2013

Choice Amount and Choice-Making in Children: A Comparison of Children with and without Symptoms of ADHD

Liesa Klein
Minnesota State University - Mankato

CHOICE AMOUNT AND CHOICE-MAKING IN CHILDREN: A COMPARISON OF CHILDREN WITH AND WITHOUT SYMPTOMS OF ADHD

by

Liesa A. Klein

A Dissertation Submitted in

Partial Fulfillment of the

Requirements for the Degree of

Doctor of Psychology

in School Psychology

at

Minnesota State University, Mankato

July, 2013

Choice Amount and Choice-Making in Children: A Comparison of Children with and without Symptoms of ADHD

Liesa A. Klein

This dissertation has been examined and approved by the following members of the student's committee.

Carlos Panahon, Ph.D.
Advisor

Michelle Alvarez, Ph.D.
Committee Member

Daniel Houlihan, Ph.D
Committee Member

Daniel Sachau, Ph.D
Committee Member

ABSTRACT

CHOICE AMOUNT AND CHOICE-MAKING IN CHILDREN: A COMPARISON OF CHILDREN WITH AND WITHOUT SYMPTOMS OF ADHD

by

Liesa A. Klein

Minnesota State University, Mankato, 2013
Under the Supervision of Carlos J. Panahon, Ph.D.

Research has demonstrated that increased options can have a negative impact on choice experience, post-choice affect, and purchasing behavior in adults. While the use of choice and choice interventions is sometimes used in educational settings, this negative impact, *the choice overload hypothesis*, has yet to be examined in children. Further, if the presence of *choice overload* were to be identified in this population it may have further implications on children with ADHD who exhibit deficits in executive functioning. The purpose of this study was threefold: (1) to examine choice duration in children with and without symptoms of ADHD; (2) to determine if data suggested *choice overload* was present in children; and (3) to examine whether choice experience and post-choice affect were related to the number of options available. One hundred-sixty children aged 4 to 8 participated in a decoy task and were allowed to choose a prize from a treasure box containing 5, 10, 15, or 20 toys. Results indicated that children with symptoms of ADHD spent more time making a decision compared to controls; however, results failed to find support for the *choice overload hypothesis* in this sample. Implications, limitations, and future directions for research are discussed.

TABLE OF CONTENTS

List of Figures

List of Tables

Choice Amount and Choice-Making in Children: A Comparison of Children with and without Symptoms of ADHD

Teachers and staff implement a variety of techniques during each school day to encourage positive behavior (e.g., prompts, praise for appropriate behavior, and strategies to increase engagement and interest). Integration of choice in an academic setting as a strategy to increase engagement can be achieved using few resources and has been demonstrated to be an effective strategy for increasing motivation and task engagement, and effectively reducing problem behavior (c.f., Stayer Smeltzer, Graff, Ahearn, & Libby 2009; Ulke-Kurkcuoglu & Kircaali-Iftar, 2010). Having the opportunity to engage in choice is a preferred activity of children (Fenerty & Tiger, 2010; Tiger, Hanley, & Hernandez, 2006), and teachers support its use (Jolivette, Wehby, Canale, & Massy, 2001). Thus, choice is an easily implemented, teacher-friendly, and effective tool in dealing with a variety of goals with students.

A fairly logical assumption is that the more options one has to choose from the more satisfaction one will experience with their choice. With options comes more autonomy and greater opportunity to find alignment with one's preferences. However, research has found higher amounts of choice, more than 10 options, can have a negative impact such as frustration, decreased satisfaction, and regret (Berger, Draganska, & Simonson, 2007; Iyengar & Lepper, 2000; Iyengar, Wells, & Schwartz, 2006; Park & Jang, 2013; Reutskaja & Hogarth, 2009; Sagi & Friedland, 2007). These findings are based on adult populations and to date no research has evaluated the impact of choice amount with children.

Children do demonstrate the use of appropriate choice-making techniques to help narrow options though younger children use strategies less effectively (Berebey-Meyer, Assor, & Katz, 2004). A variety of factors may play a role in this finding such as noted deficits in the ability to

sort relevant and irrelevant information (Miller, Haynes, DeMarie-Dreblow, & Woody-Ramsey, 1986), difficulty identifying good and poor reasoning processes (Amsterlaw, 2006), and difficulty using information to eliminate options (Davidson, 1991a). Further, children with disabilities may have an increased vulnerability to the negative consequences of choice options.

Children with Attention Deficit Hyperactivity Disorder (ADHD) demonstrate a variety of characteristics which may impact choice-making. Impairments in attention (Fischer, Barkley, Smallish, & Fletcher, 2005), working memory (Boonstra, Oosterlaan, Sergeant, & Buitelaar, 2005), organization (American Psychological Association, 2000), and processing speed (Mayes & Calhoun, 2006) are noted in this population. Children with ADHD similarly display slower reaction times (Mullane, Corkum, Klein, & McLaughlin, 2009; Oosterlaan, Logan, & Sergeant, 1998). Further, ADHD is often accompanied by a comorbid disorder which may exacerbate present symptoms and impact other areas of functioning (Kadesjo & Gillberg, 2001; Shaw, Wagner, Eastwood, & Mitchell, 2002). Collectively, these factors suggest that children with ADHD may have more difficulty with choice, particularly as the amount of options increase.

The current study examined the impact of choice amount on choice duration, difficulty, and enjoyment in children. First, choice duration in children with ADHD symptoms and typically-developing peers was examined to determine if groups differed overall. Second, this study examined whether increased choice resulted in either drastic increases or decreases in choice duration. Third, the levels of frustration, enjoyment, and choice satisfaction were evaluated across choice amounts to examine if choice amount impacted affect across groups. Results from this study may provide some guidance for implementing choice within the classroom to minimize children's frustration or time to choose while maximizing enjoyment and choice satisfaction.

This paper begins with a brief overview of ADHD, followed by a short introduction to neuropsychological variables that may impact choice-making in children with ADHD. Next, a review of the literature examining choice-making characteristics is provided, followed by a review of the research examining choice in children with ADHD.

Overview of Attention-Deficit Hyperactivity Disorder

Attention Deficit Hyperactivity Disorder is a disorder in which the ability to regulate and organize behavior is impaired (Barkley, 1997; Brown, 2000). The *Diagnostic and Statistical Manual of Mental Disorders-IV-TR* (DSM-IV-TR; American Psychiatric Association, 2000) identifies four subtypes occurring with ADHD: predominantly inattentive (ADHD-I), predominantly hyperactive-impulsive (ADHD-H), combined type (ADHD-C), or not otherwise specified (NOS). In order to be diagnosed with ADHD-I, children must display six of the following characteristics: lack of attention to detail or carelessness with school or vocational work or activities; difficulty sustaining attention in tasks or play; poor listening; failure to follow through on tasks; organizational difficulties; avoidance or reluctance toward effortful activities; loses important items; easily distractible; and forgetful in daily activities. For ADHD-H, children must demonstrate six of the following: frequent fidgeting or squirming; frequently out of seat when being seated is expected; excessive and inappropriate running and climbing; difficulty playing quietly; is often "on the go"; talks excessively; blurts out answers prior to questions being fully given; difficulty waiting for their turn; frequently interrupts or intrudes on others. If children meet criteria for both types ADHD-C would be the appropriate subtype. For the NOS category, symptoms are characteristic of ADHD with impairment but full criteria is not met or if onset is after age 7. For the three primary subtypes, children must also display symptoms in more than one setting, impairment in functioning (e.g., social, academic, occupational), presence of

symptoms for at least six months, and symptoms should have been present prior to the age of seven; however, this criteria was set arbitrarily and will likely be removed or altered in the DSM-V (American Psychiatric Association, 2010).

Prior to diagnosis, practitioners should rule out symptom occurrence as being age-appropriate or due to under-stimulating environments, due to Pervasive Developmental Disorder, Schizophrenia or a psychotic disorder, or another mental disorder such as a mood or anxiety (APA, 2000). ADHD-I is estimated to occur in 25 to 30 percent of ADHD cases (Faraone, Biederman, Weber, & Russel, 1998) demonstrating higher functional impairments and learning disabilities than other subtypes (Weiss, Worling, & Wasdell, 2003). ADHD-H is the least diagnosed (5.5% to 9%), and ADHD-C is the most commonly diagnosed (61% to 63%) with higher rates of behavior problems in school (Faraone et al., 1998; Weiss et al., 2003).

According to the DSM-IV-TR an estimated 3 to 7 percent of children suffer from ADHD (APA, 2000); however, community samples report estimates as high as 9.5 percent making it the most commonly diagnosed disorder in children (CDC, 2010). Males are diagnosed with ADHD more frequently than females with estimates ranging from 2:1 to 9:1 (American Psychiatric Association, 2000); however, some of this discrepancy may be due to the higher levels of hyperactivity and aggression boys with ADHD demonstrate (Gaub & Carlson, 1997; Gerson, 2002; Silverthorn, Frick, Kuper, & Ott, 1996), and the higher incidence of ADHD-I in girls as opposed to ADHD-H or ADHD-C (Weiss et al., 2003). Symptoms often become apparent in preschool years (Campbell, 1995; Connor, 2002), but may not occur until after age 7 (Applegate et al., 1997). In 42 to 67 percent of childhood cases, ADHD appears to dissipate and no longer meets diagnostic criteria in adulthood (Faraone, Biederman, & Mick, 2006; Fischer, Barkley, Fletcher, & Smallish, 1993); however, the presentation of ADHD is believed to change between

childhood and adulthood impacting estimates of chronicity (Brassett-Harknett & Butler, 2007). Also, children diagnosed with ADHD-I or ADHD-H are less likely to continue to meet diagnostic criteria in subsequent years compared with ADHD-C, particularly after age 8 (Lahey, Pelham, Loney, Lee, & Willcutt, 2005). Similarly, a significant proportion of children with ADHD will vary in diagnostic subtypes between the ages of 2 and 8 (Lahey et al., 2005); however, despite this variability ADHD can be reliably diagnosed in children as young as 2 years of age (Egger, Kondo, & Angold, 2006).

Childhood ADHD is often accompanied by comorbid disorders, with estimates as high as 67 to 87 percent having at least one other disorder (Kadesjo & Gillberg, 2001; Shaw, Wagner, Eastwood, & Mitchell, 2002). The most prevalent comorbid disorders are behavioral or antisocial in nature such as oppositional defiant disorder and conduct disorder (Kadesjo & Gillberg, 2001; Lavigne, Cicchetti, Gibbons, Binns, Larsen, & DeVito, 2001); 50 to 60 percent of children with ADHD meet criteria for Oppositional Defiant Disorder (ODD; Kadesjo, Kadesjo, Hagglof, & Gillberg, 2001). Of psychological disorders, 57 percent meet criteria for a mood disorder, 31 percent for an anxiety disorder, and 11.5 percent for substance use disorder (Busch et al., 2002). Approximately, 20 to 25 percent of children with ADHD have a concurrent Learning Disability (Spencer, Biederman, & Mick, 2007; Pliszka, 2000) others have reported higher estimates of 44 percent (Pastor & Reuben, 2008). Further, a significant number of children with ADHD may suffer Developmental Coordination Disorder (Barkley, DuPaul, & McMurray, 1990; Piek, Pitcher, & Hay, 1999), Autism and related disorders, tic disorders (Kadesjo & Gillberg, 1998), sleep disorders (Corkum, Rimer, & Schachar, 1999), and 24 percent demonstrate a comorbid communication disorder (e.g., speech or language; Posner et al., 2007).

Neuropsychological Functioning

In accordance with observable and reported symptoms of ADHD, children exhibit similar behavior on measures of neuropsychological functioning. Deficits within this population are largely related to executive functioning (c.f., Fischer, Barkley, Smallish, & Fletcher, 2005), abilities involving planning and organization, working memory, response inhibition, multi-tasking, and interference filtering (Roth & Saykin, 2004). Impairment in working memory is a well-documented characteristic of ADHD (Boonstra, Oosterlaan, Sergeant, & Buitelaar, 2005; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005) as are deficits in effortful attention (Fischer et al., 2005) and processing speed (Mayes & Calhoun, 2006). Deficits in executive functioning can be observed in a variety of ways; however, this review will focus on reaction times as they are the most pertinent to the current study.

Children with ADHD demonstrate slower and variable reactions times across a number of measures utilizing distractors and or requiring response suppression given specific stimuli (c.f., Alderson, Rapport, & Kofler, 2007; Kalff et al., 2005; Lijffijt, Kenemans, Verbaten, & van Engeland, 2005; Mullane, Corkum, Klein, & McLaughlin, 2009; Oosterlaan, Logan, & Sergeant, 1998). For example, the Go/No-Go reaction time task is commonly used with this population. The Go/No-Go task consists of a computer program which individually presents stimuli very briefly. Individuals are to respond to each presentation by pressing a pre-determined key unless a targeted symbol occurs such as an “X”, in which case no response is required. Sometimes this program is implemented with red and green lights where responding should be stopped while the red light is on. Accuracy and reaction time are assessed. Slower and variable reaction times are also noted on tasks requiring visuospatial discrimination and orienting (Drechsler, Brandeis, Foldenyi, Imhof, & Steinhausen, 2005; Piek, Dyck, Nieman, Anderson, Hay, Smith, McCoy, &

Hallmayer, 2004). This deficit may be further impacted by working memory impairment, a deficit present across subtypes, particularly spatial-related storage (Martinussen, Hayden, Hogg-Johnson, & Tannock, 2005).

Some research has assessed reaction time speed and variability by subtype finding that children with ADHD-C and ADHD-I are significantly slower compared to controls (Epstein, Langberg, Rosen, Graham, Narad, Antonini, Brinkman, Froehlich, Simon, & Altaye, 2011) and ADHD-H (Pitcher, Piek, & Barrett, 2002; Querne & Berquin, 2009) and more variable in response time, though error rates in ADHD-H and ADHD-C are significantly higher (Querne & Berquin, 2009). Other research similarly found no difference in response variability between ADHD-C and ADHD-I (Nigg, Blaskey, Huang-Pollock, & Rappley, 2002; Vaurio, Simmonds, & Mostofsky, 2009) while others found ADHD-C to have more variability over ADHD-I (Mullins, Bellgrove, Gill, & Robertson, 2005) and vice versa (Desman, Petermann, & Hampel, 2008). Overall, slower and variable reactions times have been hypothesized to result from attention deficits (Bellgrove, Hester, & Garavan, 2004; Leth-Steensen, Elbaz, & Douglas, 2000; Lijffijit et al., 2005), slower cognitive speed (Kalff et al., 2005), and or slower motor speed (Rubia, Taylor, Smith, Oksanen, Overmeyer, & Newman, 2000; van Meel, Oosterlaan, & Heslenfeld, 2005). Interestingly, variability in reaction time in ADHD has been found to decrease when the rate of presented stimuli is increased suggesting more rapid presentation may increase vigilant attention to stimuli (Sergeant, 2005; Sonuga-Barke, Wiersema, van der Meere, & Roeyers, 2010). Rewards contingent on reaction time has similarly seen increases in performance; however, results have been mixed across studies (c.f., Luman, Ooserlaan, & Seargeant, 2008; Shanahan, Pennington, & Willcutt, 2008, Slusarek, Velling, Bunk, & Eggers, 2001).

