004; Kogan et al., 2008).

Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by stereotyped patterns of behavior, persistent alterations in social skills, and challenges engaging in neurotypical communication (American Psychiatric Association; APA, 2013). According to the Center for Disease Control (CDC; Maenner et al., 2021), approximately 1 in 44 children are diagnosed with ASD, with boys four times more likely to receive an ASD diagnosis than girls. The umbrella of ASD covers autistic disorder, childhood disintegrative disorder, pervasive developmental disorder-not otherwise specified (PDD-NOS), and Asperger syndrome. Thus, the characteristics and needs of autistic individuals and their families vary widely.

Given the wide range of communicative, social, and behavior presentations among autistic individuals, ASD manifests in a variety of ways, including, but not limited to, physical aggression, self-injurious behavior, persistent interests, disordered eating, and disordered sleeping (Yates & Couteur, 2016). Notably, autistic individuals often demonstrate difficulty regulating behavior and communicating with family and peers.

ASD is considered a lifelong diagnosis. Some autistic individuals live as independent adults, obtaining jobs and financial independence, without needing family or therapeutic support. Others require lifelong care, living in group homes or assisted living facilities, necessitating financial support from parents or other family members (Matson

& Rivet, 2008; Seltzer et al., 2003; Shattuck et al., 2007). Consequently, an ASD diagnosis alone provides little clarity on the individual's long-term outcomes. This makes it challenging for a parent to anticipate the extent to which they will be required to adjust their long-term expectations when their child receives an ASD diagnosis.

Among autistic individuals, forty percent receive a secondary psychological or medical diagnosis, such as Attention Deficit Hyperactivity Disorder (ADHD), intellectual disability (ID), gastrointestinal (GI) disorder, or seizure disorder (Levy et al., 2010). These frequent co-occurring diagnoses compound the already vague and varying profile of autistic individuals and further complicate a family's ability to set expectations for their newly diagnosed child.

Parenting an Autistic Child

An immense body of literature illustrates that parenting an autistic child presents unique and persistent parenting challenges that result in a high level of stress, above that experienced by parents of neurotypical (NT) children (Baker-Ericzén et al., 2005; Bonis, 2015; Brosbst et al., 2008; Costa et al., 2017; Hayes & Watson, 2013; Hoffman et al., 2009; Lee, 2009; Lee et al., 2009; Rao & Beidel, 2009; Sanders & Morgan, 1997) and children with other developmental disabilities (Abbeduto et al., 2004, Dabrowska & Pisula, 2010; Estes et al., 2013; Hayes & Watson, 2013; Schieve et al., 2007). From the onset of diagnosis, parents of newly diagnosed autistic children are tasked with navigating a variety of scientific and pseudoscientific therapeutic treatments for their child in a complicated, expensive, and often confusing healthcare system (Ruble & McGrew, 2007). This is coupled with the responsibility to learn about a potentially

unfamiliar diagnosis. Additionally, parents often take on these newfound responsibilities while adjusting to the loss of the child they envisioned and embracing new expectations for their autistic child (Mulligan et al., 2012; O'Brien, 2007). As parents transition into their new normal, they must leave behind prior expectations of who their child would be and how their family would look. Feelings of guilt and resentment often surface, as do feelings of uncertainty surrounding outcomes for their child (Altiere & von Kluge, 2009).

After an initial ASD diagnosis, parents often face a substantial adjustment to their daily lives, including financial modifications and spousal relationship changes (DePape & Lindsay, 2015). The financial reality of supporting an autistic child is troubling. Health insurance can cover some of the necessary therapies for autistic children, but this is dependent on the parent's health insurance coverage, which is often dependent on their job. Thus, parents are forced to work to cover the cost of autism treatment and to maintain health insurance coverage (Järbrink et al., 2003; Fletcher et al., 2012). Even with health insurance coverage, a substantial amount of costs associated with autism treatment are not covered, leaving parents to pay out of pocket (Fletcher et al., 2012).

Parenting an autistic child requires an increased time commitment compared to parenting a neurotypical child. This includes driving to and from therapy appointments, time spent at Individual Educational Plan (IEP) meetings, time spent navigating therapeutic options and supports, and time spent at doctors' appointments (Sawyer et al., 2010; Woodgate et al., 2008). In addition to time spent on autism care, it is necessary to note that finding an outside caregiver is often more challenging for the parent of an autistic child. Daycare options, after-school care, and babysitting options are often

limited due to the unavailability of care providers equipped to manage challenging behaviors or alternative communicative needs of autistic children (Houser et al., 2014).

Relationship Between Autism and Parenting Stress

Parenting stress is an imbalance between the perceived responsibilities of parenting and the available resources to fulfill these responsibilities (Abidin, 1997; Raphael et al., 2009). As discussed, an autism diagnosis results in a substantial increase in parenting responsibilities and causes increased strain on the finances, time, and relationships of a family. Despite this, an autism diagnosis alone only weakly predicts increased stress for parents. Instead, parenting stress is strongly predicted by the severity of ASD symptomatology. Self-injurious behavior, tantrum, and irritability are strong predictors of parenting stress (Estes et al., 2009; Herring et al., 2006; Paynter et al., 2013; Siu et al., 2019). Delays in social skills also strongly predict increased parenting stress for parents of autistic children (Anthony et al., 2005; Baker-Ericzén, M.J et al., 2005).

The child's behavior and characteristics are not the only contributing factor to a parent's stress. Other predictors of stress include a parent's ability to cope with their child's differences and challenges (Hastings & Johnson, 2001; McStay et al., 2014; Miranda et al., 2019). Coping can include accessing resources, including social support and financial assistance (Benson, 2010; Hobfoll, 2002; Holahan et al., 1997).

Adverse outcomes associated with increased stress for parents of autistic children include increased risk for depression (Bitsika & Sharpley, 2016) and anxiety (Hayes & Watson, 2013; Tint & Weiss, 2016) as well as decreased wellbeing (Montes & Halterman, 2007). Additionally, research has found that increased parental stress is

associated with decreased effectiveness of early intervention (Osborne, McHugh, & Reed, 2007) and decreased adherence to behavioral treatments (Rovane et al., 2020) for autistic children. As a compounding problem, the relationship between parental stress and child maladaptive behavior is a reciprocal one; increased child maladaptive behavior, such as tantrums or irritability, results in increased stress of the parent, and increased parental stress results in increased maladaptive behaviors of the child (Zaidman-Zait et al., 2014). Thus, addressing a parent's stress is essential for both the parent's quality of life and the child's developmental outcomes.

Interventions to Support Parents of Autistic Children

Despite the increasing challenges faced by parents of autistic children, there have been few evidence-based interventions to support their wellbeing. In fact, parenting interventions have typically focused on improving parents' skills for managing a challenging child, with any improvement in the parents' mental health considered a collateral positive side effect rather than the focus on the intervention (Brookman-Frazee et al., 2006). In recent years, there appears to be a renewed focus on parent mental health and a growing body of research on interventions to support parents of autistic children.

Singer et al. (2007) conducted a meta-analysis of group interventions to support parents of developmentally disabled children, dividing their review into three categories: behavioral parent training studies, coping skills education based on cognitive behavior therapy (CBT), and studies combining these two skills. Their findings found strong evidence for the use of combined interventions, with joint parent training and coping

skills training interventions significantly more effective than those individually targeting one or the other.

More recently, Frantz et al. (2018) conducted a systematic review of interventions to specifically support parents of autistic children. They divided their review into five categories: psychoeducational programs, CBT, mindfulness-based stress reduction (MBSR), behaviorally-based programs, and other. Interventions categorized as “other” included progressive muscle relaxation, massage therapy, and journal writing. This review found mixed outcomes across interventions, with the most robust support for behaviorally-based and mindfulness-based interventions. It is important to note that these findings are based primarily on studies analyzing a single intervention. Thus, there is potential for publication bias to skew the results.

In a recent review of existing mental health treatments for parents, Catalano et al. (2018) found promising results for professionally led workshops covering stress management, acceptance, and problem-solving skills. Three themes emerged in this review: the importance of incorporating parents’ perspective-taking skills and coping strategies, the effectiveness of social support by other parents, and the effectiveness of providing autism education to parents of autistic children. Each of these three themes was associated with decreased stress across the 23 included studies. Nine of the reviewed studies included stress management strategies, with two utilizing an Acceptance and Commitment Therapy (ACT; Hayes et al., 1999) approach. The studies incorporating ACT were associated with decreased depression and distress as well as increased psychological flexibility.

Across the literature, ACT has emerged as particularly well-equipped to support parents of autistic children. ACT has been shown to improve stress, depression, and overall wellbeing in parents of autistic children (Andrews et al., 2021; Blackledge and Hayes, 2006; Byrne et al., 2021; Catalano et al., 2018; Da Paz & Wallander, 2017). These improvements are thought to be mediated by psychological flexibility and consistency between actions and values (Fung et al., 2018).

Acceptance and Commitment Therapy

ACT is a type of behavior therapy rooted in functional contextualism, behavioral analysis, and relational frame theory (Hayes, 2004; Hayes et al., 2001). Functional contextualism provides the philosophy underlying ACT, which highlights the situational and historical context within which individuals behave (Hayes et al., 1988; Hayes, Stroschal, & Wilson, 2012). Relational frame theory provides an account of human language and cognition development through exponential networks of verbal relations (Hayes et al., 2001) in which ACT operates. Finally, behavior analysis provides a conceptually systematic framework through which ACT functions (Tarbox et al., 2020). These three ACT roots contribute uniquely to the ACT framework and will be further explored in Chapter 2 to elucidate ACT's mechanisms for behavior change.

ACT employs acceptance and mindfulness strategies, in combination with commitment and behavior-change strategies, to increase psychological flexibility. ACT targets psychological flexibility, defined as contacting the present moment and adapting to fluctuating situational demands (Hayes, 2004), by elucidating an individual's adherence to dysfunctional rule-governed behaviors. Rule-governed behaviors are actions

an individual engages in based on verbally-mediated rules around the behavior, rather than contact with direct contingencies (Skinner, 1966). These rule-governed behaviors become dysfunctional when an individual continues to engage in them, despite direct contingencies that contradict the behavior's effectiveness. Thus, ACT works to increase awareness surrounding the damaging effects of flawed rule-governed behavior to help individuals engage in behaviors that move them toward more valued living.

Researchers have demonstrated significant effects of ACT for individuals with chronic pain (Hughes et al., 2017), depression (Forman et al., 2007; Zettle et al., 2011), and anxiety (Bluett et al., 2014; Forman et al., 2007; Swain et al., 2013). Specific to parenting, two systematic reviews of the ACT literature (Byrne et al., 2020; Han et al., 2020) demonstrate a pattern of significant improvements in stress, depression, and anxiety and moderate effects on psychological flexibility. These results have generalized to parents of children with neurodevelopmental disorders, chronic pain, and significant physical health difficulties (Byrne et al., 2020).

ACT is particularly applicable to challenges faced by parents of autistic children, as these parents experience difficult thoughts and feelings due to the unique and consistent challenges of parenting an autistic child. In the seminal study of ACT for parents of autistic children, Blackledge & Hayes (2006) demonstrated improved psychological outcomes for parents, including significant reductions in depression and stress and decreases in cognitive fusion and experiential avoidance. Other researchers have built upon these findings, solidifying outcomes of decreased depression and stress (Fung et al., 2018; Hahs et al., 2019) and extending positive outcomes to physical health

(Lunsky et al., 2017), quality of life, anxiety, and psychological flexibility (Poddar et al., 2015).

Despite these promising findings, some barriers exist to parents engaging with the ACT model. ACT sessions are complex, often spanning several months and requiring consistent, ongoing meetings with an ACT-trained therapist. Additionally, insurance companies often limit the number of yearly therapy sessions an individual can attend. Given the already full schedules of parents of autistic children and the financial burden of having a child with autism (Sharpe & Baker, 2007), a brief intervention targeting the same processes could increase accessibility and engagement with the ACT model.

The ACT Matrix

The ACT Matrix is a method for delivering ACT to individuals in a brief, visual format with the goal of enhancing psychological flexibility and increasing valued living (Polk & Schoendorff, 2014). Developed by Kevin Polk in 2009, the ACT Matrix encourages individuals to sort their experiences into categories and recognize what hinders their ability to move toward what is important in their lives. Visually, the ACT Matrix consists of a vertical line bisecting a horizontal line to create four quadrants. It encompasses all components of ACT concisely and efficiently, allowing the participant to walk away with an action plan for increasing their values-aligned behaviors. While extensive research demonstrates the effectiveness of ACT as a comprehensive intervention to increase psychological flexibility and decrease experiential avoidance, to date, there is limited empirical research specifically on the ACT Matrix. The current

study provides an empirical analysis of the ACT Matrix, specifically when implemented with parents of autistic children.

CHAPTER TWO

Parenting an autistic child is associated with elevated stress levels, mediated in part by the child's level of challenging behaviors. This problem is intensified due to the bidirectional relationship between parenting stress and the child's challenging behaviors, in which challenging behavior of the child increases a parent's stress level, and increased parental stress results in increased challenging behaviors (Zaidman-Zait et al., 2014). While a vast amount of research focuses on decreasing the challenging behaviors of autistic children, less attention is paid to the other side of this bidirectional equation.

Interventions aimed at parenting are often focused on training the parent to anticipate or respond to their child's challenging behaviors in a manner that will modify or decrease the behaviors in the future. Any decrease in the parent's stress level is seen as an unintended, albeit positive, side effect of the intervention. In addition to the child's level of challenging behavior, a known predictor of stress is the parent's ability to cope with their child's challenges and access supportive resources (Benson, 2010). Thus, focusing on parents' ability to cope and providing parents with supportive resources are avenues to improving outcomes for parents of autistic children.

As previously discussed, ACT is a type of behavior therapy rooted in functional contextualism, behavioral analysis, and relational frame theory (Hayes, 2004; Hayes et al., 2001). Each of these components is essential to the implementation of ACT and is necessary to understand ACT's mechanisms for change.

Functional Contextualism

Functional Contextualism is a philosophy of science that emphasizes the situational and historical context within which individuals behave (Hayes et al., 1988; Hayes, Stroschal, & Wilson, 2012). By considering an individual's situational and historical context, a person's behavior is analyzed not as an isolated event but as an interconnected component of their timeline and contexts. Within functional contextualism, behaviors are labeled "acts in context" to further emphasize this worldview (Hayes et al., 1988). Functional contextualism aims to predict and influence behaviors with precision, scope, and depth. It requires an explicitly stated verbal goal that the individual identifies as the reason for better understanding their behavior, or acting, in context (Hayes et al., 2012). Success is determined by movement toward the explicitly stated verbal goal. For example, if an individual is interested in addressing their behavior of yelling, functional contextualism would approach this desire by first asking what the individual wishes to accomplish by decreasing their behavior of yelling. This would allow the individual to take a more contextual view of their yelling, understanding the factors contributing to the behavior, and why they wish to decrease their yelling. They may identify a goal of building a stronger relationship with their child and, through the identification of that goal, recognize that yelling moves them away from the goal. Thus, functional contextualism would define success for this individual as building a stronger relationship with their child rather than simply decreasing their yelling.