Functioning within the Educational System

Children with ADHD exhibit a number of academic deficits that may impair learning and progression through grade-levels. As early as preschool deficits are noted in children with ADHD who display poor or absent pre-academic skills (DuPaul, McGoey, Eckert, & VanBrakle, 2001). Children continue to have difficulty through grade school demonstrating difficulties and deficits in math, reading (Lahey et al., 1988; Mariani & Barkley, 1997), and writing skills (Marcotte & Stern, 1997). Consequently, children with ADHD score approximately 9 points below the mean on standardized measures of achievement overall, with significantly low scores on reading, mathematics, and spelling, respectively (Frazier, Youngstrom, Glutting, & Watkins, 2007). It is important to note that many of the studies examining achievement including meta-analysis did not control for comorbidity of learning disabilities. While some of these academic deficits may be more severe due to comorbid learning disabilities (August & Garfinkel, 1990), research has demonstrated that significant academic deficits are still present when comorbidities and socio-economic status have been accounted for (Pastura, Mattos, & de Queiroz Campos Araujo, 2009). It has been estimated that over three quarters of children with ADHD fall more than one grade level behind academically (Cantwell & Baker, 1992) and are approximately three times more likely than peers to repeat a grade (Faraone, Biederman, & Monuteaux, 2002). It is estimated that 28 percent of students with ADHD are placed in special classrooms and 53 percent require additional supports such as those provided by a paraprofessional (Faraone et al., 2002).

Children with ADHD display higher rates of problem behavior than peers (DuPaul et al., 2001). Behaviors may include inattention, talking out, or being out-of-seat at undesignated times. Children may also engage in noncompliance or aggression if a comorbid behavior disorder is

present (e.g., ODD or CD). Indeed, rates of punitive measures as early as preschool have been reported with high rates of suspension (40%) and expulsion (16%) compared with non-ADHD peers (.5%; Egger, Keeler, & Angold, 2006a as cited in Egger, Kondo, & Angold, 2006b). Suspension and expulsion rates remain elevated across grade levels with 23 percent of children with ADHD-C and 11 percent of children with in ADHD-I subject to at least instance (Weiss, Worling, & Wasdell, 2003). Children with ADHD are also at higher risk for dropping out of school (Fergusson, Lynskey, & Horwood, 1997) as well as increased risk of juvenile offending and conviction (Fergusson et al., 1997).

Treatment and Intervention

Based on the performance deficits and behavior problems often occurring within academic settings, evidence-based strategies are needed to reduce their severity. Although evidence-based interventions can be presented here, actual practices within educational settings have not been published.

Three evidenced-based treatments have been identified to date: pharmacological, psychosocial (e.g., behavior therapy, parent training), and combined use of medication and psychosocial interventions (American Psychological Association, 2006). Medication is a frequent strategy utilized, with estimates of 71 percent of children with ADHD on some medication to treat symptoms (CDC, 2010), most commonly stimulants (93%; Rowland, Umbach, Stallone, Naftel, Bohlig, & Sandler, 2002). Of individuals with ADHD who are medicated (stimulant and non-stimulant medications) an estimated 65 to 75 percent respond well with decreased symptoms (Greenhill, 2002); however, other intervention appears warranted as medications do not appear to alleviate academic-related variables (Fabiano et al., 2007). Behavioral intervention has been demonstrated as effective in improving a variety of behaviors

across a variety of settings. In a meta-analysis of 174 behavior treatment studies of children with ADHD, Fabiano, Pelham, Coles, Gnagy, Chronis-Tuscano, and O'Connor (2009) found behavior interventions in general to produce substantial positive outcomes across a variety of target behaviors, intervention strategies, settings, interventionists, and comorbidities. Similarly, behavioral parent training, behavioral classroom management, and peer-focused behavioral intervention have been demonstrated to produce increased adaptive skills; however, sufficient research examining long term and generalization of effects is limited though maintenance of positive effects appears to continue longer than medication after intervention is terminated (Pelham & Fabiano, 2008). Psychoeducation, education of ADHD for children, parents, or teachers, also has some supporting evidence, which provides information on the disorder itself (Montoya, Colom, & Ferrin, 2011).

Within an educational setting, a variety of intervention strategies have been implemented. Among the more frequently utilized are basic behavior management such as praise and prompts for appropriate behavior, ignoring low-impact problem behavior, or rewards contingent on pre-determined behavioral expectations. These strategies are both effective and easily implemented by teachers (Pelham & Fabiano, 2008). Students may also receive instruction, assignment, or tests with modifications such as presentation of tasks in small units, different or multiple modes of task instruction (Raggi & Chronis, 2006; Zentall, 2005), small-group instruction (Foorman & Torgesen, 2001), and or extended time for assignments and testing (Bolt & Thurlow, 2004). Although some of these modifications seem appropriate given the neuropsychological aspects of ADHD such as low processing speed and distractibility, research examining the effectiveness of many of these is limited, research that has been conducted is often mixed, and may be based on

the disability rather than the individual's needs (Bolt & Thurlow, 2004; Lewandowski, Lovett, Parolin, Gordon, & Codding, 2007).

The majority of the intervention has primarily targeted problem behavior, and while behavior intervention and medication do reduce the severity of ADHD symptoms (Ghuman, Arnold, & Anthony, 2008) only small improvements in academic functioning have been noted (DuPaul, Kern, Gormley, & Volpe, 2011). Only interventions which target academic-related variables have proven effective for increasing academic performance, such as strategic instruction and contingency-based interventions for work completion (Trout, Ortiz Lienemann, Reid, & Epstein, 2007).

Choice and Decision-Making

Choice can be defined in two ways: the action of engaging or not engaging in an option presented singly, and the act of selecting a pre-determined number of options from two or more presented options (c.f., Stafford, Alberto, Fredrick, Heflin, & Heller, 2002); this review will focus on the latter as the current study examines the act of choice between several options provided. Two factors which appear to influence choice-making are the complexity of the decision making process and the relative value attributed to each available option. In many cases individuals will run into options where systematically reviewing all available options will become difficult and time-consuming. Therefore, strategies can be employed to reduce the difficulty of the process; these are called non-compensatory strategies and allow characteristics of little meaning or value to be overlooked and decisions made based on specific characteristics. For example, elimination by aspects is the process of determining the most valued characteristic of the options (e.g., the color blue) and rejecting all options that do not meet that criteria and begin the process over (e.g., long sleeves) until one option is left (Tversky, 1972). Another non-

compensatory model is the lexicographic strategy, it consists of selecting a preferred characteristic of items (e.g., a toy I can play with my friend) and selecting the option which provides that characteristic the most (e.g., a soccer ball over a paddle ball or yo-yo; Payne, Bettman, & Johnson, 1988). Adults will typically switch to non-compensatory strategies when there are more than 6 options available (Payne, 1976) or when complexity of choice increases (Bettman, Luce, & Payne, 1998), a technique also found in early adolescents (Klayman, 1985). In other cases decisions may be extremely high or low stakes, in which case compensatory strategies may be used. These strategies allow low-weight negative characteristics to be outweighed by high-weighted positive characteristics in decision-making, but involve examination of all characteristics. For example, when choosing between several cars, the heated seats in the white car may far outweigh its lack of sun-roof which the nearby non-heated seat red car possesses. One example of a compensatory strategy is the weighted additive compensatory process, it consists of assessment of all characteristics, their relative values (e.g., color, brand name, durability), and probability (i.e., likelihood or projected outcome) where probability is multiplied by value to created weighted values and select the highest scoring option (Payne, Bettman, & Johnson, 1988). These theories have largely been the result of research with adults; however, there is a small amount of literature examining choice strategies in children.

Strategies and Characteristics in Young Children

Decision-making skills by early adolescence appear to be comparable to that of adults (Davidson, 1991a; Klayman, 1985); however, younger children demonstrate deficits in appropriate use of decision-making strategies. Capon and Kuhn (1980) conducted a two part examination of choice strategies. In part one, individuals attending kindergarten, 4th grade, 8th grade, and undergraduate students were to rate their preference on 32 notebooks presented singly

as well as liking of each characteristic. The 32 notebooks varied on 2 levels of 4 dimensions (e.g., color was either red or green) yielding 2 sets of 16 possible combinations. Based on the preference ratings, the majority of adults were shown to prefer items based on 2 characteristics; however, kindergarteners in particular were found to give inconsistent ratings between object and dimensions of notebooks. Based on this result, it was hypothesized that young children may have unstable preferences or that due to the large number of combinations children were overloaded preventing them from expressing preferences. Therefore, a 2nd study was conducted with kindergarteners alone replicating the procedures of part one except notebooks varied on 2 levels of 2 dimensions and 6 presentations of each were conducted for a total of 24. Results indicated some increase in consistency and yielded a pattern of responding suggesting children chose one dimension to rate and that the dimension chosen frequently changed. This, however, does not discount the possibility interference from too many options impacted responding and strategy, but does indicate the use of lexicographic strategy in response to complex choice-making. Similarly, Berebey-Meyer, Assor, and Katz (2004) examined choice strategies of 3rd and 7th graders. First students assessed values of different items, then a week later children were given choice problems which included high ranking items (familiar) as well as unfamiliar items. Choice problems were constructed so half were lexicographic and half were equal-weight using and each question had either 2 or 4 options to gauge complexity. Both age groups implemented the lexicographic strategy more often and effectively used either equal-weight or lexicographic when problems were less complex. Older children used both strategies more effectively, but younger children had notably poorer accuracy with complex problem despite use of the appropriate (lexicographic) strategy. Thus, children ages 8 to 9 do adapt to increased choice

complexity by utilizing non-compensatory strategies; however, their effective use of strategies is limited compared to older children.

One characteristic that may impact choice-making variables is the opportunity to reverse a decision and pre-decision knowledge. Davidson and Hudson (1988) examined time taken and consistency in children attending kindergarten, 1st, and 3rd grade. Children were randomly assigned to a condition either allowing or disallowing reversibility of their choice of 5 stickers chosen from a sample of 15. Consistency and time taken to choose increased with age, and children who were not allowed to change their decision were more consistent and took more time in choosing stickers. In part two of the study, children (preschoolers excluded) were again divided by the opportunity to choose and were asked to select 1 of 2 boxes each containing 4 unknown prizes. Both groups had the opportunity to use an information board to examine pieces of information about each box's contents. Those who could not change their decision gathered more information prior to choosing, and 3rd graders sought more information than 1st graders in both conditions. In the final portion of the study, children were provided hypothetical scenarios of either high or low importance with decisions, again decisions were either reversible or not. Children were asked to select how much time should be spent and options examined prior to making a decision. Children endorsed more time and more options be examined when the option was either irreversible or of higher importance. Thus, children demonstrate increasing decision-making skills with age where time and information become a growing requisite; however, even children in 1st grade are cognizant of the role importance plays in altering resource distribution. Interestingly, this study also suggests children as young as preschool are subject to changing preferences when given the option to reverse decisions, one of the paradoxes of choice.

Two factors that may impact choice in children are information sorting skills and motivation. Children under the age of 9 have demonstrated difficulty in determining relevant from irrelevant information and/or ignoring irrelevant information (Miller, Haynes, DeMarie-Dreblow, & Woody-Ramsey, 1986; Pick & Frankel, 1973) and using this information to eliminate options (Davidson, 1991a). However, when specific information is emphasized (pertinent or not) children attend more to that information over other characteristics (Davidson, 1991b; Kingma, 1984). Further, training children in decision-making can improve final choices made (Howse, Best, & Stone, 2003). Motivation may increase appropriate or advantageous choice-making in young children; however, the current research is confounded by implementation of concurrent feedback (Howse et al., 2003).

The relatively poorer implementation of choice-strategies and the ability to train children to make better decisions is rather reasonable given that children may be provided fewer choice-making opportunities and fewer options within each opportunity that are of significant impact. For example, choosing what activity to engage in after dinner is a matter of preference and is not a high-stake decision and will likely not result in serious or long-term consequences providing useful information for future decisions. A parallel phenomenon is children's tendency to use more effective coping strategies with age and fewer nonproductive or maladaptive strategies when dealing with stress (Byrnes, 1998). Indeed, children between the ages of 6 and 10 reason differently, and increased age results in the ability to distinguish between good and poor reasoning processes (Amsterlaw, 2006). This suggests that through experience, and perhaps modeled behavior, children learn to utilize more strategies more effectively.

Choice versus Preference

Preference is an indication of liking which can be assessed using stimulus preferences assessments. Examples include surveys (e.g., verbal report or rank-ordered lists); free operant observations, observing what individuals engage with most; and trial-based methods (Cooper, Heron, & Heward, 2007). Trial-based methods use physical presentation or representation (e.g., written description) of options; there are three primary formats to this method: single-, paired-, and multiple-stimuli. Single-stimulus consists of single presentation of each option and rating of liking individually. Paired-stimuli consists of presentation of two options; the preferred or chosen option can then be paired against new options to determine the most preferred or rank ordered preference of presented options. The multiple-stimuli format consists of presentation of at least three options, where the individual chooses the most preferred and options can be withdrawn or substituted between trials. Paired- and multiple-stimuli methods are formats which involve choice (selecting one option over another); these assessments are often used in identifying a reinforcer for an intervention; however, they are also present in choice interventions, confounding the separation of preference from choice as effective intervention strategies.

The separation of choice from preference has been increasingly examined after researchers began questioning whether positive outcomes in choice studies were partially if not fully due to preference rather than the act of choosing or opportunity to choose itself (e.g., Bambara, Ager, & Koger, 1994; Dunlap, DePerczel, Clarke, Wilson, Wright, White, & Gomez, 1994; Kennedy & Haring, 1993). For example, Fisher, Thompson, Piazza, Crosland, and Gotjen (1997) found that individuals prefer no-choice conditions when rewarded with high preferred items over choice conditions which supplied low preferred items. To differentiate between

choice and preference researchers have utilized high preference rewards across conditions or through yoking to control preference (e.g., Fisher et al., 1997). An example of yoking would be providing the reward for task completion in no-choice conditions which was the same reward chosen by the participant in the most recent choice condition. However, preference may differ trial-to-trial (e.g., Kennedy & Haring, 1993) and choice opportunities may be chosen more frequently to gain access to other reinforcers (Schmidt, Hanley, & Layer, 2009). More recent research has focused on reducing this type of confound by equalizing consequences across conditions, which results in preference of choice opportunities over no-choice (Bambara et al., 1994; Dunlap et al., 1994; Dyer, Dunlap, & Winterling, 1990; Parsons, Reid, Reynolds, & Bumgarner, 1990; Tiger, Hanley, & Hernandez, 2006). For example, Thompson, Fisher, and Contrucci (1998) examined choice of a control condition, choice condition, and no-choice condition. Choice and no choice conditions resulted in the same reward, soda, across conditions, choice varied in that the reward could be consumed in a larger cup or with a straw. A second dimension to the study was the use of increasing variable intervals of delivery of reward. Choice was found to be the preferred condition and the participant in this study continued to select the choice condition despite it resulting in a lower rate of reinforcement; however, this trend lasted for 3 session and selection of no-choice increased.