In addition to the importance of context to better understand, predict, and control behaviors, viewing behaviors as "acts in context" underscores the individualized nature

and interpretation of behaviors. From a functional contextualist point of view, no thought or feeling is inherently problematic (Harris, 2019). Understanding thoughts and feelings leading to behaviors that move an individual away from their stated goals is part of the process toward understanding the contextual nature of the behavior; negative thoughts or feelings that an individual has about themselves are not something that needs to be fixed. For example, a mother responding to her child's screaming may think, "I am a bad mom," and yell at her child because she feels tied to the idea that she is a bad mom. Functional contextualists would categorize the thought, "I am a bad mom," as nothing more than a contextual clue surrounding the behavior of yelling. The resulting behavior of yelling would not be categorized as problematic but rather an act in the context of a mother feeling like a bad or overwhelmed parent. This freedom to divorce a behavior from its label as problematic or non-problematic allows the individual to disentangle any negative thoughts associated with the behavior, which, in turn, can lead to more flexibility regarding their response to internal, negative thoughts.

Relational Frame Theory

Relational Frame Theory (RFT; Hayes, 2004) is a theory of verbal behavior and higher-order cognition that proposes that individuals develop language and cognition through the identification and creation of large networks of associations between stimuli. This begins with simple stimulus equivalence, known as mutual entailment, in which human language begins to develop with simple bidirectional associations, such as learning that a picture of a ball is called "ball." It then develops into more complex associations such as learning that "ball" in Spanish is "bola." The connection builds more

complexity, known as combinatorial entailment, when the individual associates a picture of a ball with the Spanish word “bola” without being directly taught that relation.







A = A	A = B and B = A	A = B and B = C so A = C
 = 	 = “ball”	 = “ball”
	“ball” = 	“ball” = “bola”
		 = “bola”

Figure 1: Example of Derived Relation

This final level of association is known as a derived relation, as it does not have to be directly taught to be learned. These learned and derived relations develop with objects, as exemplified here, but also with actions, people, and emotions. An individual may learn that a feeling of tightening in their chest means they are angry. They may also learn through life experience, television, or social media, that angry mothers are labeled bad mothers. Therefore, an unlearned and potentially subconscious association is that they must be a bad mother if they start to feel a tightening in their chest in reaction to their child’s behavior.

RFT builds on simple stimulus equivalence by establishing relational links between stimuli. For example, an individual learns that Brianna is taller than Christine.

They also learn that Christine is taller than Dominika. This leads to the derived relation that Brianna is taller than Dominika, despite never learning this directly. These networks then expand as more information is added to the frame. For example, if in the future, one learns that Brianna's husband is shorter than she is but taller than Christine, they have also learned that he is taller than Dominika, so this information is added to the relational network. These relational links expand exponentially and are the foundation for language development (Hayes et al., 2001).

The power of RFT, and its relevance to ACT as a treatment, is in the human brain's ability to continue to build networks and associations in addition to the ones an individual has already built. For example, expanding the association of "angry mother" not just to be "bad mother" but to include a mother who cares fiercely about her child and a mother who is anxious about her child developing into an independent adult can help broaden an individual's awareness and their subsequent behaviors. This broadening of networks is known as a transformative stimulus function and can change how a stimulus event occasions behavior.

Behavior Analysis

At its core, ACT is a behavior-analytic method to increase psychological flexibility. Behavior analysis is concerned with the function of behavior, or why behavior occurs. To gather more information regarding the function, Applied Behavior Analysis (ABA) looks to the immediately preceding events (antecedents) and immediately succeeding events (consequences).

For example, a mother interested in decreasing her yelling can set up antecedent events, such as deep breathing, to change the sequence of events. She can also choose a replacement behavior that serves the same function as yelling, such as firmly stating the rule to her child and following through with the expectation. Finally, she can manipulate the consequences of her behavior by asking her partner to recognize the times she chooses the preferred alternative behavior.

In the context of ACT, working through antecedents, behaviors, and consequences can help an individual understand why they may engage in patterns of behavior that move them away from their goals. Using the example of the yelling mother, by analyzing the consequences of her yelling, she may recognize that it stops an aversive stimulus in the moment (i.e., her child's screaming) but serves to increase this behavior in the long term and move her further away from her goal of connecting with her child. She may also begin to recognize an antecedent in the form of a negative thought (i.e., "I am a bad mom") that sets the occasion for her yelling. Simply bringing awareness to these contextual variables for her yelling can be an intervention.

In addition to the importance of function in understanding ACT is the connection between ACT and more complex behavior analytic applications. From its inception, ACT researchers focused on understanding the rigidity of rule-governed behavior and its relation to the development of language and cognition (Hayes et al., 1988; Hayes & Brownstein, 1986; Hayes & Hayes, 1992). While ACT's placement in behavior analysis is sometimes questioned due to its inclusion of private events, understanding rule-

governed behavior allows for a behavior analytic understanding of these underlying mechanisms and firmly places ACT within the behavior analytic literature.

Rule-governed behavior has long been recognized in the behavior analytic literature as behavior modified without direct contact with environmental contingencies (Skinner, 1966). This differs from contingency-shaped behavior, in which behavior is modified through direct contact with consequences. The discussion of rule-governed behavior originates from Skinner's explanation of problem-solving behavior within a verbal operant framework, in which he defines a rule as a contingency-specifying verbal stimulus that exercises stimulus control over the behavior of the listener and allows the listener to solve problems without directly contacting environmental contingencies (Skinner, 1966). As an example of contingency-shaped behavior, a parent learning to bring an extra pair of pants for their child when going on an all-day outing may be shaped by contacting the punishing contingency of having an upset, wet child on a prior outing. In contrast, an example of rule-governed behavior would be the same parent holding their child's hand when crossing a busy street. This exemplified hand-holding behavior does not require direct contact with the consequences associated with allowing a child to cross the street alone but is instead shaped by rule-governance, which is likely along the lines of "If you let your child cross a busy street independently, they will run into traffic and get hit by a car."

RFT provides the framework underlying the development of rule-governed behavior through derived stimulus relations. As previously discussed, derived relations are relationships between stimuli that develop without direct teaching due to placement in

a network of previously taught stimuli relations. Through the lens of RFT, a rule involves a network of relations consisting of stimulus equivalences between the words in the rule and the events to which they refer, as well as transformative functions that allow for stimulus control of the rule. For example, the rule “If you let your child cross a busy street independently, they will run into traffic and get hit by a car” is only effective if a repertoire of stimulus equivalence among the words in the sentence (e.g., “busy,” “independently,” “hit”) exist. The parent must understand the meanings of these words ($A=B$, busy = lots of cars) as well as have several acquired derived relations ($A=B$, hit by a car = injured; $B=C$; injured = painful and potentially deadly; $A=C$, hit by a car = the child could become severely injured or die). Thus, rule-governed behavior is a complex example of several derived stimulus relations acting together to modify behavior.

In the previous example, the positive effects of rule-governance were exemplified. There is a clear evolutionary advantage for a parent to follow this rule without contacting the consequences of letting their child run into a busy street. While rule-governed behavior is essential for day-to-day functioning as humans, there are significant drawbacks to rule-governed behavior.

Research has demonstrated that the ability to engage in rule-governed behavior produces behavior that is insensitive to direct contingencies (Bentall et al., 1985; Hayes et al., 1986; Lowe et al., 1978) or, alternately, sensitive to conditions controlled by rules (Hayes et al., 1989). Meaning, behavior change based on rules governance rather than direct contingencies is harder to modify, even when the behavior becomes dysfunctional. This sensitivity to rules and insensitivity to direct contingencies can have detrimental

effects for the rule-follower. Namely, a person may continue to adhere rigidly to a rule even when experienced contingencies actively contradict the verbally expressed rule. For example, if a parent internalizes the rule “Good parents must demonstrate that they have well-behaved children in public,” they may adhere to this rule despite seeing many examples to the contrary. Adherence to this rule may result in negative thoughts when their child engages in challenging behaviors in public (e.g., throwing a tantrum at the grocery store), which may then result in what they perceive as corrective parenting behavior (e.g., yelling at their child to stand up and calm down). Despite this sequence of events having adverse outcomes for both parent and child, the parent may continue to adhere to the original rule because of its insensitivity to direct contingencies.

Adherence to dysfunctional rules rather than direct contingencies can create a cycle of ineffective behavior that moves an individual away from reinforcement contingencies. For example, a parent adhering to the rule, “A good parent has a well-behaved child in public” may think, “I am a bad parent if I let my child misbehave in public” when their child engages in a public tantrum. To address this thought and respond to the adopted rule, the parent may respond to the thought by yelling at their child. Despite the apparent damaging effects of this cycle of behavior on the parent-child relationship and the long-term ineffectiveness of yelling, the parent may continue to implement this consequence as a reaction to the derived relation between their child’s behavior and perception of their own parenting.

Maladaptive behavior resulting from dysfunctional rule adherence is central to the mechanisms of ACT. The goal of ACT is to promote psychological flexibility, defined as

the ability to adapt to fluctuating situational demands while remaining present, and to engage in actions that are congruent with one's personal values. Thus, psychological flexibility counteracts strict and ineffective rule adherence.

ACT takes a behavioral approach to address emotions, thoughts, and feelings that hinder an individual's ability to live a life aligned with their values (Blackledge et al., 2009; Hayes, 2004). This is accomplished through engagement with six core psychological processes: acceptance, defusion, contact with the present moment, self-as-context, values, and committed actions (Hayes et al., 2006). Each of these six core processes interacts with one another and is essential to implementing ACT.

ACT Six Core Processes

Acceptance. The first core process, acceptance, is best defined in relation to its ACT antonym, experiential avoidance. Experiential avoidance is a response pattern of behaviors that distance an individual from their unpleasant emotions or thoughts rather than allowing acceptance and awareness of these unpleasant thoughts as part of the human experience (Hayes et al., 1996). While experiential avoidance serves to decrease unpleasant experiences in the short term, continually engaging in avoidance can hinder an individual's ability to engage in meaningful life experiences. Repeated patterns of experiential avoidance increase a person's distress, anxiety, and depression over time (Hayes et al., 2014; Ruiz, 2010). In parenting, experiential avoidance may occur when a child engages in tantrums when going out in public places. A parent may choose to avoid social situations due to the discomfort experienced when their child engages in tantrums. While this avoidant behavior eliminates the short-term discomfort and embarrassment of

their child's tantrum in public, it hinders the parents' ability to engage in meaningful social experiences, and their child's ability to learn to handle public settings better. The antidote to experiential avoidance is acceptance, in which an individual actively embraces uncomfortable thoughts, feelings, and emotions in recognition of the idea that acceptance can serve to increase values-based living (Blackledge & Drake, 2013).

Defusion. The second core process of ACT, defusion, refers to an individual noticing their negative thoughts as simply thoughts rather than a reality upon which they must immediately act (Blackledge, 2007). Similar to acceptance, defining defusion in terms of its opposite, fusion, can assist in understanding this core process. Fusion is the act of responding to thoughts and feelings as if they are literal rather than just thoughts (Coyne & Wilson, 2004). In parenting, this may manifest as a parent thinking they are a "bad parent" after yelling at their child. Instead of recognizing that thought as a fleeting interpretation of the situation, they may fuse the thought "I am thinking I am a bad parent" with "I am a bad parent." Repeated experience with this fused thought subsequently defines their parenting experience and makes it challenging to engage in adaptive parenting behavior (Coyne & Wilson, 2004). The core process of defusion allows a person to distance themselves from their negative thoughts, rather than allowing the thought to define them and their experience, and thus respond in a more psychologically flexible manner (Hayes, 2004). For example, instead of yelling at their child and then ruminating on the thought, "I am a bad parent," they can recognize that yelling was a one-time behavior in which they engaged and is not definitive of their

parenting. They can then acknowledge “I did not act in line with my values” and choose to respond differently the next time.

Contact with the present moment. The third process, contact with the present moment, is often likened to mindfulness and encourages non-judgmental noticing of an individual’s internal and external experiences from moment to moment (Harris, 2019). By contacting the present moment, individuals fully engage with what they are doing and determine whether they are acting in a psychologically flexible manner or in an experientially avoidant manner. In parenting, contacting the present moment allows a parent to recognize their internal thoughts prior to responding within their traditional patterns of behavior (Cachia et al., 2016). This core process may also help a parent notice more positive moments with their child (e.g., their child engaging in helpful behavior or calmly playing independently) rather than perseverating on the often more salient, negative moments.

Self-as-context. The fourth core process, self-as-context, is the conscious awareness of one’s own perspective (Hayes et al., 2016). It is a form of flexible perspective-taking that allows a person to develop a sense of self separate from their negative thoughts (Hayes et al., 2016). An extension of contacting the present moment, self-as-context allows an individual to take a third-party perspective on their behaviors and thoughts. Recognizing the self as context is instrumental in facilitating the core process of defusion (Harris, 2019), as it allows an individual to recognize the smallness of a seemingly large challenge. Self-as-context has been associated with improved outcomes for individuals with chronic pain, as well as improved wellbeing for the clinical

population (Godbee & Kangas, 2020; Yu et al., 2017). In parenting, it is easy to become overwhelmed with the responsibilities and challenges associated with raising a child. Self-as-context can orient these responsibilities and challenges among the many other facets of parents' lives and experiences. For example, if a child is having a tantrum in the grocery store, a parent may feel negative thoughts and feelings, such as anger with themselves and frustration with their child. The parent may react to their child's behavior by yelling at them to get up. When reflecting on the situation, the parent may regret responding to their child out of frustration. Engaging in self-as-context during their child's tantrum would allow the parent to observe themselves as distinct from their thoughts and the situation. This, in turn, would allow the parent to claim their reflective perspective in the moment, rather than hours after yelling at their child, and to engage in a more helpful and adaptive parenting behavior.

Values. The fifth of the six core processes, values, is defined as chosen life directions that guide an individual's actions and give life meaning (Harris, 2019). While seemingly similar to goals, values differ in that they are not achievable. Instead, values function simply to steer a person's behaviors in a chosen direction. Values work in ACT is designed to support an individual's behavior and help guide them through short-term, uncomfortable experiences toward longer-term, meaningful experiences (Harris, 2019). In parenting, this may show up as identifying the value of "independence for my child." Identifying this value would facilitate engaging in behaviors that move toward this value, such as toilet training their child, despite the challenges and uncomfortable feelings that arise while moving toward that value. Living a life in accordance with one's values has

been shown to increase wellbeing as well as decrease distress (Fung et al., 2018, Williams et al., 2015), thus situating values as an essential component of ACT for parents of autistic children.

Committed actions. The final core process, committed actions, are overt behaviors conducted in service of an individual's chosen values (Harris, 2019). This final core process is the tangible output of work with the other core processes. While acceptance, defusion, contact with the present moment, self-as-context, and values can help an individual take a holistic and contextual view of their negative emotions and thoughts, engaging with committed actions contributes to overt and meaningful changes in a person's day-to-day life that help them live in accordance with their values. A parent may recognize their value of independence for their child, identify the thoughts that show up when their child has a difficult time engaging in toilet training (e.g., "I am an inadequate parent"), and defuse these thoughts from their actions (e.g., "I am having the thought that I am an inadequate parent"). In turn, they can set a committed action (e.g., to verbally recognize every successful toileting attempt their child has), which supports the day-to-day movements toward their identified value of independence for their child.

Acceptance and Commitment Therapy to Support Parents of Autistic Children

A growing amount of research has amassed supporting the use of ACT for parents, particularly parents of autistic children. The first empirical study analyzing the effects of ACT on parents of autistic children was conducted by Blackledge & Hayes (2006). In this seminal study, a two-day (14-hour) ACT workshop was presented to twenty parents of autistic children. Researchers assessed parents' levels of depression,

acceptance, and cognitive fusion, finding pre- to post-treatment improvements across all three measurements. However, changes in acceptance and cognitive fusion were not found to be significant. Strengthening the study's findings, the noted improvements were sustained across a three-month follow-up period. Overall, these seminal findings offered support for ACT as an intervention to improve the psychological functioning of parents of autistic children.

Following this seminal study, there was a large gap in the literature until 2013, when Tani et al. published a replication study of Blackledge & Hayes' (2006) original research. Tani et al. replicated the procedure, measuring pre- and post-test scores on depression, acceptance, and cognitive fusion of 27 parents undergoing a two-day ACT workshop. This replication reinforced the original effects of ACT on depression, finding medium to large effect sizes on depression scales. The authors did note differences between the three groups undergoing ACT workshops and hypothesized differences in the make-up of the groups as well as the external resources available to the group participants as potential factors contributing to these differences. This replication also failed to find significant changes in psychological flexibility, as measured by the Acceptance and Action Questionnaire (AAQ).

Poddar et al. (2015) released the subsequent ACT study on parents of autistic children, building on the prior foundation of group workshops. Nine parents attended a nine-week ACT group session, which gathered pre- and post-test measures of anxiety, depression, quality of life, and psychological flexibility. Significant improvements were observed in anxiety, depression, psychological flexibility, and quality of life. Notably, in

contrast to the first two ACT studies, this is the first study to report significant improvements in psychological flexibility. The authors do not point to clear contributing factors for this difference in findings. However, they suggest more research and replication in the field to understand ACT's efficacy better.

Following Poddar et al.'s (2015) study, Joeekar et al. (2016) improved the validity of ACT research by comparing an ACT treatment group to a treatment as usual (TAU) group. Researchers assigned 24 mothers to ACT or TAU groups, measuring depression, stress, anxiety, psychological flexibility, and quality of life at pre- and post-treatment. Similar to Poddar et al. (2015), researchers found significant improvements in psychological flexibility and depression. Notably, there was no significant difference between the ACT and TAU groups on stress, anxiety, or quality of life measures. These findings furthered support for the use of ACT in a group setting to decrease parental stress and increase psychological flexibility.

Poddar et al. (2017) bolstered their initial 2015 findings by conducting a follow-up study, assessing psychological flexibility and valuing behavior of parents of autistic children. This was the first study in the ACT parenting literature to implement the Personal Values Questionnaire (PVQ; Ciarocchi et al., 2005) as a measure of valuing behavior. Like the initial study, parents underwent a nine-session protocol spread across six weeks. Results demonstrated significant increases in psychological flexibility and valuing behavior, further substantiating the relationship between an ACT intervention and increases in the psychological functioning of parents of autistic children.

Lunsky et al. (2018) conducted three group sessions of parent-facilitated ACT training with 29 mothers of autistic children, finding significant improvements in depression, stress, social isolation, and physical health measures. These scores were maintained at follow-up, adding to the emerging literature on the benefits of parent-focused ACT interventions. Researchers also included a satisfaction survey for participants at the end of the study, with results indicating high satisfaction levels with the program. Using the same cohort of mothers, Fung et al. (2018) focused their analysis on ACT process measures to include psychological flexibility, fusion, and values. Researchers also collected measures of depression and perceived stress. Findings revealed improvements across all measured domains, which were maintained over a three-month follow-up. Taken together, Lunsky et al. (2018) and Fung et al. (2018) offer additional support for ACT workshops to increase the psychological wellbeing of mothers of autistic children.

Corti et al. (2018) also analyzed group ACT parent training for parents of autistic children, specifically measuring mindfulness and cognitive fusion as dependent variables. Forty-three parents of children enrolled in Early Intensive Behavior Intervention (EIBI) were divided into a TAU group and an ACT group. The ACT group attended 12 90-minute sessions every two weeks, while the TAU group continued to attend EIBI sessions for their child but did not receive any additional treatment. While the ACT group initially showed a significant decrease in stress compared to the control group, this significance did not hold when controlling for time. This study contradicts the findings of prior ACT parenting studies, as the results demonstrate deterioration in parent-rated mindfulness

skills in the experimental group and no change in scores on cognitive fusion. Researchers point to the complexity of the self-report measures as a potential factor in the contradictory findings and suggest that future researchers use more observational measures of behavior change. The authors also point to enrollment in EIBI as a potentially confounding variable, as some research demonstrates that home-based EIBI programs increase parent distress (Grindle et al., 2009).

Gould et al. (2018) opted for a single-subject design in which they assessed the effects of ACT on the overt behavior of three mothers of autistic children. In addition to indirect measures of psychological flexibility, self-compassion, and appraisal of the child's impact on the family, Gould et al. collected direct observation data on the frequency of the mothers' values-directed behavior. The ACT intervention consisted of six 90-minute sessions and was conducted one-on-one. Results demonstrate robust increases in values-directed behavior across all three participants. Improvements were also demonstrated in psychological flexibility and self-compassion.

Pennefather et al. (2018) implemented an online ACT program to support parents of autistic children. The program spanned three weeks and combined ABA and ACT techniques. Results demonstrated a significant decrease in parent-reported child hyperactivity levels and an increase in parent-reported child prosocial behavior. A major limitation in using these findings to support the use of ACT for parents is the inability to attribute the changes in behavior to ACT due to the training's combination of ACT and ABA strategies. Thus, while the findings are interesting to note, they do not offer substantial evidence that ACT provided in an online format can be effective.

The following year, Hahs et al. (2019) conducted a randomized controlled trial (RCT) of a brief acceptance and commitment training for 18 parents of autistic children. In this study, researchers led a brief ACT training consisting of two two-hour group workshops and tested acceptance, mindfulness, and shame outcomes. Findings demonstrate significant improvements across all measured outcomes for the treatment group and offer promising support for brief ACT interventions to support parents of autistic children.

Building on the Hahs et al. (2019) RCT, Marino et al. (2021) conducted an RCT in which researchers compared an ACT protocol to a control Parent Training (PT) protocol. Twenty parents were randomly assigned to one of the two groups and engaged in 24 weekly meetings, held across six months, in either the ACT or PT group. Findings demonstrated significant improvements in psychological flexibility, valued-living, and parent stress. Additionally, reduced scores in parents' perceptions of their child's disruptive behaviors were observed.

With a 15-year history of ACT for parents of autistic children, more systematic and narrative reviews of available research have begun to emerge. Juvin et al. (2022) and Byrne et al. (2021) both conducted systematic reviews assessing the effectiveness of ACT for parents of autistic children and adolescents. Both reviews indicated a marked improvement in parents' psychological functioning as a result of engaging in ACT interventions. The authors of both systematic reviews note several methodological limitations to the reviewed research. As is evident in the review here, the minimal number of RCTs in the ACT literature is a drawback to the findings. RCTs are often not

feasible in ACT studies due to the small sample size and ethical implications of withholding treatment. However, several studies encouraged future ACT researchers to include RCTs. An important limitation noted in the systematic review was the inclusion of ACT as part of a treatment package rather than in isolation, making it challenging to extricate the effects of ACT from the other treatment components. Thus, future researchers should attempt to assess ACT in isolation rather than as part of a treatment package. Another noted limitation was publication bias, in which both reviews excluded unpublished literature, which has the potential to skew the effectiveness of ACT. A final limitation of the reviewed studies was the lack of a cohesive ACT protocol that was standardized across the reviewed research. Due to the newness of ACT as an intervention, there is no standard protocol used by clinicians or researchers. Thus, it is challenging to compare ACT interventions run by varying researchers, as they likely have different implementation methods. Despite these limitations, both systematic reviews concluded that results across the research signify ACT interventions are promising for parents of autistic children.

The ACT Matrix

The ACT Matrix is a visual method for delivering ACT to individuals, encompassing the same six core processes in a brief and accessible blueprint for engaging with each component of ACT (Polk & Schoendorff, 2014). It consists of an intersecting horizontal and vertical line. The vertical line divides the diagram in half, with the left side of the line representing movement away from one's values and the right side representing movement toward one's values. Similarly the horizontal line further divides the diagram

into a top and bottom half, with the top half representing overt behaviors that people in one's environment can see and the bottom half representing internal experiences that only the individual witnesses (Polk et al., 2016). The resulting representation of these intersecting lines is four quadrants in which the individual categorizes their experiences.

Typically approached in a clockwise format, the individual begins with the values component of ACT. This is addressed in the lower right quadrant, in which the individual identifies their values, including who or what is important to them. As discussed, values encompass things that guide a person's life direction and give their life meaning. A person may list as many or as few values as they would like in the bottom right quadrant. The facilitator of the ACT Matrix does not guide or correct the individual's chosen values.

Once their values are identified, the individual engages with the core processes of defusion and contacting the present moment. This is done by identifying internal experiences, emotions, and feelings that hinder their ability to engage fully with their values. The facilitator asks the question, "What thoughts and/or feelings show up when things get tough?" This question allows the individual to identify thoughts that may be fused with their self-identity and to bring awareness to the thoughts and feelings to which they may react without being fully conscious of them. The participant's responses are listed in the bottom left quadrant of the matrix. At this point, the facilitator of the ACT Matrix is not commenting or passing judgment on what the individual is sharing but is simply listing these internal thoughts and feelings in the bottom right quadrant.

From defusion, the individual moves to the process of acceptance in the upper left quadrant by identifying outward behaviors of experiential avoidance. These are overt behaviors in which they engage to avoid the internal experiences they described in the previous quadrant. The facilitator encourages the participant to engage in this process by asking, “What do you do when the thoughts and feelings listed [in the bottom left quadrant] show up?” The facilitator again refrains from judgment or commenting on these behaviors and simply lists them in the top left quadrant.

From acceptance, the individual moves to committed actions. The facilitator asks the participant, “What could you do to get closer to the things that are important to you?” The participant lists overt behaviors in which they can engage to move them closer to the values they identified at the beginning of the exercise. These are written in the top right quadrant of the matrix. This completes the written portion of the matrix.

After filling out the four quadrants, the individual is guided to look at the complete diagram, notice the experiences they sorted (e.g., self-as-context), and identify how they want to move forward with their life. Through this process, the individual contacts each of the six core ACT processes in an efficient and salient manner, resulting in a visual representation of their values and experiences. The exercise provides a visual representation of the thoughts, feelings, and actions hindering their ability to live a life in alignment with their values, along with written actions they have committed to practicing in the short term.

The ACT Matrix in Practice

While ACT interventions have demonstrated promising results for parents of autistic children across RCTs, group workshops, and one-on-one sessions, the literature on the ACT Matrix is still emerging. The first empirical analysis of the ACT Matrix was conducted by Levin et al. (2017) and piloted the effectiveness of an ACT Matrix mobile application on the health behaviors of 23 adults, finding significant improvements in both diet and exercise. Since this seminal analysis of the ACT Matrix, researchers have demonstrated promising results for increasing health-conscious behaviors in individuals (Levin et al., 2022) and increasing wellbeing for help-seeking individuals (Krafft et al., 2019) and those with depression due to chronic illness (Krafft et al., 2019; Mirsharifa et al., 2018). Researchers have analyzed the effect of the ACT Matrix delivered via a mobile application, as well as when conducted by a clinician in one-on-one and group sessions (Hahs et al., 2019; Krafft et al., 2019; Levin et al., 2017; Levin et al., 2022; Mirsharifa et al., 2018).

To date, there is only one study that incorporated the ACT Matrix in an ACT treatment package for parents of autistic children (Hahs et al., 2019). However, the package included only two two-hour workshops, making it difficult to extract the impact of the ACT Matrix, as opposed to other components of the workshop, on parent outcomes. Results of the ACT package indicate parent improvements in psychological flexibility, mindfulness, and shame. Outside of this study, researchers have not yet assessed the use of the ACT Matrix, in isolation, for parents of autistic children.

While research on the ACT Matrix is still in its infancy, the findings so far, combined with the substantial body of research on ACT, are promising. A significant

limitation of this literature review is the unavailability of research isolating the ACT Matrix from a full ACT intervention. Thus, there is a clear need for additional research focusing on the ACT Matrix in isolation. Isolating the implementation of the ACT Matrix will assist in determining whether its implementation can result in the same robust outcomes as a full ACT package. If a brief ACT Matrix protocol can demonstrate findings equitable to that of a long-term ACT intervention, there would be several implications regarding the accessibility of treatment. An additional scarcity in the literature exists in the area of social validity measures. While statistical outcomes are essential to demonstrate, social validity is an equally important measure of an intervention's success. It would be useful for future researchers and practitioners to determine whether participants engaging with the ACT Matrix find it enjoyable and beneficial.

CHAPTER THREE

Existing literature demonstrates the favorable effect of ACT treatment packages on parents' stress, psychological flexibility, and experiential avoidance. These are promising findings for parents experiencing high levels of stress related to parenting an autistic child. However, ACT interventions are often lengthy and costly to parents in the absence of insurance coverage. Thus, the ACT Matrix would be a useful intervention for parents if it accomplishes similar outcomes to the full ACT treatment package in a condensed manner.