Tiger et al. (2006) conducted a four part study examining choice preference given varying numbers of equivalent rewards. In part one, six children were asked to complete a basic, low effort academic task. Each child was able to pick from one of three conditions at the beginning of each trial: choice, where the child was offered one of five identical rewards; no-choice, where a single reward, offered in the choice condition, was presented; and control, where no reward was given contingent on completion of the academic task. The majority of children

preferred the choice condition, but was not consistently stable in half. In part two, the three children who consistently preferred choice were again asked to complete a low effort academic task. Each child was able to again pick from one of three options: variable amount of choice, one from four identical rewards were offered – which was systematically increased and decreased (from 2 to 16); stable choice, one from two identical rewards were offered ; and control, where no reward was provided contingent on task completion. When the number of reward options presented increased, an increased selection for that condition was observed. In part three, children who did not consistently prefer the choice condition in part 1 participated. Methods were the same; however, only 2 conditions were available: no-choice from part 1 and variable amount of choice from part 2. Overall, choice was selected more frequently particularly with increased reward option availability. In part four, three participants were retained and participated in a replication of part 1; however, in the choice condition the reward was put on an increasing fixed ratio schedule so that increasingly more tasks had to be complete to receive reward. Participants chose the choice-condition more frequently even when it resulted in more effort to obtain an equivalent reward than the no-choice. In sum, choice was preferred over no choice despite equivalent reward, and when the amount available to choose from was increased preference for the choice condition increased, often even when more tasks were required to receive reward and a continuous reinforcement schedule no-choice was available. Thus, choice in itself is a preferred opportunity.

The Paradox of Choice

Although larger assortments offer the opportunity to find a closer approximation of a desired outcome (Kahn, 1998; Kahneman, Wakker, & Sarin, 1997; Lancaster, 1990) and people prefer greater variety (Boyd & Bahn, 2009) and opt to choose from larger sets of options when

available (Chernev, 2003), too much choice can have drawbacks. Iyengar and Lepper (2000) proposed the *choice overload hypothesis* in which increased available options results in demotivation. Indeed, research has demonstrated support for this hypothesis in that individuals experience reduced satisfaction, regret, and or difficulty choosing when larger sets of options are available compared with fewer options (Berger, Draganska, & Simonson, 2007; Iyengar & Lepper, 2000; Iyengar, Wells, & Schwartz, 2006; Park & Jang, 2013; Reutskaja & Hogarth, 2009; Sagi & Friedland, 2007), as well as when variety across options is increased (Sagi & Friedland, 2007). While the precise reason for this occurrence is not known, it has been hypothesized that increased options provide the individual to imagine a better choice could have been made (Schwartz, 2000, 2004). This is consistent with the finding that dissimilar characteristics in the same brand product results in increased regret (Gourville & Soman, 2005); however, the closer the similarity between two options the more difficult the choice can become (Festinger, 1957). In fact, when two desirable options are available or a large assortment is available consumers are more likely to choose none of the options or put off making a decision (Boatwright & Nunes, 2001; Dhar, 1997; Iyengar, Huberman, & Jiang, 2004; Tversky & Shafir, 1992).

In 2010, Scheibehenne, Greifeneder, and Todd conducted a meta-analysis to examine the choice overload literature and found and an effect size of approximately zero suggesting a lack of evidence for the *choice overload* phenomenon; however, this article has been criticized because several factors impact choice overload and the analysis assessed a main effect across conditions rather than using theory to drive the analyses (Chernev, Bockenholt, & Goodman, 2010). Indeed, specific conditions appear to moderate the impact of choice overload such as preference, expertise, accountability (Scheibehenne, Greifender, & Todd, 2009; 2010), time

restriction (Haynes, 2009), and simplicity of attributes or structured categories to simplify options (Mogilner, Rudnick, & Iyengar, 2008; Reutskaja & Hogarth, 2009). One also cannot make the general assumption that less is more without accounting for these factors. For example, sales can be heavily impacted by reductions in assortment (Sloot, Fok, & Verhoef, 2006) particularly if high preference varieties are removed; however, removal of low preferences items has little impact (Broniarczyk, Hoyer, & McAlister, 1998). Also, consumers tend to prefer more choices between products (e.g., snacks: chips and chocolate bar) and brands and less product assortments (e.g., several types of chocolate bars; Briesch, Chintagunta, & Fox, 2009; Chernev, 2006). It has also been suggested that the number of options is not responsible for choice overload but the size of the consideration set, how many options an individual will even consider within those available (Scheibehenne et al., 2009). However, consideration set may be positively correlated with increased options, and within the purposes of this study reducing options to consideration sets is still part of the decision-making process.

While specific variables may influence how many options *'overload'* occurs at, few studies have systematically examined it. The majority of research has evaluated *choice overload* by comparing few options (e.g., 5 to 10) to many options (e.g., 18 to 25). One exception is Shah and Wolford (2007), who set out pens at a university under the guise of helping an academic department choose which pens should be bought for stock, and the number of pens systematically varied between 2 and 20. Students were asked which one pen they liked best and would they like to buy it, all pens costing one dollar. The results of pen buying behavior were curvilinear peaking when 10 pens were available and considerably lower buying behavior when 2 to 8 and 14 to 20 options were available. Identifying appropriate choice amounts can be

usefully applied to a variety of domains such as education, and needs further exploration in different contexts.

Choice in Educational Settings

Limited research has been conducted on teacher's incorporation of choice in daily classroom routine. Houghton, Bronicki, and Guess (1987) observed 12 students under the age of 5 with severe, multiple disabilities and found choice opportunities were given by staff .29 times per minute. Jolivette, Stichter, Sibilsky, Scott, and Ridgley (2002) observed 14 students in a preschool classroom for at risk and children with disabilities. Staff provided choice opportunities an average of .12 to .17 times per minute. Interestingly children with disabilities were provided choice more frequently, and choices provided typically consisted of within-task options rather than antecedent- or consequence-based. Jolivette, McCormick, McLaren, and Steed (2009) observed 2 and 3 year old children attending an early childhood program, just over half of children had some type of disability. Across staff, choice opportunities occurred at a rate of approximately .32 times per minute. Thus, research of choice opportunities provided in natural school settings has been restricted to children under the age of 5, the majority of whom are in educational settings with children with disabilities or a child with a disability themselves. Therefore, these environments (e.g., structure and teacher philosophy and training) and rates of choice opportunity may not be representative of choice within general education classroom. However, general education teachers do report integration of choice within the classroom; most frequently in the context of within-task choices such as paper topics (Flowerday & Schraw, 2000). Teachers support the use of choice interventions (Jolivette, Wehby, Canale, & Massy, 2001) reporting increases in student interest and creativity (Flowerday & Schraw, 2000); however, teachers have also reported they use choice differentially dependent on age and ability,

where more choices are offered to older children demonstrating higher abilities (Flowerday & Schraw, 2000). Teachers have also expressed concern of the overuse of choice which can overwhelm students and provide less effortful options which students will likely choose (Flowerday & Schraw, 2000).

Teacher concern over the use of choice may be justified; although choice is a preferred opportunity as discussed earlier, student preference may not always lead to the most effective choice. For example, Carson and Eckert (2003) conducted a study in which three students were exposed to a multi-element assessment of math fluency in 4 conditions: contingent reinforcement, goal-setting, feedback on digits correct, and timed-sprint. Math fluency was found to be superior in the timed-sprint condition; however, when children were asked to rank the conditions based on what they thought was best for solving math problems, all students selected the contingent reinforcement condition which ranged from 2nd to least most effective depending on the student. A similar study was conducted by Taber-Doughty (2005) where 3 students with moderate mental retardation were taught community based skills (e.g., using an ATM) utilizing 3 prompting strategies: auditory prompting, picture prompting, and system of least prompts. After several exposures to each prompting system, students were asked to choose their preferred strategy and instructed with it for 3 further sessions. Each prompting system effectively increased skill acquisition and reduced task duration across students, 2 of whom chose the most effective strategy as their preferred. Therefore, some students may choose a preferred intervention strategy over a more effective strategy, where other students may choose the most effective because increases success. However, if materials are not made at equal difficulty students tend to choose easy materials over more difficult tasks (Fisher, Blackwell, Garcia, & Green, 1975; Hawthorn-Embree, Skinner, Parkhurst, & O'Neil, 2010), materials

where easy items are interspersed with difficult items over difficult questions alone (Billington, Skinner, & Cruchon, 2004; Johns, Skinner, & Nail, 2000), and materials students perceive as being easier and less effortful (Jaspers, Skinner, Williams, & Saecker, 2007). One notable feature of the majority of studies examining preference of assignment and choice is that each resulted in low-stakes consequences if any consequence at all. Hontangas, Ponsoda, Olea, and Wise (2000) examined difficulty level chosen when high-stakes were involved. In the evaluation 171 high school students in Spain were required to take a formatted SAT test measuring English vocabulary where scores resulted in 20 percent of the student's English course grade. Items were sorted into 7 levels of difficulty and students were given samples of each then asked to choose a level to proceed at for each item, understanding that more difficult questions earned higher points for accuracy, and feedback was provided after each response. High ability students were found to choose higher levels of difficulty and low ability students tended to choose lower levels of difficulty.

Interventions. Research has demonstrated that choice can be effectively integrated into academic settings to improve academic performance, decrease inappropriate behavior, and increase appropriate behavior. Choice can be implemented as an antecedent intervention whereby choice is provided in order to foster appropriate behavior and performance prior to an anticipated target behavior (e.g., poor accuracy due to motivation, disruptive behavior to escape the task). For example, teachers or staff may offer students choice in the form of an alternative worksheet or task, order of completion of worksheets or tasks, order in which problems on worksheets are completed, or options in materials allowable to complete tasks or assignments (e.g., markers, calculators). Choice can also be implemented as a consequence-based intervention. For example, a variety of preferred activities or tangibles can be made accessible

contingent on appropriate behavior, the child choosing one such activity or task as reward. Fenerty and Tiger (2010) examined antecedent and consequence preferences of choice by allowing typically developing students to choose one condition when two were provided of four alternating conditions: a worksheet was provided and no reward given, 5 tasks were available to select (1) from and a reward was given, a worksheet was given and 5 rewards were available to select (1) from, and a worksheet was provided and a reward was given. Tasks and rewards were identical within each trial. Three of the four students consistently choose the condition which provided 5 reward options, while the fourth student preferred both the consequence option and task option. Thus, the majority of children preferred choice as a consequence rather than as an antecedent; however, it is important to note no data was collected on performance which may or may not have been higher in consequence-based choice.

Research evaluating choice intervention and academic outcomes in children has been mixed. Choice has been demonstrated to have favorable academic outcomes in areas such as oral reading fluency (Daly, Garbacz, Olson, Persampieri, & Ni, 2006), accuracy and or productivity across academic subject assignments/tasks (Cosden, Gannon, & Haring, 1995; Dickerson & Creedon, 1981; Fuchs, Bahr, & Rieth, 1989; Lovitt & Curtiss, 1969; McNeir & Schuldt, 1989; Moes, 1998; Stenhoff, Davey, & Lignugaris/Kraft, 2008), task engagement (Fisher, Blackwell, Garcia, & Greene, 1975; Jolivette, Wehby, Canale, & Massey, 2001), and teaching augmented communication techniques (Frea, Arnold & Vittimberga, 2001). However, choice has also been demonstrated to show poorer academic outcomes compared to no-choice conditions in measures such as items attempted (Fisher et al., 1975), performance accuracy (Fisher et al., 1975; Felixbrod & O'Leary, 1973; Morrison, Ross, & Baldwin, 1992), and essay quality (Flowerday, Schraw, & Stevens, 2004). Further, some research has also found choice to have no significant

benefit over no-choice. For example, Meyer and colleagues (2010) examined web-based tutoring and reading comprehension in 111 typically developing 5th and 7th graders. Students were divided by reading level and provided simple or elaborated feedback with or without choice between 2 topics. There was no difference found between student choice and experimenter choice of reading topic in the amount of information remembered pretest and immediate and delayed posttest, problem synthesis and solution strategy competence, and reading comprehension. Similarly, no differences were noted between choice and no-choice in reward for a matching task in preschool children (Waldron-Soler, Martella, Marchand-Martella, & Ebey, 2000), determination of token standards for multiple-choice test standards and scores on tests in high school girls (Glynn, 1970), and assessment of learning following a chosen or assigned activity with high school students (George, 1977). Finally, in a review of choice studies with children and adult students, von Mizener and Williams (2009) found that less than a quarter of studies examined demonstrated choice to produce positive performance over no-choice conditions and less than 10 percent demonstrated equivalent performance with no-choice conditions.

Unlike outcomes with academic performance, choice interventions have been highly successful in decreasing problem behavior and increasing appropriate and adaptive behaviors in students. Offering choices has resulted in the reduction of disruptive behavior (e.g., noncompliance, eloping, purging the area of task materials) and aggression (verbal insult, hitting, spitting; Carter, 2001; Cole & Levinson, 2002; Dunlap, Kern-Dunlap, Clarke, Robbins, 1991; Dyer, Dunlap, & Winterling, 1990; Moes, 1998; Newman, Needelman, Reinecke, & Robek, 2002); increased task engagement/on-task behavior (Ulke-Kurkcuoglu & Kircaali-Iftar, 2010) with decreased disruptive/problem behavior (Dunlap, DePerczel, Clarke, Wilson, Wright, White,

& Gomez, 1994; Powell & Nelson, 1997; Seybert, Dunlap, & Ferro, 1996; Stayer Smeltzer, Graff, Ahearn, & Libby 2009); reduced public stripping and incontinence (Carlson, Luiselli, Slyman, & Markowski, 2008), increased play skills (Carter, 2001), decreased socially avoidant behaviors (Koegel, Dyer, & Bell, 1987), and increased toy engagement and reduced problem behaviors in children with Autism (Reinhartsen, 2002). In contrast, Liso (2010) found no difference in toy engagement in children with a variety of disabilities between toy-choice and no-choice conditions; however, these children were relatively young compared to subjects in other studies (2, 2, and 4 years old)

Some studies targeting problem behavior have assessed the function and evaluated its relationship to choice. Romaniuk, Miltenberger, Conyers, Jenner, Jurgens, and Ringenberg (2002) examined disruptive behavior during tasks in 7 elementary school children with various disabilities. Functional analyses were conducted with each student. Once a primary function for disruptive behavior was identified, the condition which demonstrated the most disruptive behavior served as baseline (no-choice, where the teacher chose the task to be completed) in an ABAB evaluation of choice. The choice condition consisted of offering 4 to 6 tasks for the student to choose one to work on. Problem behaviors were responded to in the same manner as in the functional analysis. Students whose behavior was maintained by attention did not differ between choice and no choice conditions; however, when behavior was maintained by escaping the task or both escape and attention, choice reduced disruptive behaviors across subjects. In another study, Peck, Caniglia, and Royster (2001) conducted an FBA on problem behavior engaged in during work activities with a 10 year old boy with Autism. Results of the FBA indicated that problem behavior was maintained by both teacher attention and escape from work. An appropriate intervention which addressed both functions simultaneously in this case was not

identified. Therefore, two intervention options were developed: the student could work through tasks with teacher help, thus receiving attention, or he could work on the task independently and earn a break with access to toys after completion, thus accessing brief escape from work. At the beginning of each task, the student chose which option he would like; if he did not choose the teacher chose the attention option. A brief evaluation of efficacy was conducted and rates of problem behavior significantly decreased after 6 sessions. Similarly, Dibley and Lim (1999) also found choice opportunity to decrease problem behavior when escape was the maintaining contingency in a 15 year old student with an intellectual disability.