In addition to being potentially costly and lengthy to implement, the full ACT treatment package is also complex, incorporating various exercises and components packaged together. These packages may include one or two sessions dedicated to the ACT Matrix. However, the ACT Matrix, in isolation, has not yet been explored for parents of autistic children. In fact, across the literature, there is minimal research on the ACT Matrix in isolation for any population. Given the comprehensive manner in which the ACT Matrix incorporates each dimension of ACT in an efficient and brief therapy session, it is a promising and worthwhile treatment component to explore. In addition to potential impactful outcomes for parents of autistic children, analysis of the ACT Matrix in isolation furthers the limited research on this intervention.

This study aimed to examine the effects of the ACT Matrix on parenting stress and psychological flexibility for parents of autistic children. Additionally, the researcher explored the effect on daily values-aligned parenting to better understand the impact of

the ACT Matrix on specific overt parenting behaviors. Since socially significant behavior change is the overarching goal of ACT, examining the use of the ACT Matrix with direct behavioral measures is essential to a comprehensive analysis of its effects.

Research Design

To determine whether a functional relationship between the ACT Matrix intervention and values-aligned parenting behavior existed, the researcher employed a single-subject, concurrent multiple baseline design (Kazdin, 2021) across three participants. The design consisted of two phases: baseline and post-intervention. This allowed the researcher to examine participants' pre- and post-intervention values-aligned parenting behavior.

While large samples are efficient for demonstrating statistical significance, the researcher chose a single-subject design to focus on social significance by demonstrating a real and meaningful change in an individual's behavior rather than a statistical, average change that, despite passing a preconceived significance test, may not make a meaningful difference in the lives of participants. As Kazdin (2021) notes, single-subject designs are well suited for testing whether the findings from a group design are socially valid for an individual. In single-subject designs, each participant serves as their own baseline, allowing each individual's unique characteristics to be carried across all conditions (Johnston et al., 2020). Multiple baseline designs are ideal for interventions that cannot be reversed, either for ethical or practical reasons (Cooper et al., 2007; Smith, 2012). Due to the irreversibility of the ACT Matrix intervention, a multiple baseline across participants design was the most practical single-subject design to implement.

Hypotheses

This study aimed to assess the effects of the ACT Matrix as an intervention on parenting stress, psychological flexibility, and values-aligned parenting. Due to its brevity, the ACT Matrix has the potential to be offered as a one-time intervention for stressed parents of autistic children for whom therapeutic interventions would otherwise be unavailable or unrealistic to access.

This study addressed the following hypotheses:

1. Engaging in the ACT Matrix will decrease the reported stress levels of parents of autistic children as measured by the Parenting Stress Index™, Fourth Edition Short Form (PSI-4-SF; Abidin, 2012).
2. Engaging in the ACT Matrix will increase the percentage of values-aligned parenting responses provided by parents of autistic children.
3. Use of the ACT Matrix will increase the psychological flexibility score of parents of autistic children as measured by the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011).

Method

Participants and Setting

Parents of autistic children were recruited through autism message boards, Facebook groups, and neighborhood listservs. All participants reported English as a primary language. The participants' children varied in age from two to eight, all with a diagnosis of autism. Autism diagnoses were verified through a Clinical Diagnostic Evaluation (CDE) letter from a developmental pediatrician in addition to a parent report.

All participants were mothers and identified as the primary caregivers of their child(ren). Participants were not personally receiving any type of clinical interventions or therapy services at the time of their participation and had no prior exposure to ACT. Two of the three participants had their autistic children enrolled in ABA and Speech Therapy services. However, they did not receive any other parent training or parent-centered services during the study. The child of the third parent was not receiving any therapy or intervention services at the time of this study. No major changes in their children's services or their family dynamics were reported during the study.

Inclusion eligibility included a demonstration of a clinically high level of stress (>81), as reported on the Parent Stress Inventory – 4th Edition Short Form (PSI-4-SF; Abidin, 2012), as well as a low level of psychological flexibility (>24), as indicated on the Acceptance and Action Questionnaire – II (AAQ-II; Bond et al., 2011). Each participant was assigned a pseudonym to ensure anonymity and privacy protection.

Julie. Julie was a 33-year-old, Black mother of two sons, ages 3 and 2, the eldest of whom was diagnosed with autism. Julie had completed graduate-level education (Master's degree) and was staying at home to care for her two children at the time of the study. In addition to autism, her eldest son was diagnosed with food allergies to dairy, soy, and gluten. Julie reported that the dietary restrictions added to her day-to-day stress, as she constantly worried about what he was eating and how to ensure he received proper nutrition. Her eldest child was receiving twice-weekly therapy in an ABA center. The center had previously conducted parent training; however, this training had stopped during the COVID-19 pandemic. Julie reported being the primary caretaker for both of

her children since separating from her husband a year prior to the study. She reported an extremely high stress level related to parenting her two children and stated her reason for participating as wanting “to be more intentional with her parenting.” Julie reported often reacting to her children’s behavior out of frustration and exhaustion and shared that she wanted to change this approach but did not know how. She specifically reported difficulty around mealtimes and evening routines. She also stated concerns regarding her younger son and the potential for him to receive a diagnosis of autism.

Tyra. Tyra was a 42-year-old Hispanic mother of a 6-year-old son and an 8-year-old daughter, the younger of whom was diagnosed with autism. Tyra had completed undergraduate-level education (Bachelor’s degree) and was working part-time at the time of the study. Her eldest child received twice-weekly speech therapy and was on a waiting list for in-home ABA services. Tyra was married and reported that she and her husband shared parenting responsibilities. However, she identified as the primary caretaker and household manager. She shared that she often became overwhelmed when her son had an outburst, specifically in public, and had tried responding in many different ways but did not feel satisfied with any of her chosen responses. She was specifically concerned about how quickly she became reactive and angry when her son engaged in behaviors she deemed as challenging. Tyra chose to enroll in the study with the hopes of “practical tools to decrease [her] parenting stress.”

Amber. Amber was a 36-year-old Caucasian mother of a five-year-old autistic son. Amber had completed graduate-level education (Master’s degree) and was working full-time, from her home, at the time of the study. She and her husband shared parenting

responsibilities, but Amber identified herself as the primary caretaker and manager of the household. She reported feeling “exasperated” with her lack of direction regarding her parenting approach and hoped to learn more about “the right way to parent.” She reported concerns regarding her son’s increasing physical strength and her decreasing ability to physically manage him when he engaged in property destruction or aggression. She described feeling progressively scared of her son, making her feel hopeless about managing his behavior as he got older. She also explained a feeling of defeat regarding parenting, as she no longer felt any professionals could help her son succeed. At the time of this study, Amber had discharged her son from all intervention services. Amber emphasized feeling a lack of control when her son engaged in wasteful behaviors (e.g., dumping bottled water into the sink or throwing produce into the disposal). She identified this as a specific trigger to her own feelings due to the high importance she placed on environmental protection.

Initial communication between the researcher and participants was conducted via email. The researcher gave participants informed consent, outlining the cost, benefits, time commitment, voluntary nature of participation, and right to withdraw at any time. These consent forms were completed through secure online platforms and then de-identified to ensure the participants’ privacy was protected. Pre- and post-tests were completed through secure online platforms. The initial data collection training, ACT Matrix intervention, and interobserver agreement data collection took place over a secure, remote meeting platform.

Experimenter

The experimenter was a 35-year-old Caucasian student enrolled in a Ph.D. program in Applied Developmental Psychology at George Mason University. In addition to being a Ph.D. student, she was a Board Certified Behavior Analyst (BCBA) and ABA practitioner with seventeen years of experience working with autistic children and their families. Throughout this experience, she underwent 60 hours of direct training in ACT and received over 50 hours of direct supervision from ACT-trained behavior analysts. For five years leading up to this research, the experimenter specifically implemented ACT interventions for parents of autistic children with successful results.

Measures

Dependent variables. Three dependent variables were measured in this study: overt values-aligned parenting behavior, parenting stress, and psychological flexibility. The researcher measured these variables using a combination of self-monitoring, direct observation, questionnaires, and inventory forms. This variety in measurement allowed the researcher to comprehensively analyze the impact the ACT Matrix has on the proposed dependent variables.

Values-aligned parenting behavior was defined as overt parenting behaviors that the participant self-identified, through the ACT Matrix, as being in line with their values. The specific topography of values-aligned parenting behavior differed for each participant and was individually defined through the course of the ACT Matrix (see Table 1).

Table 1. Example of Values-Aligned Parenting Behaviors

Examples of value-aligned parenting behaviors for Julie, Tyra, and Amber.

Participant	Identified Value(s)	Value-Aligned Parenting Behavior	Example(s)	Non-example(s)
Julie	Patience	Any instance of pausing to notice thoughts before reacting (taking a deep breath) or engagement in an alternative self-care behavior. Any instance of narrating the behavior episode or verbally acknowledging son's or own feelings.	Putting on calming music, spraying a relaxing scent, taking both boys to their rooms or areas if I need a break. Taking a deep breath. Narrating the actions and potential feelings of [son] and self when he engages in tantrum behavior	Yelling, grabbing son, snatching an item away, attempting to pacify son with food or medicine, trying to immediately stop the behavior by giving him what he wants. Forcing compliance.
	Independence (for son)	Any instance of following through with an expectation or holding a boundary. Any instance of following through with identified behavior management strategies.	Calmly moving dangerous objects out of the way. Calmly blocking dangerous behaviors. Redirection to a neutral activity	Giving toys or food in response to a challenging behavior. Providing reinforcing consequence to identified problem behaviors (i.e. letting son in the bathroom when he bangs on the door and cries).
	Being understanding	Any instance of engagement in co-regulation strategies with son when he's engaging in tantrum behavior or crying	Laying on the floor or sitting with son when he's having a behavior episode. Narrating how he's feeling and why he might be feeling that way.	Yelling, offering toys, food, or milk in an attempt to stop the behavior
Tyra	Humor and Lightheartedness	Any instance of responding to son's challenging behavior with humor, sarcasm, or a silly voice.	Stating "Here goes the king of the castle" when son is engaging in behavior outburst. Using a silly voice when giving instructions that son typically doesn't follow.	Yelling, speaking in a harsh tone, Walking away from the situation
	Compassion	Any instance of verbally acknowledging son's behavior and feelings in a calm tone to include remaining close to son and narrating the events and feelings that are occurring	Telling son "I know you're upset because we've been in the car ride for a longtime"	Yelling, crying, walking away, speaking in a harsh tone

	Trust	Any instance of verbally setting a boundary and following through with the boundary being set.	Telling son “We can’t have the bottle right now, we can have it tonight after dinner” and continuing to withhold the bottle	Giving son his bottle when he becomes upset despite telling him he can’t have it
Amber	Reacting from a place of calmness, respect, and love	Any instance of verbally setting a boundary and following through with the boundary being set. Any instance of redirection to a parent-identified appropriate behavior.	Telling son, “When we’re done with dinner you can have the popsicle if you put your plate in the sink”. Calmly, verbally prompting son to spit in the sink rather than on the floor. Redirecting son to use his talker when he engages in identified challenging behaviors	Bribing son – presenting a rewarding item after a challenging behavior arises (e.g., “Come on, if you put your plate in the sink I’ll give you the popsicle”), yelling when son doesn’t respect the boundary (“I told you you couldn’t have that right now!”), physically engaging with son in an aggressive manner (e.g., snatching an item from his hand, restraining his arms or hands)
	Engagement	Any instance of engaging calmly with son in response to identified challenging behaviors, to include verbally narrating the behavior that’s occurring in the absence of yelling, whining, or physically intervening.	Telling son, “I know that’s not what you wanted and that’s frustrating.” Sitting with son and waiting for the behavior to pass. Calmly offering solutions like using his talker or stomping his feet.	Yelling, whining, physically intervening to block a behavior, forcing compliance, calling husband to step in

Parenting stress was defined as the experience of discomfort that results from parenting demands exceeding a person's resources for managing these demands (Deater-Deckard, 1998; Hayes & Watson, 2013). All participants completed the Parenting Stress Index™, Fourth Edition Short Form (PSI-4-SF; Abidin, 2012) prior to baseline and two weeks post-intervention. The PSI-4-SF is a 36-item inventory divided across three domains: Parental Distress (PD), Parent-Child Dysfunctional Interaction (P-CDI), and Difficult Child (DC). These three domains combine to form a Total Stress scale. The PD score represents the extent to which parents feel competent, restricted, conflicted, supported, or depressed in their role as a parent. P-CDI represents the extent to which parents feel satisfied with their interactions with their child. DC represents the parents' perception of whether the child is easy or difficult to care for. Total Stress indicates the overall stress a person feels in their role as a parent. In each domain, parents rate their agreement to questions on a five-point Likert scale, from 1 (strongly agree) to 5 (strongly disagree). Several studies have demonstrated adequate internal consistency for the PSI-4-SF Total Stress Score and Subscales ($\alpha=.71-.92$; Barroso et al., 2016) and good test-retest reliability across total scores and subscales (ICC =.60-.82; Barroso et al., 2016). These findings have been replicated across various socioeconomic demographics (Haskett et al., 2006; Whiteside-Mansell et al., 2007). The PSI-4-SF inventory also includes a defensive responding score, indicating the perceived validity of the protocol. A defensive responding score below ten indicates that the participant may be presenting a social desirability bias in their responses. Exclusion criteria included a defensive responding

score below ten prior to baseline. None of the study participants met this exclusion criterion.

Psychological Flexibility was defined as the ability to adapt to fluctuating situational demands while remaining present. It includes the ability to shift perspectives and behavioral strategies as needed and to engage in actions that are congruent with one's personal values (Kashdan & Rottenberg, 2010). Psychological flexibility was measured using the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011). The AAQ-II is a reliable and widely used measure of psychological flexibility, consisting of a seven-item Likert scale addressing areas of psychological flexibility and inflexibility, in which participants rate their agreement to questions from 1 (never true) to 7 (always true). Total scores on the AAQ-2 range from 7 to 49, with a higher score indicating greater inflexibility and a lower score indicating greater flexibility. AAQ-II scores above 24 indicate clinically significant distress. Researchers have demonstrated both high psychometric validity and reliability of the AAQ-II (Bond et al., 2011). Research has demonstrated internal consistency reliability (mean Cronbach's alpha = .84; Bond et al., 2011) and strong test-retest reliability at 3 and 12 months (.81 and .79; Bond et al., 2011). The AAQ-II also demonstrates discriminant validity with social desirability (Bond et al., 2011), signifying that participant responses on the AAQ-II are not influenced by a desire to satisfy social expectations. Participants in the current study took the AAQ-II prior to baseline and post-intervention. Raw scores are presented along with the percentage of increase or decrease of the scores from baseline to post-intervention.

Interobserver agreement. An additional measure, interobserver agreement, was obtained to ensure reliability of the parent-report data.

Interobserver agreement (IOA) was defined as the degree to which the researcher and participant reported the same behavior after collecting data for the same events (Cooper et al., 2007). IOA was obtained through remote observations, scheduled to coincide with a part of the day that was reported to be challenging (i.e., when the child typically engaged in high levels of challenging behaviors and the parent reported difficulty managing these behaviors). The researcher observed the parent-child interactions for three to four 45-minute sessions during baseline and five to six 45-minute sessions during the post-intervention phase. During these observations, the researcher collected antecedent-behavior-consequence (ABC) data using a behavioral observation record identical to the parent's. The researcher documented all antecedents to child maladaptive behavior, occurrences of child maladaptive behavior, and parent response provided immediately following the occurrence of behavior during the observation. An agreement was recorded if both the participant and the researcher recorded the same instance of behavior and parent response to that behavior. Nonagreement was recorded if the participant and the researcher recorded different behavior or response to behavior. The total number of agreements out of the total number of nonagreements plus agreements was calculated for an agreement percentage per session.

Social Validity. A semi-structured interview was conducted with the participants at the end of the study to assess the social validity of the ACT Matrix intervention. Parents were asked to share their experience of the intervention, ease of following

through with committed actions, barriers faced, perceived effectiveness of the approaches, and most beneficial part of the experience.

Procedures

All participants completed the following seven study components: (1) Completion of pre-intervention assessments (AAQ-II and PSI-4-SF) (2) Pre-intervention training (3) Daily baseline data collection (4) The ACT Matrix intervention (5) Post-intervention data collection (6) Post-intervention assessments and (7) Social Validity Interview.

Pre-intervention Training. The researcher trained parents to collect self-monitoring data on a Behavioral Observation Record (BOR; Gould et al., 2018) to capture the variety of parenting behaviors that occurred throughout their entire day. Participants were trained to collect data on all episodes of challenging behavior their child displayed, including the antecedent, description of the behavior, and response provided by the parent. A Behavioral Skills Training (BST; Miltenberger, 2004; Ward-Horner & Sturmey, 2012) approach was taken to train parents in data collection methods for this study. This training method included instructions, modeling, role-play, and feedback. The researcher provided extensive instructions to participants in behavioral data collection prior to beginning the experiment. The BOR was provided in a digital file to participants, with columns to record the date, time, antecedent, behavior, and consequence of each behavior episode. The researcher defined and explained antecedents, behaviors, and consequences as well as thoroughly reviewed all components of the BOR. The importance of timely submission was emphasized several times during the pre-intervention training. All behavioral terms were discussed using non-technical language.

Antecedents were described as events that occurred immediately prior to their child's behavior. The researcher elaborated with examples, including having a favorite item taken away, being told "no," or a parent being on a phone call or in a remote meeting. Non-examples were also provided, including the participant guessing what caused the behavior or ascribing their own assessment of the antecedent (e.g., "I think he was hungry" or "He always does this before bath time"). Behaviors were described as things their child did that were identified as problematic by the parents. The researcher provided examples of common maladaptive behaviors, such as hitting, throwing items, biting, and screaming, and asked participants to provide their own examples as well. Consequences were described as events that occurred immediately following the behavior. The researcher explained that consequences could be intentional, such as the parent's response to the behavior, or they could be unintentional, such as a child hurting his toe when kicking the door. The researcher emphasized the importance of participants including their responses to their child's behavior if a response occurred. Non-examples were also provided to participants, including emotions the parent experienced following the behavior or inferring internal emotional states of their child (e.g., "I was so stressed" or "He seemed to enjoy hitting his brother").

Initial instructions for the BOR and its components were followed by the researcher modeling the collection of behavioral data from a video recording. Training videos included each potential function of behavior (e.g., escape/avoidance, attention, access, and sensory) as well as a variety of consequences (e.g., providing escape, providing attention, providing access, allowing sensory engagement, not providing

escape, not providing attention, not providing access, blocking sensory engagement). It is important to note that no training regarding the functions of behaviors or preferred versus nonpreferred consequences was provided to parents. The variety in functions of behaviors was simply to provide a range of different behavior samples. The videos also included different parenting responses such as yelling, walking away, snatching an item from the child, repeating the instruction calmly, and bribing the child. The researcher used screen sharing to show the video to participants and identified each component of the behavior episode by writing in each column of the data sheet on the screen.

Following the researcher modeling two data collection episodes, participants collected their own data from a video recording. The researcher provided feedback on the accuracy of their data collection. Agreement between the participant's recorded data and the researcher's data was assessed for mastery criteria of 90% or higher across a minimum of three recordings prior to beginning the study. All study participants met mastery criteria during the one-hour training session.

Baseline

Participants collected and submitted daily BORs for the duration of baseline. From the collected data, the researcher determined the percentage of values-aligned parenting behaviors per day, calculated as the total number of values-aligned parenting behaviors divided by the total number of parenting behaviors recorded throughout the day. This percentage is reported across each day of the study and visually displayed on a line graph to allow for visual analysis. Values were not discussed prior to the intervention phase of the study to limit biasing participants' responses. Thus, baseline levels of

values-aligned parenting were measured via post hoc analysis of the data. Once participants identified their values and committed actions during the intervention phase, the researcher analyzed the existing behavioral observation records to calculate values-aligned parenting percentage during baseline.

In addition to participants collecting their own data, the researcher scheduled 45-minute observations to collect data and calculate IOA between the researcher and participant for 33% of baseline sessions. Participants collected baseline data for a minimum of five days prior to being introduced to the intervention. Baselines of the participants were staggered by a minimum of three days to strengthen the experimental control of this design. The second-tier participant, Tyra, required remedial training on completing the Behavior Observational Record following the first day of baseline data collection. This was due to the inclusion of subjective antecedents (e.g., “He was overwhelmed”) rather than observable ones. Following an additional hour of training, the participant demonstrated the ability to provide objective data for the remainder of the study. All participants were timely with their submission of baseline data collection to the researcher, with most submissions occurring the morning following data collection. IOA of 100% was scored for the first-tier participant, Julie. IOA of 96% was scored for the second-tier participant, Tyra. IOA of 89% was scored for the third-tier participant, Amber.

Intervention

The researcher conducted the ACT Matrix with each participant through a one-on-one virtual meeting. Participants were advised to find a time in which they could

commit one hour to meet with the researcher in the absence of distractions. During the appointment, the researcher introduced the ACT Matrix by sharing her screen and using an on-screen visual. The researcher followed a pre-developed script consistent with Polk et al.'s (2016) guidance to ensure consistency across each participant (Appendix B). The researcher typed the participants' responses into each quadrant as the participant responded to the researcher's questions so that the responses were visible to both the participant and researcher. At the conclusion of the session, participants were provided with a copy of their completed ACT Matrix via email.

When working through the ACT Matrix with participants, the researcher began in the bottom right quadrant and moved clockwise, finishing at the top right quadrant. The researcher asked four key questions for each quadrant:

Quadrant 1: Who and what is important to you?

Quadrant 2: When parenting is challenging, what inner feelings or thoughts show up and get in the way of moving toward who or what is important?

Quadrant 3: What are some of the things you do to move away from unwanted inner thoughts and feelings?

Quadrant 4: What do you do, or could you do, to move toward who or what is important to you?

All participants engaged fully with the ACT Matrix, providing thoughtful answers and taking time to reflect on the questions asked. At times during the intervention, each participant provided answers not fully representative of the question asked. For example, when asked about parenting challenges, one participant continued to bring up her

relationship with her ex-husband and her prior work environment. Another participant had a challenging time discussing what she could do to move closer to her values and perseverated on the “correct” way to respond to her son’s behavior to ensure he improved. The researcher refrained from correcting the participants when their answers did not coincide with the question asked. Rather, the researcher continued to guide participants toward a response that aligned with the question asked (Polk et al., 2016). All participants were able to develop a minimum of two committed actions at the conclusion of quadrant 4.

After completing the quadrants, the researcher directed participants to the center of the matrix and reminded them to focus on noticing their thoughts and feelings as they showed up. The researcher reminded participants of the committed actions they selected in quadrant four as a way to respond to uncomfortable thoughts and feelings that arise. At the conclusion of the meeting, the researcher emailed participants the completed matrix.

Post-Intervention Data Collection

Following the ACT Matrix meeting, parents were instructed to continue recording daily behavior using the behavioral observation record. Data was sent to the researcher daily until the conclusion of the study. The researcher collected IOA data for 33% of post-intervention sessions to ensure participants remained reliable in their data collection. The researcher did not provide any feedback to participants other than thanking them for continuing to submit their BORs in a timely fashion.

Post-Intervention Measures

Two weeks post-intervention, participants completed the AAQ-II and PSI-4-SF as well as the Social Validity interview.

CHAPTER FOUR

The researcher graphed and analyzed the participants' BOR data using visual analysis of data points collected during baseline and intervention phases to determine whether the ACT Matrix caused a significant change in participants' values-aligned parenting behaviors. Baseline data was retroactively analyzed to align parent-provided consequences with their stated values and committed actions. Additionally, interobserver agreement (IOA) and social validity assessments were conducted to examine the validity and integrity of the collected data.

Values-aligned parenting behavior

Visual analysis

The collected BOR data was used to generate multiple baseline graphs to interpret the results of the first dependent variable, values-aligned parenting behavior, and visually analyze the data (Figure 1). The researcher began with a visual analysis of each graph individually for level, trend, and variability, followed by a visual analysis of the three graphs to ensure they met the criteria for baseline logic. This included an analysis prediction, verification, and replication.

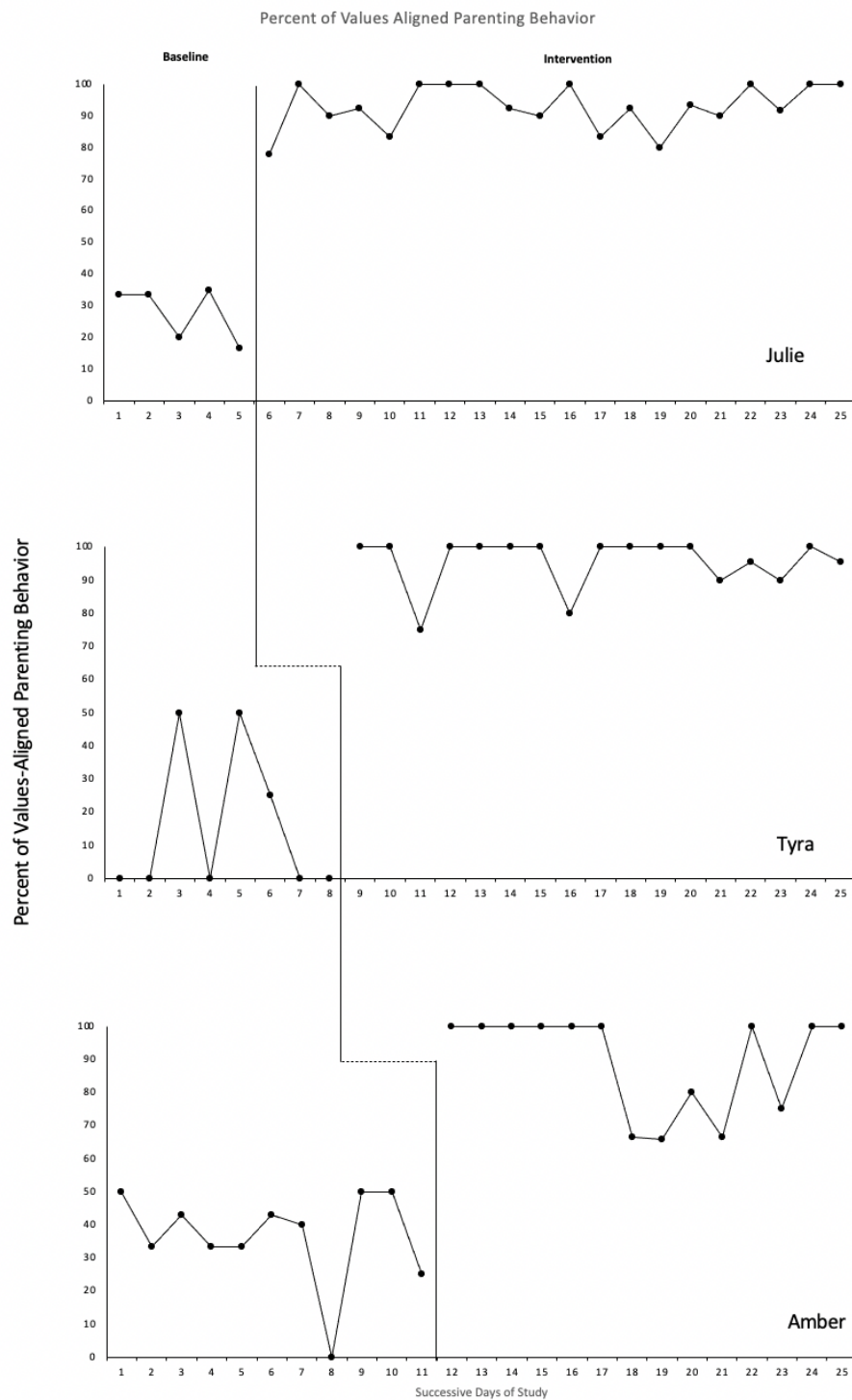


Figure 2: Percentage of daily values-aligned parenting behavior across participants.

Julie was the first-tier participant and remained in baseline for five days. During baseline, Julie demonstrated a decreasing trend in values-aligned parenting behavior. Her response variability was moderate, and she maintained a low level (27.66%) of values-aligned parenting throughout baseline. In analyzing Julie's graph for baseline logic, prediction is evident in the consistently low level of the target behavior during baseline, which allows the researcher to assume that her behavior would remain at low levels in the absence of the ACT Matrix intervention. Following the introduction of the ACT Matrix intervention, Julie's values-aligned parenting behavior displayed an immediate and clear increase to a high level (92.81%), with low variability and an increasing trend. This demonstrates the affirmation of the consequent component of baseline logic, in which an immediate change in behavior at the onset of intervention allows the researcher to deduce that the intervention is likely responsible for the change. Affirmation of the consequent was further evident with the introduction of the second-tier participant, Tyra.