Academic studies of choice (referenced) which resulted in no advantage over control and or no-choice conditions consisted almost exclusively of typically developing children and adolescents, whereas studies in which choice was beneficial consisted of participants with a disability such as EBD or an intellectual disability. Similarly, choice studies targeting problem behavior (referenced) consisted of 1 study with EBD students and the remainder of students had an intellectual disability or developmental delay. Therefore, it is possible different populations respond differently to choice opportunity. Also, some of the studies examining problem behavior conducted a functional behavior assessment to identify maintaining contingencies and used that information to tailor choice interventions. Using an FBA may increase the likelihood of positive outcomes by ascertaining the function of behavior, whereas no academic study reviewed conducted any such assessment. The studies which conducted FBAs found behaviors maintained specifically by escape and offering choice decreased disruptive/problem behavior. Thus, research needs to begin focusing on what characteristics or conditions of choice make it effective and with what populations (Shogren, Faggella-Luby, Bae, & Wehmeyer, 2004).

Choice and Children with Attention Deficit Hyperactivity Disorder

Reviewing the literature, six studies were found in which choice was used as a primary intervention in a child with ADHD with no comorbid intellectual disability. All but one study utilized an ABAB design structure comparing choice to no-choice.

Dunlap and colleagues (1994) implemented an antecedent-based intervention with an 11 year old by providing 6 to 8 options for each English-related assignment. Options in the choice condition were presented on a menu and based on task types available across the no-choice conditions. Compared with teacher assigned tasks (no-choice), providing choice reduced problem behavior and increased task engagement. Similar results were noted by Kern, Bambara, and Fogt (2002) who implemented a similar procedure with 4 children with ADHD. Students as a class could vote between 2 curricular activities, materials, or task sequence approximately 2 times during a subject lesson; students could individually engage in choice of format of work completion (i.e., with a peer on the computer), target topic, whether to take notes, or what materials could be used approximately once per subject lesson. Providing choice reduced problem behavior and increased task engagement; however, an additional component of this study was activities used were identified as being of high interest to students. Therefore choice between highly preferred stimuli may play a role compared to choice alone. Both studies also implemented procedures within an environment utilizing reward-based behavior-management programs providing further reinforcement for appropriate behavior. Powell and Nelson (1997) implemented a similar procedure with a 7 year old boy who was provided 3 choices for English-related assignments during the choice condition, and was directed to complete the same assignment as the rest of the class in the no-choice condition. Levels of undesirable behavior were reduced in the choice condition. Kern, Mantegna, Vorndran, Bailin, and Hilt (2001)

examined engagement and problem behavior maintained by escape in choice and no-choice conditions. Choice consisted of the student choosing the order he would like to complete 3 tasks in, totaling of 6 choice variations. Additionally, he was allowed to switch between tasks in the choice-condition and did so. Engagement was higher and problem behavior reduced with choice.

Conversely, Romaniuk et al. (2002) found choice to have no impact over no-choice on disruptive behavior when 4 to 6 curricular task choices (i.e., antecedent-based intervention) were offered and behavior was maintained by attention in a 7 year old boy. Cole, Davenport, Bambara, and Ager (1997) had similar results when comparing no-choice with a highly preferred vocational task, no-choice with a low preference vocational task, and choice between a highly preferred and a low preference vocational task using an alternating treatment design. Choice had no advantage over no-choice preferred task on task engagement as an antecedent-based intervention with the 13 year old boy.

Purpose of the Current Study

The current study examined the *choice overload hypothesis* in children with and without ADHD symptoms. Results provide initial research regarding the impact of choice amount with children and is anticipated to provide a range of choice amount appropriate for use with children in general and intervention measures.

The current research study examined the relationship between ADHD symptoms and choice by systematically varying the number of options available 1) to determine if children with ADHD symptoms differ from controls in choice-making duration overall, 2) to explore choice duration as an indicator of *choice overload* within children, and if children with symptoms of ADHD differ from controls with regard to how many options *choice overload* occurs at, and 3)

to determine whether levels of self-reported choice difficulty and enjoyment varied as a result of choice options available.

Based on research suggesting that children with ADHD have deficits in processing speed (Mayes & Calhoun, 2006), impairments in executive functioning (e.g., Fischer, Barkley, Smallish, & Fletcher, 2005), and demonstrate slower reaction times (e.g., Lijffijt, Kenemans, Verbaten, & van Engeland, 2005; Mullane, Corkum, Klein, & McLaughlin, 2009; Oosterlaan, Logan, & Sergeant, 1998), it was hypothesized that children with ADHD symptoms would take significantly longer than controls to choose a prize across option conditions.

Presence of *choice overload* was identified if choice duration data was curvilinear. Based on the presence of *choice overload* in adults (e.g., Iyengar & Lepper, 2000), it was hypothesized that children would also demonstrate this phenomenon. Whether children with ADHD symptoms differed from controls based on the number of choice options was exploratory as one could make an argument either way: slower processing speed and reaction time as well as working memory could increase the time spent making a choice with increasing options in children with ADHD symptoms; or children with ADHD symptoms may become frustrated or overwhelmed by choice more easily and choose more quickly to end the task.

Further, based on research suggesting that as choice options increase self-reported choice difficulty in adults increases (Iyengar & Leppers, 2000), it was hypothesized that increased self-reported choice difficulty would be observed in children with increasing choice amounts regardless of group type. Also, based on the findings of Iyengar and Leppers (2000) that despite increased difficulty in choice-making with increased choices adults enjoy the decision-making process, it was hypothesized children from both groups would also find choice-making to be enjoyable regardless of choice amount. Finally, based on research suggesting that increased

choice options reduces satisfaction post-choice (Iyengar, Wells, & Schwartz, 2006), it was hypothesized children would report increasingly reduced satisfaction with increased prize options.

Methods

Participants

Of the twelve hundred and eighteen packets distributed, one hundred seventy parents provided consent for their child to participate (response rate 13%). Two children did not provide assent and eight children were not able to be run due to three teachers withdrawing from participation. One hundred sixty children participated in the study to receive a small prize. Of these 160 participants, 50% were female (*n*=80). Participants were aged 4 (*n*=22), 5 (*n*=22), 6 (*n*=40), 7 (*n*=35), and 8 (*n*=25); age was not reported for 16 children. Approximately 80% (*n*=129) of participants were Caucasian, while the remaining participants were Hispanics (*n*=6), bi-racial (*n*=6), African-American (*n*=1), Asian-American (*n*=1), or did not report race (*n*=17). Parental report indicated that 7% (*n*=12) of participants had a documented diagnosis of ADHD, and 10% of the total sample were prescribed stimulant medication (*n*=10) or non-stimulant medication (*n*=6) used to treat ADHD. Diagnosis and medication information on the demographic questionnaire was not completed for 28 participants. Parental report indicated that no participant had a recorded developmental disability or cognitive impairment.

Participants were placed into either the ADHD symptom group or control group based on parental and or teacher scores on the Vanderbilt ADHD Diagnostic Rating Scales. Specifically, participants were placed in the ADHD group if parent or teacher Vanderbilt ADHD Diagnostic Rating Scales indicated 6 elevated scores (i.e., scores of 2 or 3 on 6 items) on Inattentive or Hyperactive/Impulsive sections. Both parent and teacher Vanderbilt Scales were returned for 104

(65%) participants, teacher forms alone were missing in 25 cases (15.6%), a parent form was missing in 2 cases, and in 29 (18.1%) cases both teacher and parent form were not returned. Forty-three children screened into the ADHD symptom group, eighty-eight served as controls.

Materials

Teacher Consent and Instructions. If a district or school granted consent to allow recruitment, teachers were informed about the study by either school staff or the researcher. If teachers were willing to participate, they signed a letter of consent (Appendix A) which briefly outlined the purpose and procedures of the study as well as provided the researcher's contact information.

Informed Consent. Two informed consent forms (Appendix B) were provided to parents or legal guardians: one to keep and one to be completed by parents to document permission for their child to participate. The informed consent letter stated that their child would receive a prize for participation. Parents of participants then completed the demographic questionnaire.

Background and Demographics Form. Demographic, diagnostic, and medication status were reported by parents using a demographics form (Appendix C) that consisted of nine items; two items were contact information for the child's primary teacher. These factors were collected in order to exclude individuals from analysis with a comorbid intellectual disability, as well as pre-existing condition or medication that could impact performance. Parents of participants then completed the Vanderbilt ADHD Diagnostic Rating Scale.

Vanderbilt ADHD Diagnostic Rating Scale. Parents were asked to complete the ADHD portion of the Vanderbilt ADHD Diagnostic Rating Scale – Parent form (VADRS-P; Appendix D; Wolraich, 2003a). The ADHD portion of the VADRS consists of 18 questions, each question a parallel of DSM-IV diagnostic criteria for ADHD. Questions are rated on a scale of never (0),

occasionally (1), often (2), and very often (3), referring to presence of symptoms occurring in the last six months. The first nine questions parallel symptoms consistent with ADHD-I; reports of symptoms occurring often or very often on six or more questions is suggestive of the ADHD-I subtype. Similarly questions 10 through 18 parallel symptoms consistent with ADHD-H; reports of symptoms occurring often or very often on six or more questions is suggestive of the ADHD-H subtype. When criteria of both ADHD-I and ADHD-H are met it is suggestive of ADHD-C. Scoring of each subtype is parallel with DSM-IV diagnostic criteria. Once parents provided consent for their child's participation, teachers were asked by the researcher to complete the ADHD portion of the VADRS-Teacher form (VADRS-T; Appendix E; Wolraich, 2003b). Question topics are identical; however, some questions are worded differently. Scoring is identical to the VADRS-P.

Both parents and teachers were also asked to complete the performance scale on the VADRS. The parent version consists of seven questions, the teacher five. Both are 5-point Likert scales assessing for academic or social impairments. Scores of 'somewhat of a problem' (4) and problematic (5) indicate presence of impairment. This information was collected to better gauge severity of ADHD symptoms.

The VADRS has been demonstrated to be a valid measure of symptoms consistent with the DSM-IV diagnosis of ADHD (Wolraich, Lambert, & Doffing, 2003).

Category Fluency. Category fluency is a measure commonly used to examine verbal semantic knowledge. Children completed two trials of this measure: animals and foods and drinks. For each category, children were asked to name as many exemplars as they could in 60 seconds. For example, the researcher might say, "when I say go, tell me as many kinds of

animals as you can think of in one minute." The researcher tracked answers on the back side of the experiment recording sheet (Appendix F). This measure was used as a decoy task.

Treasure-box. After completing the two category fluency trials, children were thanked for their participation and told they could choose one prize from the treasure box to keep. The treasure-box was an 11 x 8 x 9 inch cardboard cutout folded into a box with flat lid. Items selected for inclusion in the treasure-box were subjectively identified as "gender neutral" in design by two of the experimenters. For example, items which displayed princesses or superhero themes, necklaces, or items which were more than 30 percent pink were excluded. Items included were chosen for their generic designs such as smiley faces and stars. Items sometimes varied in color (e.g., green harmonica, blue harmonica). See Appendix G for the list of prizes used. The researcher tracked total choice duration on the experiment recording sheet.

Experiment Recording Sheet. A recording sheet (Appendix F) was used by the researcher while the child chose a prize in order to track choice-duration. Total choice duration was noted on the recording sheet when the participant has closed the treasure-box lid as directed prior to putting the treasure-box with the child's reach. The timer was not turned off until the child left the room as participants were allowed to change their mind and reopen the treasure-box.

Exit Survey. Once the child chose a prize, the participant was asked to indicate difficulty and enjoyment of choosing a prize by pointing to pictorial representations using a 4-point Likert scale printed on the Exit Survey (Appendix H). To reduce impact of any possible literacy or counting deficits (e.g., ages 4, 5) a picture-Likert scale was used to indicate answers. Picture-Likert scales have been demonstrated to be a valid measure of children's intended ratings (Reynolds, Johnson, Dickenson, & McFadden, 2009); however, the researcher also explained the

rating scale to the child and described what faces represented: hard, kind of hard, kind of easy, easy; not fun at all, not really fun, kind of fun, very fun; don't like it, it's okay, like it a little, like it a lot. Answers were recorded on the experiment recording sheet. Images were adapted from Reynolds et al. (2009).

Timer. A stopwatch was used to time category fluency tasks overtly, and used to record time durations while the child chose a prize covertly (e.g., behind a clipboard).

Procedural Fidelity and Interobserver Agreement

In order to ensure researchers were fluent in procedures, data collection, and that drift did not occur, a training session and random fidelity checks were conducted. Prior to any children being run through the experiment, a training session consisting of reviewing procedures, role-play, and a practice video was employed. An initial and 33 percent random fidelity checks were implemented. Total agreement was calculated by comparing data for each variable across raters and taking the number of agreements divided by the number of disagreements and agreements and multiplied by 100, yielding a range of agreement across subjects that was further summarized by calculating the mean of interobserver agreement.

Two individuals, a graduate level student and a practicing licensed psychologist, were trained in the procedure and worked with participants. Error of plus or minus two seconds between raters on total choice duration was accepted as agreement. The mean interobserver agreement was 98.2%.

Procedure

Children, 4 to 8 years of age, were recruited through a clinic, a university-affiliated day care, and local schools (i.e., public and private) located within twenty miles of a large

Midwestern city. Children were excluded if parents reported a developmental delay or intellectual disability.

Applications to recruit from local school districts and local university daycares were submitted. Schools permitting recruitment were contacted by the researcher or the school staff requesting aide in recruitment and participation. Teachers who wished to participate signed a letter of consent. Teachers who provided consent received manila envelopes, each contained two informed consents, one demographic questionnaire, one VADRS-P, and one pre-paid postage envelope addressed to a researcher at a local mental health clinic located in a major Midwestern city. Packets were distributed by teachers to students or parents as available. Participants were also recruited from the aforementioned local mental health clinic by resident psychologists by contacting parents of children believed to meet the requirements of this study (e.g., children between the ages of 4 and 8 without an intellectual disability), those packets included the VADRS-T.

Participants recruited from the mental health clinic completed the study at that clinic; participants recruited through a school or daycare complete the study at that facility. Most frequently, an empty office or classroom was used to run children through the study; however, on less frequent occasions (i.e., less than 15) a quiet hallway was used. No interruptions were noted by the researcher during sessions conducted within a hallway. Once a completed packet from a school or daycare was returned to the clinic, the child's teacher was contacted (using items 8 and 9 on the demographic form) in order to schedule completion of the VADRS-T and possible times to have the child complete the study. The researcher scheduled a time with the teacher to come to the premises and briefly tell the child about the study and what it consisted of.

Each child was asked if they would like to participate and told if they do not like the study they may stop at any time.

If the child provided verbal assent, the child was assessed for symptoms consistent with ADHD using forms of the VADRS. If children met criteria (i.e., elevated scores on 6 of 9 questions in the Inattentive or Hyperactive/Impulse sections) for ADHD regardless of type (i.e., Inattentive, Hyperactive/Impulsive by either rater, children were sorted in the ADHD symptom group. Children who did not meet this criterion according to either rater were sorted into the control group. Children who did not have either VADRS available at the time of participation were sorted after the fact.

Both groups completed the category fluency decoy task (i.e., animals and food and drinks). Then, children were told "you worked so well for me you get to choose one toy from the treasure box to keep". Children were told that when they had chosen a toy they were to close the treasure-box lid and show it to the experimenter. Verbal interaction with the participant was limited during choosing to concisely responding to questions (e.g., "What's this?" A top). The experimenter sat across or next to the child in order to observe choosing and lid activity. The researcher told the child they were to "put the lid back on when they found what they wanted." When the child opened the box, the researcher discretely started a timer and recorded choice duration seconds. Once a prize was chosen and the lid closed, children were asked about their choice experience. Children indicated on a 4-point picture scale how 1) difficult or easy choosing their prize was; 2) whether choosing their prize was fun or not; and 3) how much they like what they chose. Children were then returned to their scheduled classroom activity. This procedure took between 5 to 10 minutes to complete, most children were returned to their classroom within 6 to7 minutes.

Prize item variation. The number of items in the treasure box varied between 5, 10, 15, and 20; this variation was used to allow a systematic progression from smaller to larger amounts, and also due to monetary restrictions. Children were assigned to item conditions in 2 ways. First, children were sorted by group association, ADHD symptoms or control. Second, once a child was sorted into either the ADHD symptoms or control condition the experimenter used restricted randomization to sort children into item conditions in order to balance group membership. Specifically, the researcher chose an item condition to implement (5, 10, 15, 20 items) at random and left that condition out in the next drawing, and when each condition has been run (four conditions, 1 child each condition), condition options were returned to the bag for the next four participants.

Prize items used for each participant were also randomly selected using the same method as the item condition selection; however, all 20 items were included in each drawing.

Results

A 2 x 4 (group x choice number) between-subjects factorial ANOVA was conducted to examine if choice duration, regardless of choice amount, differed between children with ADHD symptoms and controls. The 29 participants missing both VADRS-P and VADRS-T were excluded from this analysis as these measures were the basis for group assignment; 131 cases were analyzed. Choice duration data violated assumptions of normality and homogeneity; substantial positive skew was noted and a log10 transformation (Howell, 2007) was used to correct these violations successfully. The means and standard deviations of choice duration by group and choice amount are presented in Table 1. Analysis yielded a main effect for group, $F(1, 123) = 7.63$, $p=.007$; $\eta^2=.05$. No main effect for choice amount was found, $F(3, 123) = 1.10$, $p=.35$, nor was an interaction effect of group and choice amount, $F(3, 123) = .40$, $p=.75$. In sum,

children with symptoms of ADHD (M=1.58) were found to use more time choosing a prize compared with controls (M=1.38), and choice duration was not significantly impacted by the number of prizes available. The lack of significant differences between item conditions and lack of an interaction between group and condition was suggestive that data were fairly linear, inconsistent with hypothesis two; however, further analysis was conducted to evaluate the presence of *choice overload*.

Using the transformed data, a lack of fit test was conducted to examine if *choice overload* was present in children across groups, where non-linearity was supportive of *choice overload*. No cases were excluded from this analysis. Consistent with results from the ANOVA, a linear trend in duration data was indicated, $F(2,156)=.07$, $p=.93$. See Figure 1 for a graph of mean choice duration by choice amount. A simple linear regression was conducted to evaluate the relationship between choice duration and number of choices. Results indicated that the number of choices did not significantly influence choice duration, $\beta=.144$, $t(158)=1.83$, $p=.06$.

Three Spearman's Rank Order correlations were run to determine the relationship between choice amount and feelings about the choosing experience. No significant relationship was found between choice amount and reported difficulty in making a choice, $r(155)= -.04$, $p=.62$; choice amount and reported choice entertainment, $r(155)= .08$, $p=.30$; or choice amount and prize satisfaction, $r(155)= -.35$, $p=.09$. See Table 2 for frequency data of choice experience by choice amount. Interestingly, a moderate number of participants expressed some choice difficulty with higher number of choice, see Table 2; however, this was not at a significant level and visual analysis offered no explanatory relationship with demographic or questionnaire data.

Discussion

People prefer the option of choice (Thompson, Fisher, & Contrucci, 1998; Tiger, Hanley, & Hernandez, 2006) and prefer to choose from larger sets of options (Chernev, 2003). Teachers report that the use of choice and choice interventions in schools can have positive effects on students and support its use (Flowerday & Schraw, 2000; Jolivette et al., 2001). Indeed, choice has been found to be a particularly effective intervention for reducing problematic behavior (e.g., Carter, 2001; Powell & Nelson, 1997; Ulke-Kurkcuoglu & Kircaali-Iftar, 2010). However, research has documented a phenomenon called *choice overload* in adults where large choice amounts can lead to frustration, regret, and even choice deferment (e.g., Boatwright & Nunes, 2001; Iyengar & Lepper, 2000; Park & Jang, 2013). To date, this phenomenon has not been studied in children or particular populations, such as ADHD, where neuropsychological deficits may negatively impact choice making and behaviors often result in school-based intervention. The purpose of this study was to examine differences in choice activity between children who do and do not display behaviors consistent with ADHD, as well as investigate the impact option number had on children's choice activity and reported choice experience.

Consistent with the hypothesis that children with ADHD symptoms would take significantly longer than controls to choose a prize overall, children with ADHD symptoms indeed took an average of 23.93 seconds longer than controls to choose. This is consistent with research findings that children with ADHD demonstrate deficits in executive functioning such as attention and processing speed as well as increased reaction time (Fischer et al., 2005; Mayes & Calhoun, 2006; Mullane et al., 2009).

Inconsistent with the hypothesis that children would display choice behavior suggestive of *choice overload,* the present study failed to find a non-linear relationship between choice

amount and time taken to choose. Specifically, time spent choosing a prize did not vary across choice options available, the relation between time spent choosing and options available was linear, and the number of options presented did not influence choice duration. Similarly inconsistent with our hypotheses, the number of choices available was not found to impact choice enjoyment, choice difficulty, or post-choice prize satisfaction. This was inconsistent with past research conducted with adults and contrary to the *choice overload hypothesis*.

In part, these divergent findings may be explained by the structure of the current study which differed significantly from previous research examining *choice overload*. Where previous research utilized vignettes or actual buying behavior as measurement with adults, the present study utilized a task-dependent, but monetarily free, reward using time to choose as measurement with children. Thus, children in the present study were not truly making an invested commitment or a commitment requiring investment (e.g., purchasing a vacation package or an assignment they would have to complete). Also, while not overtly stated, children had the ability to reverse their choice. Only two children desired to change their mind; however, some or even most of the participants may have believed that they could. Children tend to spend less time making a choice when the choice can be reversed (Davidson & Hudson, 1988). Therefore, the ambiguity of whether the choice was reversible or the belief that it was may have impacted the time taken to choose. Further, toys were fairly simple (e.g., yo-yo, stickers) and children may have been familiar with some or most of the toys and toys were fairly dissimilar in design and function (e.g., jack ball with blue swirly lines, spinning topic with an orange geometric pattern; basic characteristics such as familiarity, similarity, prior preference, and simplicity has been noted to moderate the impact of choice overload (Chernev, 2003; Gourville & Soman, 2005; Mogilner, Rudnick, & Iyengar , 2008; Reutskaja & Hogarth, 2009). Lastly, one

toy in particular demonstrated itself to be a dominating preference among children, an ice-cream cone shooter (chosen 36 times). The presence of a dominating option is hypothesized to reduce *choice overload* as it reduced the consideration set, the number of options an individual will consider within those available, and increases the ease of choice-making (Dhar, 1997; Hsee & Leclerc, 1998). While this toy was not present in every treasure-box, it was commonly drawn into inclusion and may have impacted choice duration, negating the effects of *choice overload*.

Failure to detect *choice overload* may also be related to children's choice-making abilities. It is possible young children do not experience *choice overload* or find increasing options de-motivating. As noted previously, children under the age of 9 have difficulty determining relevant from irrelevant information (Miller et a., 1986; Pick & Frankel, 1973) and using information to eliminate options (Davidson, 1991a). While they employ appropriate decision-making strategies they are less adept at implementing them (Berebey-Meyer, Assor, & Katz, 2004). This may or may not be supportive of the current study's findings, where children's use of strategy may increase or decrease the time required to choose.

Limitations

In addition to the design characteristics already discussed, there are several limitations to note. Despite best efforts to recruit, response rate was low and may have been bias. Several teachers anecdotally reported that parental consent was provided for children who were either struggling significantly in school or were high achievers. Also, the final sample size met minimal criteria for detectable power and large variances in duration between choice amount conditions were noted. Also, the original study proposed to use both VADRS as the screening measure in assignment to the ADHD group to more closely represent DSM-IV diagnostic criteria; however, due to poor rater agreement the standard was lowered to one VADRS indicating symptoms of

ADHD. While a significant difference between the ADHD symptom and control group was found, the effect size may not be representative. Based on the aforementioned deficits and characteristics related to ADHD, a more robust effect was anticipated; however, our reduced criterion for inclusion in the ADHD symptom group and lack of participants meeting full DSM criteria for ADHD may have resulted in more homogeneous groups.

Conclusion

Collectively, the results of the current study suggest that children with symptoms consistent with ADHD may require extra time when decision making is involved. In general, choosing was a positive experience for children regardless of the number of options, and varying amounts of options to choose from did not impact the time needed to make a decision. These results also raise several interesting questions. This study was a simple probe into *choice overload* which focused on a simple choice of reward; additional research is needed to further explore the possibility of *choice overload* across different choice types (e.g., homework, task), choice options exceeding 20, and variation in choice complexity (e.g., similar versus dissimilar; simple versus complex attributes) for practical application with children. If the findings of this study accurately represent a lack of *choice overload* in children ages 4 to 8, further research is needed to determine the age at which this phenomenon does emerge and its practical implications. Also, the present study found children with ADHD used more time to choose. It would be interesting to examine what role aspects of executive functioning play in moderating time to choose, and if children with ADHD use information differently or employ different decision-making strategies leading to increased time to choose. Further, it would be helpful to investigate whether subtypes of ADHD (e.g., ADHD-I) differ in choice duration and decision-

strategies. This information may provide an additional screening tool for identifying children with ADHD.

References

Alderson, R. M., Rapport, M. D., & Kofler, M. J. (2007). Attention-deficit/hyperactivity disorder and behavioral inhibition: A meta-analytic review of the stop-signal program. *Journal of Abnormal Child Psychology, 35,* 745-758.

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.). Washington, DC: Author.

American Psychiatric Association (2010). DSM-5: Options being considered for ADHD. Retrieved from: http://www.dsm5.org/Proposed%20Revision%20Attachments/APA%20Options%20for%20ADHD.pdf

American Psychological Association (2006). Report of the Working Group on Psychotropic Medications for Children and Adolescents: Psychopharmacological, Psychosocial, and Combined Interventions for Childhood Disorders: Evidence Base, Contextual Factors, and Future Directions. Retrieved from http://www.apa.org/pi/families/resources/child-medications.pdf

Amsterlaw, J. (2006). Children's belief about everyday reasoning. *Child Development, 77,* 443-464.

Applegate, B., Lahey, B. B., Hart, E. L., Biederman, J., Hynd, G. W., Barkley, R. A., Ollendick, T., Frick, P. J., Greenhill, L., McBurnett, K., Newcorn, J. H., Kerdyk, L., Garfinkel, B., Waldman, I., & Shaffer, D. (1997). Validity of the age-of-onset criterion for ADHD: A report from the DSM-IV field trials. *Journal of the American Academy of Child & Adolescent Psychiatry, 36,* 1211-1221.

August, G. J., & Garfinkel, B. D. (1990). Comorbidity of ADHD and reading disability among clinic-referred children. *Journal of Abnormal Child Psychology, 18,* 29-45.

Bambara, L. M., Ager, C., & Koger, F. (1994). The effects of choice and task preference on the work performance of adults with severe disabilities. *Journal of Applied Behavior Analysis, 27,* 555-556.

Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive function: constructing a unifying theory of AD/HD. *Psychological Bulletin, 121,* 65-94.

Barkley, R. A., DuPaul, G. J., & McMurray, M. B. (1990). Comprehensive evaluation of attention deficit disorder with and without hyperactivity as defined by research criteria. *Journal of Consulting and Clinical Psychology, 58,* 775-789.

Bellgrove, M. A., Hester, R., & Garavan, H. (2004). The functional neuroanatomical correlates of response variability: Evidence from a response inhibition task. *Neuropsychologia, 42,* 1910-1916.

Bereby-Meyer, Y., Assor, A., & Katz, I. (2004). Children's choice strategies: the effects of age and task demands. *Cognitive Development, 19,* 127-146.

Berger, J., Draganska, M., & Simonson (2007). The influence of product variety on brand perception and choice. *Marketing Science, 26,* 460-472.

Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive consumer choice processes. *Journal of Consumer Research, 25,* 187-217.

Billington, E. J., Skinner, C. H., & Cruchon, N. M. (2004). Improving sixth-grade students perceptions of high-effort assignments by assigning more work: Interaction of additive interspersal and assignment effort on assignment choice. *Journal of School Psychology, 42,* 477-490.

Boatwright, P., & Nunes, J. C., (2001). Reducing assortment: an attribute-based approach. *Journal of Marketing, 65,* 50-63.

Bolt, S. E., & Thurlow, M. L. (2004). Five of the most frequently allowed testing accommodations in state policy. *Remedial and Special Education, 25,* 141-152.