Tyra was the second-tier participant and remained in baseline for three days longer than Julie, eight days in total. Her baseline response variability was low, and her values-aligned parenting behavior maintained a low level (15.63%) for the duration of baseline data collection. The continued low response rates of values-aligned parenting behaviors following the introduction of the intervention on the first-tier participant provides additional verification and affirmation of the consequent; that baseline levels would sustain in the absence of intervention. Upon the introduction of the ACT Matrix intervention for Tyra, her response rate clearly and immediately increased to a high level (95.67%) of values-aligned parenting behavior. This change represents the replication

component of baseline logic, in which the effect of the ACT Matrix on Julie's behavior is demonstrated again on Tyra's behavior. The design is further strengthened with a third-tier participant.

Amber, the third-tier participant, remained in the baseline condition for three days longer than Tyra and six days longer than Julie, spending a total of nine days in baseline. Her baseline responding levels were variable, and her overall level of behavior was higher than the first two participants but remained at moderate rates (36.4%) during baseline. These moderate rates were sustained when the ACT Matrix was introduced for both the first and second tier participants, exemplifying the verification and affirmation of the consequent components of baseline logic. Upon introducing the ACT Matrix intervention with Amber, her rates of responding immediately and dramatically increased, further replicating the effects of the intervention demonstrated with the first two participants. Overall, visual analysis of the multiple baseline graphs across three participants presents evidence that the ACT Matrix effectively increased values-aligned parenting behaviors across all three participants.

Descriptive Statistics

In addition to assessing the level, trend, and variability using visual inspection, the researcher used descriptive statistics, including percentage calculations and percent of nonoverlapping data (PND; Scruggs & Mastropieri, 1998) to further assess whether a causal relationship exists between the participants' behavior and the ACT Matrix intervention. PND assesses the percentage of data that overlap between the baseline and intervention phase of a single-subject design. The researcher inserted a horizontal line at

the highest baseline data point to calculate PND. The researcher then calculated the intervention phase data points above and below this line. A percentage calculation was obtained by dividing the number of intervention data points above the line by the total number of intervention data points. A PND score above 90% is considered very effective, 70 – 89% is considered effective, 50-69% is considered questionable, and less than 50% is considered ineffective (Scruggs & Mastropieri, 1998).

Julie was the first-tier participant in this study. During baseline, Julie demonstrated a decreasing trend in values-aligned parenting behavior. Her percentage of values-aligned parenting during baseline fluctuated between 16.67% and 35%, a range of 18.33%. The level of Julie's values-aligned parenting behaviors at baseline, calculated as the average of her baseline data points, was 27.67%. Following the introduction of the ACT Matrix intervention, there was a clear and immediate increase in Julie's values-aligned parenting behavior. Julie's post-intervention data fluctuated between 77.77% and 100%, a range of 22.23%. The overall level of values-aligned parenting, calculated as the average of her post-intervention data points, was 92.81%. This is an increase of 65.14% from baseline, with 100% PND for Julie's post-intervention data points. Given that her post-intervention phase was the longest of the three participants, it is important to note that the range of her final three data points was 91.66% to 100%, a level of 97.22%. The overall trend of Julie's post-intervention data was increasing. This suggests that the effects of the intervention maintained for the length of Julie's participation in the study.

Tyra's baseline data exhibit a slightly decreasing trend overall, with baseline data fluctuating between 0% and 50% and a range of 50%, indicating low and variable rates of

baseline response. The level of her baseline data was 15.63%. Tyra's post-intervention data fluctuated from 75% to 100%, a range of 25%. The level of her values-aligned parenting was 95.67%, and there was no overall trend in Tyra's post-intervention data. The PND for Tyra's post-intervention data was 100%, indicating the ACT Matrix's strong effect on Tyra's values-aligned parenting behaviors.

Amber's baseline data demonstrate a variable and decreasing trend. Her percent of values-aligned parenting during baseline fluctuated between 0% and 50%, a range of 50%, with a level of 36.43%. Amber's post-intervention data fluctuated between 66.66% and 100%, a range of 33.34%. The level of her values-aligned parenting was 89.59%, with 100% PND for post-intervention data points. This indicates a strong effect of the ACT Matrix. The overall trend of Amber's post-intervention data was slightly decreasing, and the variability of her values-aligned parenting increased toward the end of the intervention. In verbal follow-up reports, Amber reported feeling dissatisfied with her child's continued disruptive behavior, despite her engagement in values-aligned parenting. She felt that values-aligned parenting was not "working to fix her child's behavior" and, therefore, she had a challenging time continuing to engage in her chosen committed actions.

Following the ACT Matrix intervention, there was an immediate, clear, and significant increase in the level of values-aligned parenting behaviors across all participants. This substantial change in behavior indicates that the ACT Matrix intervention successfully increased values-aligned parenting immediately following its introduction. It is essential to assess two additional measures of change to determine

whether the ACT Matrix intervention impacted psychological flexibility and parenting stress as substantially as it impacted values-aligned parenting.

Psychological Flexibility

The researcher utilized the AAQ-II to measure the psychological flexibility of participants at pre- and post-intervention time points. Psychological flexibility scores are reported out of a possible 49, with a higher score indicating greater inflexibility. A score above 24 is associated with cutoffs for depression and anxiety (Bond et al., 2011). AAQ-II scores for all participants are available in Table 2.

Table 2
AAQ-II Scores

<u>Participant</u>	<u>Julie</u>		<u>Tyra</u>		<u>Amber</u>	
	Pre	Post	Pre	Post	Pre	Post
AAQ-II	36	22	28	14	46	23

Note. Pre = pre-intervention; Post = post-intervention. AAQ-II = Acceptance and Action Questionnaire.

The first-tier participant, Julie, scored 36 out of 49 on the AAQ-II, indicating a high level of psychological inflexibility. Following the ACT Matrix intervention, Julie's score dropped to 22, indicating a substantial decrease in her level of psychological inflexibility. In fact, Julie's score dropped from above the cutoff for depression and anxiety to below this cutoff.

The second-tier participant, Tyra, scored 28 out of a possible 49 on the AAQ-II, indicating an average level of psychological inflexibility. Following the ACT Matrix intervention, Tyra's score decreased to 14, indicating a considerable increase in psychological flexibility. Similar to the first-tier participant, Tyra's scores indicate a drop from above the cutoff for depression and anxiety to below this cutoff.

The third-tier participant, Amber, scored 46 out of a possible 49 on the AAQ-II, indicating extremely high rates of psychological inflexibility. Following the ACT Matrix intervention, Amber scored 23 on the AAQ-II, indicating a sizable increase in psychological flexibility. Like the first two participants, Amber's decreasing score demonstrates a drop from the range for depression and anxiety to well below this cutoff. When assessed together, these three pre- and post-test scores suggest that the ACT Matrix is effectively increases psychological flexibility for parents of autistic children.

Parental Stress

Parental stress was assessed through the PSI-4-SF, delivered pre- and post-intervention. In addition to score reports, a defensive responding score, which assesses

the extent to which the respondent approaches the questionnaire with a strong bias to present the most favorable impression of him or herself or to minimize indications of problems or stress in the parent-child relationship, was generated for each participant. A defensive responding score below ten indicates a potential for social desirability bias. All participants scored above a 10 on the defensive responding scale. Reports for all participants are available in Table 3.

TABLE 3
PSI-4-SF Scores

<u>Participant</u>	<u>Julie</u>		<u>Tyra</u>		<u>Amber</u>	
	Pre	Post	Pre	Post	Pre	Post
PSI-4-SF						
Total Score	>99	93	>99	>99	88	84
PD	>99	91	91	82	85	62
PC-DI	>99	85	96	90	86	92
DC	>99	96	>99	>99	91	96
DR	31	25	21	19	27	18

Note. Pre = pre-intervention; Post = post-intervention. PSI-4-SF = Parenting Stress Index, 4th Edition, Short Form. TS = Total Score; PD = Parental Distress; PC-DI = Parent-Child Dysfunctional Interaction; DC = Difficult Child; DR = Defensive Responding

The first-tier participant, Julie, scored in the >99th percentile for total stress during the pre-intervention assessment. She scored in the >99th percentile for the parental distress subdomain, in the >99th percentile for the parent-child dysfunctional interaction subdomain, and in the >99th percentile for the difficult child subdomain. Following the ACT Matrix intervention, the PSI-4-SF was delivered again. Julie scored in the 93rd percentile for total stress on the post-test measure. She scored in the 91st percentile for the parental distress subdomain, in the 85th percentile for the parent-child dysfunctional interaction subdomain, and in the 96th percentile for the difficult child subdomain. Overall, Julie decreased her total stress score as well as her score for each of the three subdomains, indicating that the ACT Matrix successfully decreased her stress.

The second-tier participant, Tyra, scored in the >99th percentile for total stress during the pre-intervention assessment. She scored in the 91st percentile for the parental distress subdomain, in the 96th percentile for the parent-child dysfunctional interaction subdomain, and in the >99th percentile for the difficult child subdomain. In the post-test measure, Tyra scored in the >99th percentile for total stress. She scored in the 82nd percentile for the parental distress subdomain, in the 90th percentile for the parent-child dysfunctional interaction subdomain, and in the >99th percentile for the difficult child subdomain. Overall, Tyra decreased her score for the subdomains of parental distress and parent-child dysfunctional interaction, while her scores for total stress and difficult child remained stable.

The third-tier participant, Amber, scored in the 88th percentile for total stress during the pre-intervention assessment. She scored in the 85th percentile for the parental distress subdomain, in the 86th percentile for the parent-child dysfunctional interaction subdomain, and in the 91st percentile for the difficult child subdomain. In the post-test measure, Amber scored in the 84th percentile for total stress. She scored in the 62nd percentile for the parental distress subdomain, in the 92nd percentile for the parent-child dysfunctional interaction subdomain, and in the 96th percentile for the difficult child subdomain. Overall, Amber decreased her score for total stress and for the subdomain of parental distress. Her scores increased for the parent-child dysfunctional interaction subdomain and difficult child subdomains.

Interobserver Agreement

During the post-intervention collection of values-aligned parenting behavior, the researcher collected IOA data across 33% of the days for all participants to ensure reliability of BOR reports. The researcher collected six days of IOA for the first-tier participant, with an IOA of 100% across all six observations. The researcher collected six days of IOA for the second-tier participant, with an IOA of 95.67% and a range from 92.86% to 100%. The researcher collected five days of IOA for the third-tier participant, with an IOA of 89.6% and a range from 66.67% to 100%. These scores demonstrate that a high level of reliability was maintained through post-intervention BOR data collection.

Social Validity

Overall, participants reported that the ACT Matrix intervention was a positive experience. Additionally, all participants reported that the intervention helped bring

awareness to why they were engaging in certain parenting behaviors that did not align with their values. All three participants identified the most beneficial part of the intervention as recognizing, in the second quadrant, that the parenting behaviors in which they habitually engaged were actively moving them away from the people and ideas they listed as valuing most. Tyra also reported that it was helpful to have a list of values-aligned parenting behaviors she could engage in instead of the ones that came naturally to her.

Julie reported generalizing the skills learned during the ACT Matrix for her autistic son to her parenting of her neurotypical son. Tyra reported that the skills learned to help increase her values-aligned parenting generalized to improve her approach to disagreements with her husband. Of the three participants, Amber expressed the most frustration with the ACT Matrix intervention, as she felt it was initially ineffective in addressing her son's challenging behavior. She struggled to understand the acceptance component of the intervention and expressed concern that accepting her son's challenging behaviors rather than reacting to them would increase these behaviors. By the end of the study, she did express that it "clicked" and that "even if we handle it perfectly, he still will have his moments, and that's not about us." She also reported finding the visual ACT Matrix beneficial to her engagement in the intervention.

Reported barriers to engaging in values-aligned parenting involved being distracted or overwhelmed with other responsibilities at the same time their child was engaging in challenging behaviors. However, all three participants reported that engagement in values-aligned parenting became more accessible as they practiced it.

Amber reported that her largest barrier to engagement was a lack of buy-in to acceptance at the beginning. Additionally, all participants reported that their satisfaction and confidence with their own parenting increased by the end of the study.

CHAPTER FIVE

The current study was designed to analyze the effect of the ACT Matrix on values-aligned parenting behavior, psychological flexibility, and parenting stress through a concurrent multiple baseline design across participants. Specifically, the study aimed to test the following three hypotheses:

- (1) Engaging in the ACT Matrix will decrease the reported stress levels of parents of autistic children as measured by the PSI-4-SF.
- (2) Engaging in the ACT Matrix will increase the percentage of values-aligned parenting responses provided by parents of autistic children.
- (3) Use of the ACT Matrix will increase the psychological flexibility score of parents of autistic children as measured by the AAQ-II.

Consistent with hypothesized results, engagement with the ACT Matrix increased values-aligned parenting behaviors across all three participants. This was demonstrated by a clear and substantial change in the level of values-aligned parenting behavior for each participant, sustained through the study's conclusion. In addition to substantial increases in values-aligned parenting, all three participants demonstrated increased psychological flexibility, as measured by the AAQ-II. Prior to baseline, all three participants displayed high levels of psychological inflexibility that were above the cutoff for depression and anxiety. Following engagement in the ACT Matrix intervention, all participants increased their psychological flexibility, and their scores reduced to below the cutoff score for depression and anxiety. Parenting stress results, as measured by the

PSI-4-SF, were the least robust but also supported the initial hypothesis that the ACT Matrix would decrease parenting stress. Specifically, PSI-4-SF pre- and post-test scores demonstrate a decrease in the subdomain of parental distress across all. Overall, the intervention was highly successful across all targeted areas and represents promising findings for using the ACT Matrix with parents of autistic children.

Discussion of Findings

Values-Aligned Parenting

The current study's concurrent multiple baseline design allows for causal claims between the ACT Matrix intervention and values-aligned parenting behaviors. It is evident that the ACT Matrix intervention caused an increase in values-aligned parenting behaviors across all three participants. After engaging with the intervention, all participants maintained consistently high levels of values-aligned parenting behaviors that were not observed during baseline. It is possible to draw a functional relationship between the ACT Matrix and value-aligned parenting due to the immediate and clear change in each participant's behavior upon introduction of the ACT Matrix, as well as the lack of change in other participants' behaviors until the ACT Matrix was introduced.

The PND for all participants was 100%, indicating that all the post-intervention data points exceed baseline levels of values-aligned parenting behavior. Julie, the first-tier participant, had the most prolonged post-intervention phase and sustained values-aligned parenting behavior above 77% for the duration of this phase. Her post-intervention rates were the most stable compared to the other two participants. Tyra, the second-tier participant, sustained rates above 75% and engaged in values-aligned

parenting behaviors at 100% for 10 of the 17 days in the post-intervention phase. This supports her report that parenting in line with her values was “pretty easy” once she identified both her values and negative thoughts that occasioned parenting behavior misaligned with her values. The third-tier participant, Amber, displayed the most variability in her post-intervention data. Her value-aligned parenting ranged from 66.66% to 100%. Her initial data points display consistency at 100%. However, Amber’s value-aligned parenting began to decrease by the seventh day of the post-intervention phase. This aligns with her report that she expected her son’s behaviors to improve upon her engagement in values-aligned parenting and became frustrated when the behaviors stayed the same. Following four days of decreasing values-aligned parenting behaviors, Amber’s behaviors trend upwards, again aligning with her report that it “clicked” that his behaviors were not a reflection of her as a parent. During the social validity follow-up interview, the researcher probed Amber further to identify what caused the “click” on post-intervention day 11. Amber reported reviewing the ACT Matrix visual to see if she was “doing it right” and feeling prompted by the visual that parenting in alignment with her values was not about her son, and that her son’s behavior did not mean she was a terrible mother.

The researcher collected two measures in this study in addition to the values-aligned parenting behaviors: psychological flexibility measured through the AAQ-II and parenting stress measured through the PSI-4-SF.

Psychological Flexibility

The AAQ-II scores represent a consistent and substantial increase in psychological flexibility across all participants after engaging with the ACT Matrix intervention. Participant scores are reported out of a possible 49, with a higher score indicating greater inflexibility. A score above 24 is associated with cutoffs for depression and anxiety. All the participants' pretest AAQ-II scores were above the cutoff for depression and anxiety, suggesting all three mothers were at risk of depression and anxiety. All participants' post-test scores decreased below this cutoff after engaging with the ACT Matrix intervention. These results indicate decreased risks for depression and anxiety across all participants due to engaging with the ACT Matrix. Given the previously discussed findings that all participants increased their values-aligned parenting behaviors, this noted increase in psychological flexibility is not surprising. Psychological flexibility is considered a potential change mechanism in ACT (Ciarrochi et al., 2010). While this area of research is emerging and ongoing, it is thought that increasing psychological flexibility allows individuals to disentangle themselves from their negative thoughts and focus on committed actions to best move them toward their values. Thus, an increase in psychological flexibility across participants is to be expected as value-aligned behaviors increase. While anecdotal, it is interesting to note that the participant with the greatest psychological flexibility at the end of the study, Tyra, also engaged in the steadiest rates of high values-aligned parenting behaviors following the ACT Matrix intervention. Amber, the participant who reported the most difficulty with acceptance and the intervention, exhibited the lowest rates of psychological flexibility. This study's

AAQ-II results further demonstrate the suggested link between psychological flexibility and engagement in values-aligned behaviors. While limited by the small number of participants, the results support the researcher's second hypothesis that engagement with the ACT Matrix would increase the psychological flexibility of participants.

Parenting Stress

The PSI-4-SF scores include a Total Stress (TS) score, as well as three subdomains: Parental Distress (PD), Parent-Child Dysfunction Interaction (P-CDI), and Difficult Child (DC). Interestingly, as hypothesized, all participants demonstrated a decrease in the subdomain score of PS. Scores of TS, P-CDI, and DC represent some variability. Two of the three participants demonstrated a clear decrease in their TS score, indicating that their total stress related to parenting decreased after implementing the ACT Matrix. One participant, Tyra, did not demonstrate a decrease in her TS score. However, this may be due to a ceiling effect, as both her pre- and post-test TS scores were >99, which is the upper limit of the PSI-4-SF scale. Thus, any decreases in her TS may be difficult to perceive if they were still above the PSI-4-SF threshold. The P-CDI scores decreased for two participants but increased for a third participant, Amber, from 86 to 92. This is interesting to note because, despite this increase in perceived dissatisfaction in her relationship with her child, Amber still demonstrated decreased scores in total stress and parental distress. This suggests that the ACT Matrix successfully supported Amber in accepting the challenging relationship with her child and protected her against increased stress due to this strained relationship. The same appears to be true for Amber's DC score. Despite a reported increase in her perception of her child as

difficult to care for, Amber's TS and PS scores decreased, again suggesting that engagement with the ACT Matrix protected against increased stress. Anecdotally, it is interesting to note that Amber, who initially reported the most considerable barriers to engagement with the intervention followed by a "click" toward the end of the study, had the largest change in her PS score from pre- to post-test.

Overall Discussion

Stress levels of parents of autistic children are shown to be higher than those of parents of NT children and parents of children with other developmental disabilities. Despite this, most research is directed at supporting the child, without much attention paid to the parents' psychological functioning. In fact, much of the available research that surfaced during the literature review focused on parents as a mechanism to decrease their child's challenging behaviors rather than intervening to specifically support parents as they managed the increased responsibilities of raising an autistic child.

This study examined the effects of a brief ACT Matrix intervention on parenting stress, values-aligned parenting, and psychological flexibility. Consistent with initial hypotheses, the findings reveal that a brief ACT Matrix intervention yielded substantial decreases in parent stress and robust increases in values-aligned parenting behaviors and psychological flexibility. These results extend the existing literature on the ACT Matrix and provide provisional evidence that a brief, 45-minute ACT Matrix intervention may positively affect parents of autistic children.

The current study adds to the existing literature on ACT and the ACT Matrix and was the first to examine the use of the ACT Matrix, in isolation, for parents of autistic

children. Thus, much of the findings should be viewed as a tentative foundation on which to build future research in this area.

Limitations

Research Design

While single-subject designs are unique in their absence of a separate control group, it is important to note that, in single-subject designs, each participant serves as his or her own control (Barlow et al., 2008; Johnston and Pennypacker, 2009; Kazdin, 2010; Sidman, 1960). By testing individual participants under baseline and then intervention conditions, the researcher demonstrates the effects of the intervention for each individual participant and then replicates these effects across multiple participants. This is advantageous, as each participant serving as their own control allows their unique characteristics to be carried across all conditions (Johnston et al., 2020). This protects against the chief disadvantage of large group designs, in which it is difficult to ascertain whether the observed differences between the experimental group and control group are due to the intervention or differences of the participants in each group.

While large samples are efficient for demonstrating statistical significance, single-subject designs focus on social significance, in which the researcher demonstrates a real and meaningful change in an individual's behavior rather than a statistical, average change that, despite passing a preconceived significance test, may not make a meaningful difference in the lives of participants. As Kazdin (2011) notes, single-subject designs are well suited for testing whether the findings from a group design are socially valid for an individual. Large-n designs with a control and experimental group have the potential to

mask variability due to analysis of the average of the group. On the other hand, single-subject designs allow the researcher to analyze the intervention for each individual participant and determine whether the intervention is effective for everyone rather than on average. Thus, using a single-subject design, specifically a concurrent multiple baseline design, is a strength of this study that allows the researcher to demonstrate individual social significance and a functional relationship between the ACT Matrix intervention and the increase in values-aligned parenting behaviors across all participants.

Threats to Validity

There were several potential threats to this research design's internal and external validity, including social desirability bias, the Hawthorn effect, and regression to the mean. Each of these is explained below, along with the researcher's steps to mitigate each.

The issues of social desirability bias and expectation bias are essential to address, as the presence of either would greatly impact the interpretation of results in this study. Specific to the measurement tools, researchers have assessed the construct validity of the AAQ-II using social desirability scales, finding appropriate discriminant validity. Similarly, the PSI-4-SF includes a defensive responding score that indicates the participant's minimization or underreporting of stress. None of the participants' defensive responding scores initiated concern for social desirability bias. To further protect against these potential biases on the indirect measures, the pre- and post-tests were presented with a significant time lapse between them to prevent participants from remembering prior scores and attempting to present an improved score. Additionally, using frequent, direct observation of the participants' observable and measurable behavior by the

researcher offers support for the outcomes of both the pre- and post-intervention measures. The behaviors observed by the researcher were indicative of improved outcomes on the indirect measures.

Another conceivable threat to internal validity is the Hawthorne effect of reactivity (Kratochwill, 1978; Portney & Watkins, 2000), in which participants may not display their natural behavior when observed. This was of specific concern to the researcher, as self-report data is particularly susceptible to this effect. To mitigate this effect, the researcher did not fully disclose the plans for analysis of the data being collected. Participants were instructed to collect data on their child's behavior, including the antecedent, behaviors, and consequences to this behavior. While all collected data was useful to the study, the researcher explicitly analyzed the parents' provided consequences to determine whether they were in line with stated parenting values. By omitting an explanation of the data analysis, the participants were not fully aware of which of their behaviors were being observed and were, therefore, less likely to present false data. In addition to this preventative step, the researcher instructed participants to take ongoing, daily data across 25 days. Due to the frequency of data collection, participants likely became desensitized to the Hawthorne effect over time.

Another potential threat to internal validity within this study design was the possibility that findings illustrated a regression to the mean rather than a real change in the participants' data. Regression to the mean (RTM) occurs when participants are selected based on their extremely high or low scores, and then follow-up scores naturally regress to a less extreme score (Kratochwill et al., 2010). In this study, participants were

included based on their high scores on the PSI-4-SF as well as high scores on the AAQ-II, so RTM is a potential threat to internal validity. This threat, however, is unlikely, given the increase in some subdomains of the PSI-4-SF, as well as anecdotal reports that corroborate the high stress and low psychological flexibility during baseline. Additionally, the repeated measures of values-aligned parenting behaviors throughout the study allow for assessment of the participants' change in behavior over time. Thus, it is unlikely that changes in the dependent variables were due to a confound of RTM.

It is possible that other variables outside of the ACT Matrix intervention contributed to the findings of this study. Other potentially confounding variables include a one-on-one relationship between the researcher and the participants and self-monitoring through data collection. However, it should be noted that the researcher's interaction with participants was limited to e-mail except for the brief, one-time ACT Matrix intervention. Given this, it is unlikely that this relationship served as a confounding variable. Anecdotally, participants reported being frustrated by the self-report data collection. While it may have provided accountability for their values-aligned parenting behaviors, it is unlikely that it served to decrease their stress or increase their psychological flexibility. Future research should explore alternatives to self-report data collection to better control for this potentially confounding variable.

Importantly, this research supports the idea that a parent's stress can be reduced without requiring intervention for their child. There is a growing movement of autistic individuals rejecting what they see as intrusive treatments aimed at reducing the symptomology of autism. For parents of autistic children, the stress associated with

raising an autistic child is likely to remain and potentially increase if treatments are no longer considered a viable option for supporting their child. Thus, it is encouraging to find that interventions for parents of autistic children can effectively reduce their stress and increase their psychological flexibility in the absence of interventions for their children.

The largest limitation of this study was the requirement of daily data collection by the participants. While this data collection method was necessary to ensure continuous tracking of parent behavior, it was cumbersome and labor-intensive for the parents. All participants reported frustration with the data collection, particularly when they were out with their children in public places. Many reported using the “Notes” application on their phones to collect data. It may be possible for future researchers to develop a more advanced method of data collection using a mobile phone application. Future studies may find it beneficial to set up a research design that isolates data collection to a specific segment of the families’ day to decrease the burden placed on participants. While this limitation applies to the research aspect of this study and may be required for future researchers wishing to measure the effects of the ACT Matrix on parenting behaviors, it is important to note that ongoing data collection would not be required for the actual implementation of the ACT Matrix intervention as a treatment.

Related to the limitation of data collection, a marked limitation of this study was the use of self-report by parents on their own values-aligned parenting behaviors. Response bias is a phenomenon inherent in self-report data in which individuals reporting on their own behavior consciously or subconsciously skew the data to provide a more

favorable representation of their behavior (Ganster et al., 1983). As previously mentioned, the researcher attempted to mitigate this limitation by instructing participants to collect data on their child's behavior rather than on their own behavior and then gathering information on the parents' behavior based on those BOR reports. Despite this incomplete disclosure of data analysis procedures, it is possible that parents did not accurately report on their own behavior. To further mitigate this concern, the researcher conducted frequent observations of the parents interacting with their children to verify the self-report data. If parents' data collection during these observations appeared to be outliers from days in which they were not observed, this would indicate inaccurate self-reports. Across the researcher's twenty-eight observations, there was no indication that participants were inaccurately reporting their behavior data. Future researchers may wish to implement a more objective form of reporting, such as having the researcher collect data from a recording of the parent-child interaction.

This study would have benefited from a treatment fidelity measure during the implementation of the ACT Matrix. While the researcher utilized a predeveloped script, results would be strengthened if an observer collected data on the researcher's adherence to this script. The natural variability in the researcher's language and interactions with participants may have individualized the treatment beyond the intended ACT Matrix intervention, and a treatment fidelity measure would have assessed this variability. It is recommended that future research in this area include an observer during the observation or utilize video recording during the intervention to enable treatment fidelity data collection following the intervention.

A further limitation of this study was the small number of participants and the somewhat homogeneous participants, as well as the small number of replications. While the benefits of single-subject design research have been addressed in prior sections, more replications with more heterogeneous participants would serve to strengthen the findings. The participants in this study were of varied races. However, they all reported being cisgender, straight, highly educated, female mothers who were the primary childcare providers in their homes. Thus, it is unknown whether the results would generalize to same-sex couples, fathers, or other diverse populations. Additionally, it is unknown if the same results would replicate with nonprimary caretakers. Future researchers would benefit from replicating the ACT Matrix protocol with larger, more heterogeneous samples of caregivers to assess its generalizability to the greater population.

COVID-19

The COVID-19 pandemic presented a classic “history effect” in which participants’ experiences with events outside the study had the potential to influence the study outcome (Campbell & Stanley, 1963; Cook & Campbell, 1979). Several researchers have demonstrated the exacerbating impact of the COVID-19 pandemic on parenting stress (Hiraoka & Tomoda, 2020; Wu & Xu, 2020) and parenting behaviors (Brown et al., 2020; Gerard et al., 2020). COVID-related external variables that had the potential to threaten validity of this study included, but were not limited to, daycare and school closures and openings, pandemic-related job losses, and changes in local masking requirements. A concurrent multiple baseline design was employed to protect against the effects of these potential threats to validity. Using this design, the researcher identified a

functional relationship between the ACT Matrix intervention and changes in the participants' values-aligned parenting behaviors. Additionally, participants were asked to report any large family-structure changes (e.g., loss of childcare, job loss, or travel) during the study. None of these changes were reported, so it is unlikely that COVID-related external variables contributed to decreased parental stress levels.

Implications and Future Directions

The findings of this study have several implications for how clinicians can support parents of autistic children. First, this study demonstrated that the ACT Matrix is an effective intervention for parents of autistic children that can be implemented in a brief timeframe with meaningful outcomes. For clinicians working with both autistic children and their parents, the ACT Matrix could be a useful intervention at the onset of treatment to provide immediate support for parents. Given the previously discussed bidirectional relationship between parenting stress and maladaptive child behavior, this short intervention could offer an entry point for reducing the child's challenging behaviors prior to intervening with the child.