Boonstra, A. M., Oosterlaan, J., Sergeant, J. A., & Buitelaar, J. K. (2005). Executive functioning in adult ADHD: A meta-analytic review. *Psychological Medicine, 35,* 1097-1108.

Boyd, D. E., Bahn, K. D. (2009). When do large product assortments benefit consumers? An information-processing perspective. *Journal of Retailing, 85,* 288-297.

Brassett-Harknett, A., & Butler, N. (2007). Attention-deficit/hyperactivity disorder: An overview of the etiology and a review of the literature relating to the correlates and lifecourse outcomes for men and women. *Clinical Psychology Review, 27,* 188-210.

Briesch, R. A., Chintagunta, P. K., & Fox, E. J. (2009). How does assortment affect grocery store choice. *Journal of Marketing Research 46,* 176-189.

Broniarczyk, S. M., Hoyer, W. D., & McAlister, L. (1998). Consumers' perceptions of the assortment offered in a grocery category: the impact of item reduction. *Journal of Marketing Research, 35,* 166-176.

Brown, T. (2000). *Attention Deficit Disorders and Comorbidities in Children, Adolescents, and Adults.* Washington, DC: American Psychiatric Press.

Busch, B., Biederman, J., Cohen, L. G., Sayer, J. M., Montuteaux, M. C., Mick, E., Zallen, B., & Faraone, S. V. (2002). Correlates of ADHD among children in pediatric and psychiatric clinics. *Psychiatric Services, 53,* 1103-1111.

Byrnes, J. P. (1998). *The Nature and Development of Decision-Making: A Self-Regulation Model.* Mahwah, NJ: Erlbaum.

Cantwell, D. P., & Baker, L. (1992). Attention deficit disorder with and without hyperactivity: A

review and comparison of matched groups. *Journal of the American Academy of Child and Adolescent Psychiatry, 31,* 432-438.

Cambell, S. B. (1995). Behavior problems in the preschool child: A review of the recent literature. *Journal of Child Psychology and Psychiatry, 36,* 113-149.

Capon, N., & Kuhn, D. (1980). A developmental study of consumer information-processing strategies. *Journal of Consumer Research, 7,* 225-233.

Carlson, J. I., Luiselli, J. K., Slyman, A., & Markowski, A. (2008). Choice-making as intervention for public disrobing in children with developmental disabilities.

Carson, P. M., & Eckert, T. L. (2003). An experimental analysis of mathematics instructional components: Examining the effects of student-selected versus empirically-selected interventions. *Journal of Behavioral Education, 12,* 35-54.

Carter, C. M. (2001). Using choice with game play to increase language skills and interactive behaviors in children with Autism. *Journal of Positive Behavior Interventions, 3,* 131-151.

CDC. (2010). Increasing prevalence of parent-reported attention-deficit/hyperactivity disorder among children-United States, 2003 and 2007. *Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report. 59,* 1439-1443.

Chernev, A. (2003). Product assortment and individual decision processes. *Journal of Personality and Social Psychology, 85,* 151-162.

Chernev, A. (2006). Decision focus and consumer choice among assortments. *Journal of Consumer Research, 33,* 50-59.

Chernev, A., Bockenholt, U., & Goodman, J. (2010). Commentary of Scheibehenne,

Greifeneder, and Todd, Choice overload: is there anything to it? *Journal of Consumer Research, 37,* 426-428.

Cole, C. L., & Levinson, T. R. (2002). Effects of within-activity choices on the challenging behavior of children with severe developmental disabilities. *Journal of Positive Behavior Interventions, 4, 29-38.*

Connor, D. F. (2002). Preschool attention deficit hyperactivity disorder: A review of prevalence, diagnosis, neurobiology, and stimulant treatment. *Journal of Developmental and Behavioral Pediatrics, 23,* S1-S9.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied Behavior Analysis* (2nd ed.). Upper Saddle River, New Jersey: Pearson Education Inc.

Corkum, P., Rimer, P., & Schachar, R. (1999). Parent knowledge of attention-deficit/hyperactivity disorder and opinions of treatment options: Impact on enrollment and adherence to a 12-month treatment trial. *Canadian Journal of Psychiatry, 44,* 1043-1048.

Cosden, M., Gannon, C., & Haring, T. G. (1995). Teacher-control versus student-control over choice of task and reinforcement for students with severe behavior problems. *Journal of Behavioral Education, 5,* 11-27.

Daly, E. J., Garbacz, S. A., Olson, S. C., Persampieri, M., & Ni, H. (2006). Improving oral reading fluency by influencing students' choice of instructional procedures: An experimental analysis with two students with behavioral disorders. *Behavioral Interventions, 21,* 13-30.

Davidson, D. (1991a). Children's decision-making examined with an information-board procedure. *Cognitive Development, 6,* 77-90.

Davidson, D. (1991b). Developmental differences in children's search of predecisional information. *Journal of Experimental Child Psychology, 6,* 239-255.

Davidson, D., & Hudson, J. (1988). The effects of decision reversibility and decision importance of children's decision making. *Journal of Experimental Child Psychology, 46,* 35-40.

Desman, C., Petermann, F., & Hampel, P. (2008). Deficit in response inhibition in children with attention deficit/hyperactivity disorder: impact of motivation? *Child Neuropsychology, 14,* 483-503.

Dhar, R. (1997). Consumer Preference for a no-choice option. *Journal of Consumer Research, 24,* 215-231.

Dibley, S., & Lim, L. (1999). Providing choice making opportunities within and between daily school routines. *Journal of Behavioral Education, 9,* 117-132.

Dickerson, E. A., & Creedon, C. F. (1981). Self-selection of standards by children: The relative effectiveness of pupil-selected and teacher-selected standards of performance. *Journal of Applied Behavior Analysis, 14,* 425-433.

Drechsler, R., Brandeis, D., Foldenyi, M., Imhof, K., & Steinhausen, H. C. (2005). The course of neuropsychological functions in children with attention deficit hyperactivity disorder from late childhood to early adolescence. *Journal of Child Psychology Psychiatry, 46,* 824-836.

Dunlap, G., DePerczel, M., Clarke, S., Wilson, D., Wright, S., White, R., & Gomez, A. (1994). Choice making to promote adaptive behavior for students with emotional and behavioral challenges. *Journal of Applied Behavior Analysis, 27,* 505-518.

Dunlap, G., Kern-Dunlap, L., Clarke, S., & Robbins, F. R. (1991). Functional assessment

curricular revision, and severe behavior problems. *Journal of Applied Behavior Analysis, 24,* 387-397.

DuPaul, G. J., Kern, L., Gormley, M. J., & Volpe, R. J. (2011). Early intervention for young children with ADHD: Academic outcomes for responders to behavioral treatment. *School Mental Health, 3,* 117-126.

DuPaul, G. J., McGoey, K. E., Eckert, T. L., & VanBrakle, J. (2001). Preschool children with attention-deficit/hyperactivity disorder: impairments in behavioural, social and school functioning. *Journal of the American Acadmey of Child and Adolescent Psychiatry, 40,* 508-515.

Dyer, K., Dunlap, G., & Winterling, V. (1990). Effects of choice making on the serious problem behaviors of students with severe handicaps. *Journal of Applied Behavior Analysis, 23,* 515-524.

Egger, H. L., Keeler, G., & Angold, A. (2006a). *Preschool ADHD in pediatric primary care.*

Egger, H. L., Kondo, D., & Angold, A. (2006b). The epidemiology and diagnostic issues in preschool attention-deficit/hyperactivity disorder: A review. *Infants & Young Children, 19,* 109-122.

Epstein, J. N., Langberg, J. M., Rosen, P. J., Graham, A., Narad, M. E., Antonini, T. N., Brinkman, W. B., Froehlich, T., Simon. J. O., & Altaye, M. (2011). Evidence for higher reaction time variability for children with ADHD on a range of cognitive tasks including reward and event rate manipulation. *Neuropsychology, 25,* 427-441.

Fabiano, G. A., Pelham, W. E., Coles, E. K., Gnagy, E. M., Chronis-Tuscano, A., & O'Connor, B. C. (2009). A meta-analysis of behavioral treatments for attention-deficit/hyperactivity disorder. *Clinical Psychology Review, 29,* 129-140.

Fabiano, G. A., Pelham, W. E., Gnagy, E. M., Burrows-McLean, L., Coles, E. K., Cahacko, A., Wymbs, B. T., Walker, K. S., Arnold, F., Garefino, A., Keenan, J. K., Onyango, A. N., Hoffman, M. T., Massetti, G. M., & Robb, J. A. (2007). The single and combined effects of multiple intensities of behavior modification and methylphenidate for children with attention deficit hyperactivity disorder in a classroom setting. *School Psychology Review, 36,* 195-216.

Faraone, S. V., Biederman, J., & Mick, E. (2006). The age-dependent decline of attention deficit hyperactivity disorder: a meta-analysis of follow-up studies. *Psychological Medicine, 36,* 159-165.

Faraone, S. V., Biederman, J., & Monuteaux, M. C. (2002). Further evidence for the diagnostic continuity between child and adolescent ADHD. *Journal of Attention Disorders, 6,* 5-13.

Faraone, S. V., Biederman, J., Weber, W., & Russell, R. L. (1998). Psychiatric, neuropsychological, and psychosocial features of DSM-IV subtypes of attention-deficit/hyperactivity disorder: Results from a clinically referred sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 37,* 185-193.

Felixbrod, J. J., & O'Leary, K. D. (1973). Effects of reinforcement on children's academic behavior as a function of self-determined and externally imposed contingencies. *Journal of Applied Behavior Analysis, 6,* 241-250.

Fenerty, K. A., & Tiger, J. H. (2010). Determining preschoolers' preferences for choice-making opportunities: Choice of task versus choice of consequence. *Journal of Applied Behavior Analysis, 43,* 503-507.

Fergusson, D. M., Lynskey, M. T., & Horwood, L. J. (1997). Attentional difficulties in middle

childhood and psychosocial outcomes in young adulthood. *Journal of Child Psychology and Psychiatry, 38,* 633-644.

Festinger, L. (1957). *A Theory of Cognitive Dissonance.* Stanford, CA: Stanford University Press.

Fischer, M., Barkley, R. A., Fletcher, K. E., & Smallish, L. (1993). The adolescent outcome of hyperactive children – predictors of psychiatric, academic, social, and emotional adjustment. *Journal of the American Academy of Child and Adolescent Psychiatry, 32,* 324-332.

Fischer, M., Barkley, R. A., Smallish, L., & Fletcher, K. (2005). Executive functioning in hyperactivity children as young adults: attention, inhibition, response perseveration, and the impact of comorbidity. *Developmental Neuropsychology, 27,* 107-133.

Fisher, M. D., Blackwell, L. R., Garcia, A. B., & Greene, J. C. (1975). Effects of student control and choice on engagement in a CAI arithmetic task in a low-income school. *Journal of Educational Psychology, 67,* 776-783.

Fisher, W. W., Thompson, R. H., Piazza, C. C., Crosland, K., & Gotjen, D. (1997). On the relative reinforcing effects of choice and differential consequences. *Journal of Applied Behavior Analysis, 30,* 423-438.

Flowerday, T., & Schraw, G. (2000). Teacher beliefs about instructional choice: A phenomenological study. *Journal of Educational Psychology, 92,* 634-645.

Flowerday, T., & Schraw, G. (2003). Effect of choice on cognitive and affective engagement. *The Journal of Educational Research, 96,* 207-215.

Flowerday, T., Schraw, G., & Stevens, J. (2004). The role of choice and interest in reader engagement. *The Journal of Experimental Education, 72,* 93-114.

Foorman, B., & Torgesen, J. (2001). Critical elements of classroom and small-group instruction promote reading success in all children. *Learning Disabilities Research & Practice, 16,* 203-212.

Frazier, T. W., Youngstrom, E. A., Glutting, J. J., & Watkins, M. W. (2007). ADHD and achievement: Meta-analysis of the child, adolescent, and adult literatures and a concomitant study with college students. *Journal of Learning Disabilities, 40,* 49-65.

Frea, W. D., Arnold, C. L., & Vittimberga, G. L. (2001). A demonstration of the effects of augmentative communication on the extreme aggressive behavior of a child with Autism within an integrated preschool setting. *Journal of Positive Behavior Interventions, 3,* 194-198.

Fuchs, L. S., Bahr, C. M., & Rieth, H. J. (1989). Effects of goal structures and performance contingencies on the math performance of adolescents with learning disabilities. *Journal of Learning Disabilities, 22,* 554-560.

Gaub, M., & Carlson, C. L. (1997). Behavioral characteristics of DSM-IV ADHD subtypes in a school-based population. *Journal of Abnormal Child Psychology, 25,* 103-111.

George, T. W. (1977). Teacher- versus student-choice of learning activities. *Educational Research Quarterly, 2,* 22-29.

Gerson, J. (2002). A meta-analytic review of gender differences in ADHD. *Journal of Attention Disorders, 5,* 143-154.

Ghuman, J. K., Arnold, L. E., & Anthony, B. J. (2008). Psychopharmacological and other treatments in preschool children with attention-deficit/hyperactivity disorder: current evidence and practice. *Journal of Child and Adolescent Psychopharmacology, 18,* 413-447.

Glynn, E. L. (1970). Classroom applications of self-determined reinforcement. *Journal of Applied Behavior Analysis, 3,* 123-132.

Gourville, J. T., & Soman, D. (2005). Overchoice and assortment type: when and why variety backfires. *Marketing Science, 24,* 382-395.

Greenhill, L. L. (2002). Stimulant medication treatment of children with attention deficit hyperactivity disorder. In P. S. Jensen & J. R. Cooper (Eds.), *Attention Deficit Hyperactivity Disorder: State of Science. Best Practices* (9,1-9,27). Kingston, NJ: Civic Research Institute.

Hawthorn-Embree, M. L., Conley, E., Skinner, C. H., Parkhurst, J., & O'Neil, M. (2010). Assignment choice: Do students choose briefer assignments or finishing what they started? *School Psychology Quarterly, 25,* 143-151.

Haynes, G. A. (2009). Testing the boundaries of the choice overload phenomenon: the effect of number of options and time pressure on decision difficulty and satisfaction. *Psychology & Marketing, 26,* 204-212.

Hontangas, P., Ponsoda, V., Olea, J., & Wise, S. L., (2000). The choice of item difficulty in self-adapted testing. *European Journal of Psychological Assessment, 16,* 3-12.

Houghton, J., Bronickim, G. J., & Guess, D. (1987). Opportunities to express preferences and make choices among students with severe disabilities in classroom settings. *Journal of the Association of Persons with Severe Handicaps, 12,* 18-27.

Howell, D. C. (2007). *Statistical Methods for Psychology* (6th ed). Belmont, CA: Thomson Wadsworth.

Howse, R. B., Best, D. L., & Stone, E. R. (2003). Children's decision making: the effects of training, reinforcement, and memory aids. *Cognitive Development, 18,* 247-268.

Hsee, C. K., & Leclerc, F. (1998). Will products look more attractive when presented separately or together? *Journal of Consumer Research, 25,* 175-186.

Iyengar, S. S., Huberman, G., & Jiang, W. (2004). How much choice is too much? Contributions to 401(k) Retirement Plans. In O. S. Mitchell & S. Utkus (Eds.) *Pension Design and Structure: New Lessons from Behavioral Finance.* Oxford: Oxford University Press.

Iyengar, S. S., & Lepper, M. R. (2000). When choice is demotivating: can one desire too much of a good thing? *Journal of Personality and Social Psychology, 79,* 995-1006.

Iyengar, S. S., Wells, R. E., & Schwartz, B. (2006). Doing better but feeling worse: looking for the 'best' job undermines satisfaction. *Psychological Science, 17,* 143-150.

Jaspers, K. E., Skinner, C. H., Williams, R. L., & Saecker, L. B. (2007). Effects of problem order on accuracy, preference, and choice of multiplication assignments. *The Behavior Analyst Today, 8,* 347-359.

Johns, G. A., Skinner, C. H., & Nail, G. L. (2000). Effects of interspersing briefer mathematics problems on assignment choice in students with learning disabilities. *Journal of Behavioral Education, 10,* 95-106.

Jolivette, K., McCormick, K., McLaren, E., & Steed, E. A. (2009). Opportunities for young children to make choices in a model interdisciplinary and inclusive preschool program. *Infants & Young Children, 22,* 279-289.

Jolivette, K., Stichter, J. P., Sibilsky, S., Scott, T. M., & Ridgley, R. (2002). Naturally occurring opportunities for preschool children with and without disabilities to make choices. *Education & Treatment of Children, 25,* 396-414.

Jolivette, K., Wehby, J. H., Canale, J., & Massey, N. G. (2001). Effects of choice-making

opportunities on the behavior of students with emotional and behavioral disorders. *Behavioral Disorders, 26,* 131-145.

Kadesjo, B., & Gillberg, C. (1998). Attention deficits and clumsiness in Swedish 7 year-old children. *Developmental Medicine and Child Neurology, 40,* 796-804.

Kadesjo, B., & Gillberg, C. (2001). The comorbidity of AD/HD in the general population of Swedish school-age children. *Journal of Child Psychology and Psychiatry, 42,* 487-492.

Kadesjo, C., Kadesjo, B., Hagglof, B., & Gillberg, C. (2001). ADHD in Swedish 3- to 7-year-old children. *Journal of the American Academy of Child and Adolescent Psychiatry, 40,* 1021-1028.

Kahn, B. E. (1998). Dynamic relationships with customers: high variety strategies. *Journal of the Academy of Marketing Science, 26,* 45-53.

Kahneman, D., Wakker, P. P., Sarin, R. (1997). Back to Bentham? Explorations of experienced utility. *Quarterly Journal of Economics, 112,* 375-405.

Kalff, A. C., De Sonneville, L. M., J., Hurks, P. P. M., Hendriksen, J. G. M., Kroes, M., Feron, F. J. M., Steyaert, J., Van Zeben, T. M. C. B., Vles, J. S. H., & Jolles, J. (2005). Speed, speed variability, and accuracy of information processing in 5 to 6 year-old children at risk of ADHD. *Journal of the International Neuropsychological Society, 11,* 173-183.

Kennedy, C. H., Haring, T. G. (1993). Teaching choice making during social interactions to students with profound multiple disabilities. *Journal of Applied Behavior Analysis, 26,* 63-76.

Kern, L., Bambara, L., & Fogt, J. (2002). Class-wide curricular modification to improve the behavior of students with emotional or behavioral disorders. *Behavioral Disorders, 27,* 317-326.

Kern, L., Mantegna, M. E., Vorndran, C. M., Bailin, D., & Hilt, A. (2001). Choice of task sequence to reduce problem behaviors. *Journal of Positive Behavior Interventions, 3,* 3-10.

Kingma, J. (1984). The influence of task variations in seriation research: Adding irrelevant cues to the stimulus material. *The Journal of Genetic Psychology, 144,* 241-253.

Klayman, J. (1985). Children's decision strategies and their adaptation to task characteristic. *Organizational Behavior and Human Decision Processes, 35,* 179-201.

Koegel, R. L., Dyer, K., & Bell, L. K. (1987). The influence of child-preferred activities on Autistic children's social behavior. *Journal of Applied Behavior Analysis, 20,* 243-252.

Lahey, B. B., Pelham, W. E., Loney, J., Lee, S. S., & Willcutt, E. (2005). Instability of the DSM-IV subtypes of ADHD from preschool through elementary school. *Archives of General Psychiatry, 62,* 896-902.

Lahey, B. B., Pelham, W. E., Stein, M. A., Loney, J., Trapani, C., Nugent, K., Kipp, H., Schmidt, E., Lee, S., Cale, M., Gold, E., Hartung, C. M., Willcutt, E., & Baumann. (1988). Validity of DSM IV attention deficit/hyperactivity disorder for younger children. *Journal of the American Academy of Child and Adolescent Psychiatry, 37,* 695-702.

Lancaster, K. J. (1990). The economics of product variety: a survey. *Marketing Science, 9,* 189-206).

Lavigne, J. V., Cicchetti, C., Gibbons, R. D., Binns, H. J., Larsen, L., & DeVito, C. (2001). Oppositional defiant disorder with onset in preschool years: longitudinal stability and pathways to other disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 40,* 1393-1400.

Leth-Steensen, C., Elbaz, Z. K., & Douglas, V. I. (2000). Mean response times, variability, and

skew in the responding of ADHD children: A response time distributional approach. *Acta Psychologica, 104,* 167-190.

Lewandowski, L. J., Lovett, B. J., Parolin, R., Gordon, M., & Codding, R. S. (2007). Extended time accommodations and the mathematics performance of students with and without ADHD. *Journal of Psychoeducational Assessment, 25,* 17-28.

Lijffijt, M., Kenemans, L., Verbaten, M. N., & van Engeland, H. (2005). A meta-analytic review of stopping performance in attention-deficit/hyperactivity disorder: Deficient inhibitory motor control? *Journal of Abnormal Psychology, 114,* 216-222.

Liso, D. R. (2010). The effects of choice making on toy engagement in nonambulatory and partially ambulatory preschool students. *Topics in Early Childhood Special Education, 30,* 91-101.

Lovitt, T. C., & Curtiss, K. A. (1969). Academic response rate as a function of teacher- and self-imposed contingencies. *Journal of Applied Behavior Analysis, 2,* 49-53.

Luman, M., Ooserlaan, J., & Sergeant, J. (2008). Modulation of response time in ADHD, effects of reinforcement valence and magnitude. Journal of Abnormal Child Psychology, 36, 445-456.

Marcotte, A. C., & Stern, C. (1997). Qualitative analysis of graphomotor output in children with attentional disorders. *Child Neuropsychology, 3,* 147-153.

Mariani, M. A., & Barkley, R. A. (1997). Neuropsychological and academic functioning in preschool boys with attention deficit hyperactivity disorder. *Developmental Neuropsychology, 13,* 111-129.

Martin, T. L., Martin, G. L., Spevack, S., Verbeke, A., & Yu, D. C. T. (2002). Does choice,

independent of preference, improve behaviour for persons with developmental disabilities? A review. *Developmental Disabilities Bulletin, 30,* 1-15.

Martinussen, R., Hayden, J., Hogg-Johnson, S., & Tannock, R. (2005). A meta-analysis of working memory impairments in children with attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 44,* 377-384.

Mayes, S. D., & Calhoun, S. L. (2006). WISC-IV and WISC-III profiles in children with ADHD. Journal of Attention Disorders, 9, 486-493.

McNeir, L. M., & Schuldt, W. J. (1989). Effects of achievement standards, choice, sex, and educational level on mathematical performance. *Psychology in the Schools, 26,* 415-421.

Meyer, B. J. F., Wijekumar, K., Middlemiss, W., Higley, K., Lei, P. W., Meier, C., & Spielvogel, J. (2010). Web-based tutoring of the structure strategy with or without elaborated feedback or choice for fifth- and seventh-grade readers. *Reading Research Quarterly, 45,* 62-92.

Miller, P. H., Haynes, V. F., DeMarie-Dreblow, D., & Woody-Ramsey, J. (1986). Children's strategies for gathering information on three tasks. *Child Development, 57,* 1429-1439.

Moes, D. R. (1998). Integrating choice-making opportunities within teacher-assigned academic tasks to facilitate the performance of children with Autism. *The Journal of the Association for Persons with Severe Handicaps 23,* 319-328.

Mogilner, C., Rudnick, T., & Iyengar, S. S. (2008). The mere categorization effect: how the presence of categories increases choosers' perceptions of assortment variety and outcome satisfaction. *Journal of Consumer Research, 35,* 202-215.

Montoya, A., Colom, F., & Ferrin, M. (2011). Is psychoeducation for parents and teachers of

children and adolescents with ADHD efficacious? A systematic literature review. *European Psychiatry, 26,* 166-175.

Morrison, G. R., Ross, S. M., & Baldwin, W. (1992). Learning control of context and instructional support in learning elementary school mathematics. *Educational Technology Research and Development, 40,* 5-13.

Mullane, J. C., Corkum, P. V., Klein, R. M., & McLaughlin, E. (2009). Interference control in children with and without ADHD: a systematic review of Flanker and Simon Task Performance. *Child Neuropsychology, 15,* 321-342.

Mullins, C., Bellgrove, M. A., Gill, M., & Robertson, I. H. (2005). Variability in time reproduction: difference in ADHD combined and inattentive subtypes. *Journal of the American Academy of Child and Adolescent Psychiatry, 44,* 169-176.

Nigg, J. T., Blaskey, L. G., Huang-Pollock, C. L., & Rappley, M. D. (2002). Neuropsychological executive functions and DSM-IV ADHD subtypes. *Journal of the American Academy of Child and Adolescent Psychiatry, 41,* 59-66.

Oosterlaan, J., Logan, G. D., & Sergeant, J. A. (1998). Response inhibition in AD/HD, CD, comorbid AD/HD+CD, anxious, and control children: A meta-analysis of studies with the stop task. *Journal of Child Psychology and Psychiatry, 39,* 411-425.

Park, J. Y., & Jang, S. C. (2013). Confused by too many choices? Choice overload in tourism. *Tourism Management, 35,* 1-12.

Parsons, M. B., Reid, D. H., Reynolds, J., & Bumgarner, M. (1990). Effects of chosen versus assigned jobs on the work performance of persons with severe handicaps. *Journal of Applied Behavior Analysis, 23,* 253-258.

Pastor, P. N., & Reuben, C. A. (2008). Diagnosed attention deficit hyperactivity disorder and

learning disability: United States, 2004-2006: data from the national health interview survey. *Vital and Health Statistics, 10(237), 1-15.*

Pastura, G. M. C., Mattos, P., & de Queiroz Campos Araujo, A. P. (2009). Academic Performance in ADHD when controlled for comorbid learning disorder, family income, and parental education in Brazil. *Journal of Attention Disorder, 12,* 469-473.

Payne, J. W. (1976). Task complexity and contingent processing in decision making: An information search and protocol analysis. *Organizational Behavior and Human Performance, 16,* 366-387.

Payne, J. W., Bettman, J. R., & Johnson, E. J. (1988). Adaptive strategy selection in decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 14,* 534-552.

Peck Peterson, S. M., Caniglia, C., & Royster, A. J. (2001). Application of choice-making intervention for a student with multiply maintained problem behavior. *Focus on Autism and Other Developmental Disabilities, 16,* 240-246.

Pelham, W. E., & Fabiano, G. A. (2008). Evidence-based psychosocial treatments for attention-deficit/hyperactivity disorder. *Journal of Clinical Child & Adolescent Psychology, 37,* 184-214.

Pick, A. D., & Frankel, G. W. (1973). A study of strategies of visual attention in children. *Developmental Psychology, 9,* 348-357.

Piek, J. P., Dyck, M. J., Nieman, A., Anderson, M., Hay, D., Smith, L. M., McCoy, M., & Hallmayer, J. (2004). The relationship between motor coordination, executive functioning and attention in school aged children. *Archives of Clinical Neuropsychology, 19,* 1063-1076.

Piek, J. P., Pitcher, T. M., & Hay, D. A. (1999). Motor coordination and kinaesthesis in boys with attention deficit hyperactivity disorder. *Developmental Medicine and Child Neurology, 41,* 159-165.

Pitcher, T. M., Piek, J. P., & Barrett, N. C. (2002). Timing and force control in boys with attention deficit hyperactivity disorder: subtype differences and the effect of comorbid developmental coordination disorder. *Human Movement Science, 21,* 919-945.

Pliszka, S. R. (2000). Patterns of psychiatric comorbidity with attention-deficit/hyperactivity disorder. *Child and Adolescent Psychiatric Clinics of North America, 93,* 525-540.

Posner, K., Melvin, G. A., Murray, D. W., Gugga, S. S., Fisher, P., Skrobala, A., Cunningham, C., Vitiello, B., Abikoff, H. B., Ghuman, J. K., Kollins, S., Wigal, S. B., Wigal, R., McCracken, J. T., McGough, J. J., Kastelic, E., Boorady, R., Davies, M., Chuang, S. Z., Swanson, J. M., Riddler, M. A., & Greenhill, L. L., (2007). Clinical presentation of attention-deficit/hyperactivity disorder in preschool children: the preschoolers with attention-deficit/hyperactivity treatment study (PATS). *Journal of Child & Adolescent Psychopharmacology, 17,* 547-562.

Powell, S., & Nelson, B. (1997). Effects of choosing academic assignments on a student with attention deficit hyperactivity disorder. *Journal of Applied Behavior Analysis, 30,* 181-183.

Querne, L., & Berquin, P. (2009). Distinct response time distributions in attention deficit hyperactivity disorder subtypes. *Journal of Attention Disorders, 13,* 66-77.

Raggi, V. L., & Chronis, A. M. (2006). Interventions to address the academic impairment of children and adolescents with ADHD. *Clinical Child and Family Psychology Review, 9,* 85-111.

Reinhartsen, D. B. (2002). Engagement with toys in two-year-old children with Autism: Teacher selection versus child choice. *Research & Practice for Persons with Severe Disabilities, 27,* 175-187.

Reutskaja, E., & Hogarth, R. M. (2009). Satisfaction in choice as a function of the number of alternatives: when goods satiate. *Psychology and Marketing, 26,* 197-203.

Reynolds-Keefer, L., Johnson, R., Dickenson, T., & McFadden, L. (2009). Validity issues in the use of pictorial likert scales. *Studies in Learning, Evaluation, Innovation and Development, 6,* 15-24.

Romaniuk, C., Miltenberger, R. G., Conyers, C., Jenner, N., Jurgens, M., & Ringenberg, C. (2002). The influence of activity choice on problem behaviors maintained by escape versus attention. *Journal of Applied Behavior Analysis, 35,* 349-362.