Social validity. This study's social validity findings can guide future practitioners when implementing the ACT Matrix intervention with parents. For example, parents reported that values identification and pinpointing alternative patterns of responding to their negative thoughts were the most helpful components of the intervention. Future practitioners may want to spend more time on or emphasize these areas of the ACT Matrix when implementing it with parents. Additionally, future researchers may want to conduct a component analysis of the ACT Matrix to determine whether the entire

intervention is needed or if specific components can act as effectively in isolation as they do when presented as an ACT Matrix package.

Part of the purpose of this study was to isolate the effects of the ACT Matrix on behavior. Prior research demonstrated an ACT package's positive effects, including using an ACT Matrix among other interventions. However, research examining the ACT Matrix in isolation remains scarce. Even when presented in isolation, the ACT Matrix itself is a package of several components, including mindfulness, goal-setting, and identification of alternative functional behaviors. Thus, it is difficult to assert that the ACT Matrix as an intervention is responsible for the change or whether individual components of the ACT Matrix may create a similar change. Given the participant responses regarding the appeal of certain aspects of the ACT Matrix, a component analysis would be a beneficial direction for future research.

Telehealth. In addition to the findings that the ACT Matrix can be implemented to increase values-aligned parenting behaviors, decrease parenting stress, and increase psychological flexibility, this study also revealed that the ACT Matrix could be effectively delivered via telehealth. Additionally, all participants reported a preference for telehealth delivery if they were to receive additional services in the future. This delivery modality provides potential access to the ACT Matrix to individuals that may otherwise be unable to locate a clinician, such as individuals in remote areas or individuals unable to drive to a clinician's office. Prior research has demonstrated that ACT can be effectively delivered via telehealth (Pennefather et al., 2018; Sairanen et al., 2019), and the current study builds on these findings in demonstrating that the ACT Matrix is also

able to be delivered through a remote platform. Future research should build on these findings to address barriers to service and increase the availability of supportive interventions.

Anti-ableism. While much of the academic and medical language surrounding ASD is deficit-based, it is important to note that autistic individuals are vocal in their request not to define their differences as deficits (Bottema-Beutel et al., 2021). While the current study focused on the challenges associated with parenting an autistic child, it is critical to consider that it is society's responsibility to accommodate autistic people and not the responsibility of autistic individuals to fit into a neurotypical society. Thus, while this discussion may be interpreted as enumerating ways autistic children are burdensome to their parents, it should instead be viewed as how society's failure to support autistic individuals and their families has created the burden around parenting an autistic child.

The current study's findings are meaningful for the anti-ableist movement. As the autistic community deliberates the pros and cons of interventions aimed at reducing the symptomology of autism (Bottema-Beutel et al., 2021; Pearson & Rose, 2021) and an increasing number of advocates posit that it is society's responsibility to adjust to autistics rather than the responsibility of autistics to adjust to society (Kapp et al., 2012), this intervention offers a promising way in which parents can be taught to accept challenges related to raising an autistic child, rather than changing their child.

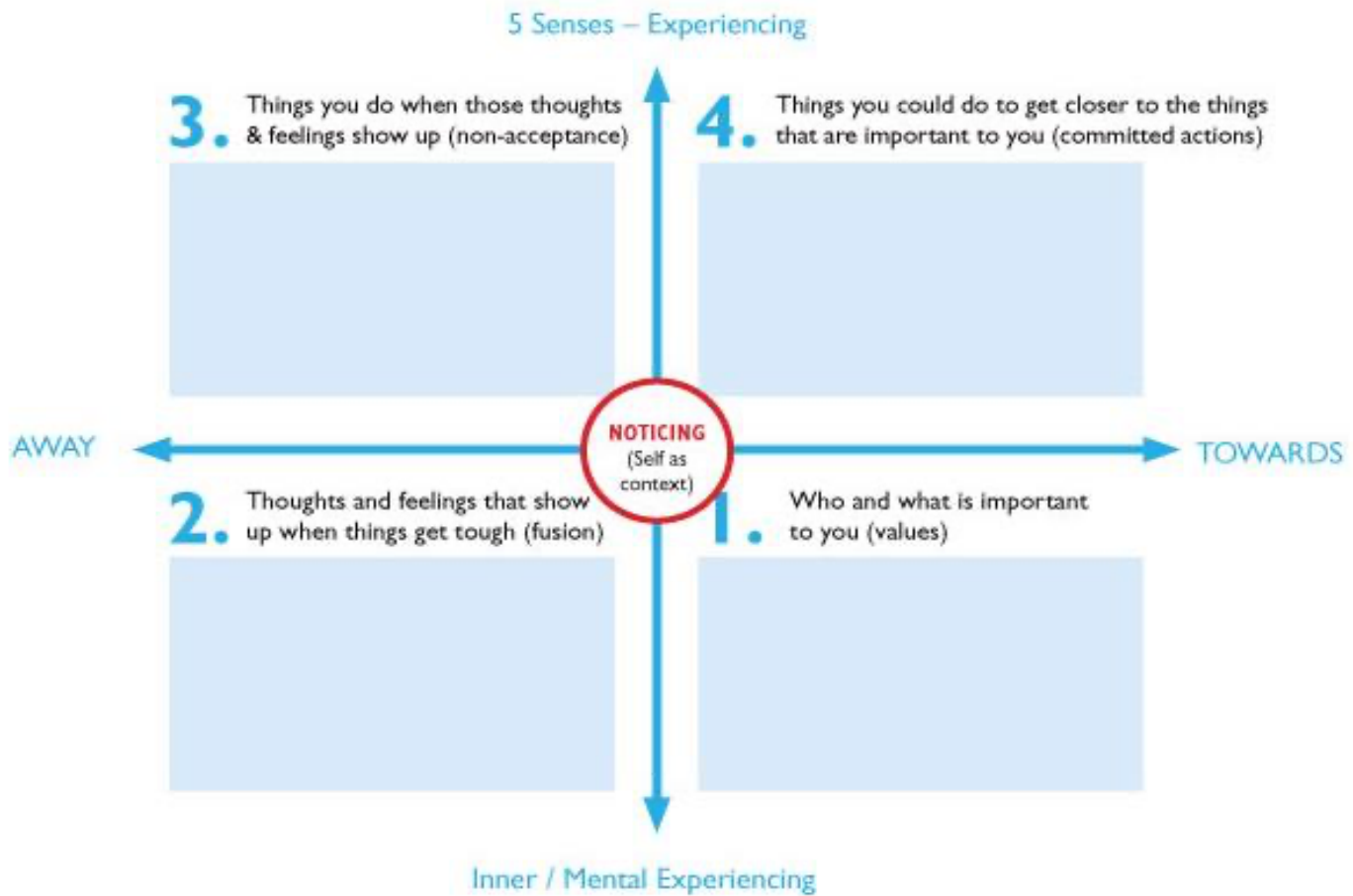
Conclusion

This study revealed that the ACT Matrix was an effective intervention for increasing values-aligned parenting behaviors for parents of autistic children. It may also

have increased psychological flexibility and decreased parenting stress. Parents reported noticeable differences in their own behaviors and described the intervention as helpful in decreasing their day-to-day stress related to parenting their autistic children. Thus, this study provides preliminary support for the effectiveness of the ACT Matrix when implemented with parents of autistic children. The ACT Matrix should be further studied on this foundation to determine whether results sustain with more heterogeneous populations and with larger samples of parents. Overall, the ACT Matrix is a promising intervention, specifically to support parents of autistic children.

APPENDIX

Appendix A The ACT Matrix Visual



Appendix B: ACT Matrix Script

- Introductions
- Brief intro to acceptance:
 - We're going to be working with something called the ACT Matrix.
 - ACT stands for "Acceptance and Commitment Therapy", which is a therapy method that uses acceptance strategies along with commitment techniques to increase something called psychological flexibility and help you parent in a way that's more aligned with your values.
 - Today, we're going to focus on the challenges you face as a parent and help you develop strategies to approach parenting in a way that is more aligned with your values.
- Explain the Matrix
 - Lower half = Inner thoughts, feelings, physical sensations
 - Upper half = Overt behaviors, five sense experience
 - Left side = Actions, feelings that bring you away from the people and things that are most important in your life
 - Right side = Actions, feelings that bring you closer to the people and things that are most important in your life
 - Inner circle = Represents you, just noticing all of this happening around you, at any given moment
- Discuss lower right-hand quadrant:
 - "What are the things, and people that are most important in your role as a parent?"
 - "Are there certain values that guide your parenting or that you would like to guide your parenting?"
 - "What kind of parent do you want to be? What qualities in yourself matter?"
- Move to the lower left-hand quadrant:
 - "When parenting is challenging, what inner feelings, thoughts, or bodily sensations show up and get in the way of moving towards who or what is important?"
- Move to the upper left-hand quadrant:
 - "What are some of the things you do to move away from unwanted inner thoughts and feelings?"
 - "When these difficult experiences, or uncomfortable thoughts and feelings show up in your mind and body, what are your 'go to' moves to get rid of them quickly in the moment that help you avoid experiencing them?"
- Move to the upper right-hand quadrant:
 - "If you are being the best version of yourself - how would you act, at any given moment, regardless of whether or not you are experiencing the thoughts, feelings, and emotions you listed in the lower left-hand quadrant?"

- “What are some things you wish you could do when you’re experiencing uncomfortable thoughts and feelings that would move you closer to these chosen values?”
- “If you embodied the your chosen values in your most difficult parenting moments, what would that look like?”
- Re-visit the center
 - “This is you, in the center, noticing, at the center of this point of view. Only you can choose to notice who or what is important to you, what inner stuff can show up and get in the way, and whether what you do is a move towards or away from what is important.”
- Committed Actions
 - “Now that we’ve going through the matrix, I’d like you to identify 2-3 actions you identified from quadrant for that you are willing to commit to doing over the next few days.”

Appendix C:

Social Validity Interview Questions

Directions: Researcher reads statements/questions for the participant to answer.

1. Describe your experience in receiving the ACT Matrix intervention
2. How easy or difficult were the ACT concepts for you to understand?
3. How effective were the strategies developed from the ACT Matrix in reducing your stress as a parent of an autistic child?
4. How easy or difficult do you feel it will be for you to apply the learned strategies to new situations in the future? Either as a parent or in other contexts?
5. What barriers, if any did you face with the ACT Matrix intervention?
6. Would you recommend the ACT Matrix intervention to other parents of autistic children? Why or why not?
7. What part of the intervention did you find most beneficial?

Appendix D

Consent Form

Evaluating the effects of the ACT Matrix on Parenting Stress and Values-Aligned Behaviors of Parents of Autistic Children

*Required

1. Email*: _____

Research Procedures

This research is being conducted to learn more about how the ACT Matrix impacts parenting stress and value- aligned parenting behavior. If you agree to participate, you will be asked to collect daily data on a provided data sheet, participate in a 1-hour virtual intervention, and conduct two online assessments.

Risks

There are no foreseeable risks or discomfort for your child in this research.

Benefits

There are no direct benefits to you for participating in this research.

Confidentiality

The data in this study will be confidential. Names and other identifiers will be requested but will be removed for any sharing of this research. While it is understood that no computer transmission can be perfectly secure, reasonable efforts will be made to protect the confidentiality of your transmission. Data would only be available to the researchers working on this study for the duration of the study and would be deleted 5 years after the conclusion of the study.

Participation

Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty. There are no costs to you or any other party. You are eligible for this study if you have a child with autism between the ages of 18-months and 12 years old.

Contact

This research is being conducted by Rebecca Correll, MD, LBA, BCBA, Psychology Department, George Mason University.

2. Consent*
Mark only one oval

I have read this form, all of the questions I have at this time have been answered by the research staff, and I agree to participate in this study.
I am NOT interested in participating in this study

Participant Information

3. Has your child received a diagnosis of autism from a medical professional?
Mark only one oval.
Yes
No
4. How old is your child with autism (If you have more than one child diagnosed with autism, please list all of their ages here).

5. Please provide your date of birth:

Example: January 7, 2019
6. Please provide your sex:
Mark only one oval.
Male
Female
Other
Prefer not to say
7. Please select your highest level of education:
Mark only one oval.
Some high school
GED or alternative high school credit
High School Diploma
Associates degree (for example: AA, AS)
Bachelor's degree (for example: BA, BS)
Master's degree (for example: MA, MS, MEng, MEd, MSW, MBA)
Professional degree beyond bachelor's degree (for example: MD, DDS, DVM, LLB, JD)
Doctorate degree (for example, PhD, EdD)
8. Please provide your race and/or ethnicity below

Appendix E

Recruitment Script

Hi,

My name is Rebecca Correll, and I am a doctoral student in the Applied Developmental Psychology program at George Mason University. I am conducting a research study investigating the use of a values-based tool to increase values-aligned parenting and decrease parenting stress (IRBNet number: 1846378-1). I am reaching out to invite you to participate in this study.

I am specifically looking for participants who have at least one child diagnosed with autism between the ages of 18 months and twelve years old. Additionally, I am looking for parents who feel they have both a high level of stress related to parenting and a lack of confidence regarding how to respond to their child's more challenging behaviors. This study aims to address both of these areas.

Participation in this study includes completion of an initial screening questionnaire, as well as daily data collection. Following 5-8 days of data collection, participants will meet with the researcher for a 1-hour intervention. Following the intervention, participants will continue to collect data for up to two weeks. At the conclusion of the study, participants will complete the same questionnaires that were completed at the start of the study. The anticipated time commitment for this study is 2 hours in total.

All meetings with the researcher will take place entirely online, through Zoom video conferencing software.

Participation in the study is voluntary and your identity as well as your child's identity would be kept confidential.

If you are interested in participating or would like to learn more, please contact me by replying to this email or calling me at XXX-XXX-XXXX.

Thank you,

Rebecca Correll, MS, LBA, BCBA

Graduate Teaching Assistant

PhD Student in Applied Developmental Psychology

Department of Psychology

George Mason University

e: rcorrel@gmu.edu

c: XXX-XXX-XXXX

APPENDIX F

Behavior Observation Record Template

Parent Name: _____

Child Initials: _____

Directions: Please fill out this form for every behavior incident that occurs throughout the day. Please add notes on the back of the sheet if you'd like to provide more information

Date/ Time	Antecedent <i>What happened before the behavior?</i>	Behavior <i>What was the behavior that occurred?</i>	Consequence <i>What did you do in response to the behavior?</i>

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