Roth, R. M., & Saykin, A. J. (2004). Executive dysfunction in attention-deficit/hyperactivity disorder: cognitive and neuroimaging findings. *Psychiatric Clinics of North America, 27,* 83-96.

Rowland, A.S., Umbach, D. M., Stallone, L., Naftel, A. J., Bohlig, E. M., & Sandler, D. P. (2002). Attention-deficit-hyperactivity disorder among elementary school children in Johnston county, North Carolina. *American Journal of Public Health, 92,* 231-234.

Rubia, K., Taylor, E., Smith, A. B., Oksanen, H., Overmeyer, S., & Newman, S. (2001). Neuropsychological analyses of impulsiveness in childhood hyperactivity. *British Journal of Psychiatry, 179,* 138-143.

Sagi, A., & Friedland, N. (2007). The cost of richness: the effects of the size diversity of decision sets on post-decision regret. *Journal of Personality and Social Psychology, 93,* 515-524.

Scheibehenne, B., Greifeneder, R., & Todd, P. M. (2009). What moderates the too-much-choice

effect? *Psychology & Marketing, 26,* 229-253.

Scheibehenne, B., Greifeneder, R., & Todd, P. M. (2010). Can there ever be too many options? A meta-analytic review of choice overload. *Journal of Consumer Research, 37,* 409-425.

Schmidt, A. C., Hanley, G. P., & Layer, S. A. (2009). A further analysis of the value of choice: controlling for the illusory discriminative stimuli and evaluating the effects of less preferred items. *Journal of Applied Behavior Analysis, 42,* 711-716.

Schwartz, B. (2000). Self determination: the tyranny of freedom. *American Psychologist, 55,* 79-88.

Schwartz, B. (2004). *The Paradox of Choice: Why More is Less.* New York, NY: Ecco Press.

Sergeant, J. A., (2005). Modeling attention-deficit/hyperactivity disorder: A critical appraisal of the cognitive-energetic model. *Biological Psychiatry, 57,* 1248-1255.

Seybert, S., Dunlap, G., & Ferro, J. (1996). The effects of choice-making on the problem behaviors of high school students with intellectual disabilities. *Journal of Behavioral Education, 6,* 49-65.

Shah, A. M., & Wolford, G. (2007). Buying behavior as a function of parametric variation of number of choices. *Psychological Science, 18,* 369-370.

Shanahan, M. A., Pennington, B. F., & Willcutt, E. F. (2008). Do motivational incentives reduce inhibition deficits in ADHD? Developmental Neuropsychology, 33, 137-159.

Shaw, K., Wagner, I., Eastwood, H., & Mitchell, G. (2002). A qualitative study of Australian GP's attitudes and practices in the diagnosis and management of attention-deficit/hyperactivity disorder. *Family Practice, 20,* 129-134.

Shogren, K. A., Faggella-Luby, M. N., Bae, S. J., & Wehmeyer, M. L. (2004). The effect of

choice-making as an intervention for problem behavior: a meta-analysis. *Journal of Positive Behavior Interventions, 6,* 228-237.

Silverthorn, P., Frick, P. J., Kuper, K., & Ott, J. (1996). Attention deficit hyperactivity disorder and sex: A test of two etiological models to explain the male predominance. *Journal of Clinical Child Psychology, 25,* 52-59.

Sloot, L. M., Fok, D., & Verhoef, P. C. (2006). The short- and long-term impact of an assortment reduction on category sales. *Journal of Marketing Research, 43,* 536-554.

Slusarek, M., Velling, S., Bunk, D., & Effers, C. (2001). Motivational effects on inhibitory control in children with ADHD. Journal of the American Academy of Child and Adolescent Psychiatry, 40, 355-363.

Sonuga-Barke, E. J. S., Wiersema, J. R., van der Meere, J. J., & Roeyers, H. (2010). Context-dependent dynamic processes in attention-deficit/hyperactivity disorder: Differentiating common and unique effects of state regulation deficits and delay aversion. *Neuropsychology Review, 20,* 86-102.

Spencer, T. J., Biederman, J., & Mick, E. (2007). Attention-deficit/hyperactivity disorder: Diagnosis, lifespan, comorbidities, and neurobiology. *Journal of Pediatric Psychology, 32,* 631-642.

Stafford, A. M., Alberto, P. A., Fredrick, L. D., Heflin, J., & Heller, K. W. (2002). Preference variability and the instruction of choice making with students with severe intellectual disabilities. *Education and Training in Mental Retardation and Developmental Disabilities, 37,* 70-88.

Stayer Smeltzer, S., Graff, R. B., Ahearn, W. H., & Libby, M. R. (2009). Effect of choice of task sequence on responding. *Research in Autism Spectrum Disorders, 3,* 734-742.

Stenhoff, D. M., Davey, B. J., & Lignugaris/Kraft, B. (2008). The effects of choice on assignment completion and percent correct by a high school student with a learning disability. *Education & Treatment of Children, 31,* 203-211.

Taber-Doughty, T. (2005). Considering student choice when selecting instructional strategies: a comparison of three prompting systems. *Research in Developmental Disabilities, 26,* 411-432.

Thompson, R. H., Fisher, W. W., & Contrucci, S. A. (1998). Evaluating the reinforcing effects of choice in comparison to reinforcement rate. *Research in Developmental Disabilities, 19,* 181-187.

Tiger, J. H., Hanley, G. P., & Hernandez, E. (2006). An evaluation of the value of choice with preschool children. *Journal of Applied Behavior Analysis, 39,* 1-16.

Trout, A. L., Ortiz Lienemann, T., Reid, R., & Epstein, M. H. (2007). A review of non-medication interventions to improve the academic performance of children and youth with ADHD. *Remedial and Special Education, 28,* 207-226.

Tversky, A. (1972). Elimination by aspects: A theory of choice. *Psychological Review, 79,* 281-299.

Tversky, A., & Shafir, E. (1992). Choice under conflict: the dynamics of deferred decision. *Psychological Science, 3,* 358-361.

Ulke-Kurkcuoglu, B., & Kircaali-Iftar, G. (2010). A comparison of the effects of providing activity and material choice to children with Autism spectrum disorder. *Journal of Applied Behavior Analysis, 43,* 717-721.

van Meel, C. S., Oosterlaan, J., & Heslenfeld. D. J. (2005). Motivational effects on motor timing

in attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 44,* 451-460.

Vario, R. G., Simmonds, D. J., & Mostofsky, S. H. (2009). Increased intra-individual reaction time variability in attention-deficit/hyperactivity disorder across response inhibition tasks with different cognitive demands. *Neuropsychologia, 47,* 2389-2394.

Von Mizener, B. H., & Williams, R. L. (2009). The effects of student choices on academic performance. *Journal of Positive Behavior Interventions, 11,* 110-128.

Waldron-Soler, K. M., Martella, R. C., Marchand-Martella, N. E., & Ebey, T. L. (2000). Effects of choice of stimuli as reinforcement for task responding in preschoolers with and without developmental disabilities. *Journal of Applied Behavior Analysis, 33,* 93-96.

Weiss, M., Worling, D., & Wasdell, M. (2003). A chart review study of the inattentive and combined types of ADHD. *Journal of Attention Disorders, 7,* 1-9.

Willcutt, E. G., Doyle, A. E., Nigg, J. T., Faraone, S. V., & Pennington, B. F. (2005). Validity of the executive function theory of attention-deficit/hyperactivity disorder: a meta-analytic review. *Biological Psychiatry, 57,* 1336-1346.

Wolraich, M. L. (2003a) Vanderbilt ADHD Parent Rating Scale (VADPRS). American Academy of Pediatrics and the National Initiative for Children's Healthcare Quality: Cambridge, M.A.

Wolraich, M. L. (2003b) Vanderbilt ADHD Teacher Rating Scale (VADTRS). American Academy of Pediatrics and the National Initiative for Children's Healthcare Quality: Cambridge, M.A.

Wolraich, M. L., Lambert, W., & Doffing, M. (2003). Psychometric properties of the Vanderbilt ADHD Diagnostic Parent Rating Scale. *Journal of Pediatric Psychology, 28,* 559-567.

Zentall, S. S., (2005). Theory- and evidence-based strategies for children with attentional problems. *Psychology in the Schools, 42,* 821-836.

Table 1

Mean and Standard Deviations of Choice Duration

	Number of Prizes			
	5	10	15	20
ADHD Symptoms	N=10	N=13	N=10	N=10
Raw	47.5(35.6)	41.2(34.2)	70.3(80.2)	72.9(83.6)
LOG	1.53(.42)	1.47(.37)	1.67(.40)	1.64(.49)
Control	N=23	N=20	N=19	N=26
Raw	29.3(29.2)	31.0(23.2)	37.4(47.8)	38.5(26.1)
LOG	1.32(.36)	1.36(.36)	1.35(.43)	1.50(.27)
Total	N=33	N=33	N=29	N=36
Raw	34.81(31.8)	35.0(28.0)	48.7(61.6)	48.0(50.3)
LOG	1.38(.38)	1.41(.36)	1.46(.44)	1.54(.34)

Raw choice durations are reported in seconds

Table 2

Self-reported Choice Experience

	Number of Prizes			
	5	10	15	20
Choosing Difficulty				
Hard	3	5	2	1
Sort of Hard	6	1	12	13
Sort of Easy	8	7	4	4
Easy	18	29	23	21
Choosing Enjoyment				
Boring	0	1	0	1
Little Boring	1	4	1	0
Little Fun	3	4	8	1
Fun	31	33	32	36
Prize Satisfaction				
Do not like	0	0	0	0
Like very little	1	0	0	1
Like it	3	2	3	8
Like it a lot	31	40	37	30

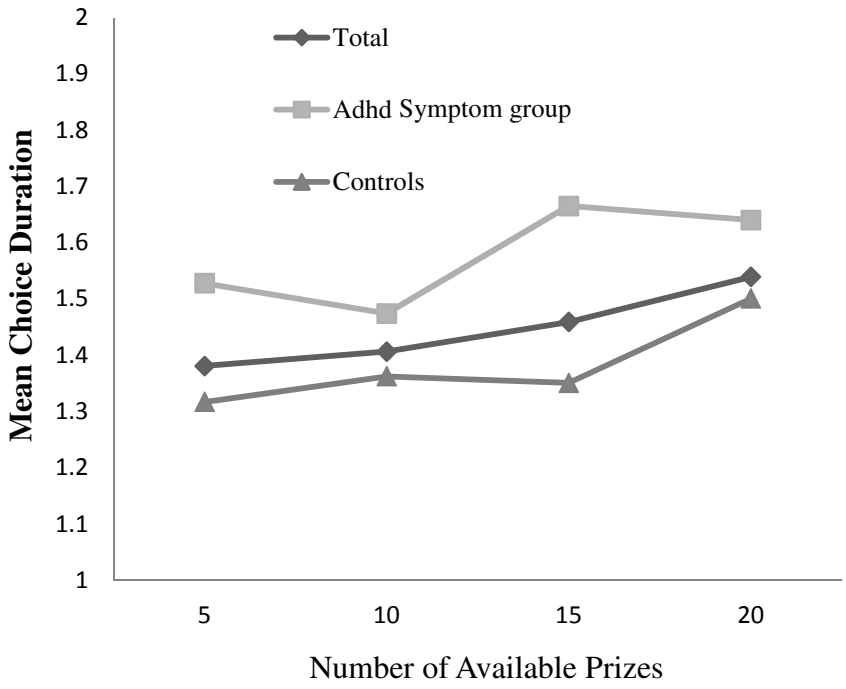

Figure 1. Mean duration of choice by group and number of choices. Data presented are on a logarithmic scale.

APPENDIX A

Teacher Consent

Dear Educator,

Thank you for your willingness to help recruit participants for this study and your time in completing Vanderbilt Assessment Scales for children whose parents have provided consent.

The purpose of this research is to examine choice and decision-making in children. We anticipate that results of this study will provide information for increasing the efficient use of choice within classrooms and interventions. No anticipated risks are associated with your participation.

Parents who give their consent are asked to return the necessary documents to the researcher. If consent is granted, we will contact you and we would greatly appreciate your participation by filling out the Vanderbilt Assessment Scale for that child. This form is expected to take 5-7 minutes to complete for each child.

You will be asked to choose a time that is convenient for you and the child so that s/he may be run through the study (e.g., during class-time, recess, or break). It is expected the study will take about 5 to 10 minutes per child to complete. Specifically, children will complete 2 naming tasks which will take 2 minutes to complete, choose a prize to keep, and then be returned to their scheduled activity.

Participation in this study is voluntary. You have the right not to participate at all cease participation at any time. Deciding not to participate or choosing to leave the study will not result in any penalty or loss of benefit, and it will not harm your relationship with Minnesota State University, the Therapy Center, or the school.

If you have questions about this study please contact, the secondary researcher, Liesa Klein at (262) 490-6887 or email her at Liesa.Klein@gmail.com; you may also contact the primary researcher, Carlos Panahon at (507) 389-2815 or the Therapy Center at (316) 636-1188.

This research has been approved by the MNSU, Mankato Institutional Review Board (IRB). If you have any questions concerning the MNSU, Mankato IRB policies or procedures or your rights as a human subject, please contact Barry Ries, IRB Administrator, at barry.ries@mnsu.edu.

If you are willing to participate, please sign and date the below section and return it to the recruiter present or mail to the Therapy Center 7807 E. Funston St. Wichita, KS 67207.

_____ _____

Teacher Signature Date

Thank you once again for your time.

Sincerely,
Liesa Klein

APPENDIX B

Parental Informed Consent for Participation in the Research

INTRODUCTION
Your child has been invited to join a research study to look at characteristics of decision-making. In this research study, we are investigating how children ages 4 to 8 with and without behaviors similar to Attention Deficit Hyperactivity Disorder respond to choices and the behaviors they display while making choices. The decision to let your child participate or not is up to you.

WHAT IS INVOLVED IN THE STUDY
In order for your child to be involved in this study, the parental consent form, the demographic questionnaire, and the Vanderbilt Assessment Scale - Parent Form supplied to you should be completed and returned via the return envelope addressed to the Therapy Center. If your consent is given, your child's primary or homeroom teacher will be asked to complete a Vanderbilt Assessment Scale - Teacher Form by the experimenter.

If you were informed of this study through the school, the researcher will be contacted to come to the school. If you were informed of this study through the Therapy Center, you may be asked to bring your child to the Therapy Center to participate.

Your child will be briefly told about the study and asked if they would like to participate (verbal assent). If your child says no, then they will not be asked further or run in the study.

If your child chooses to participate, s/he will be asked to name examples from two categories (i.e., kinds of animals; types of foods) with a time limit of one minute for each category. They will then be allowed to choose one small prize to keep from a treasure-box for their participation. Children will complete this procedure once only (i.e., 2 minute naming task, chose 1 prize, then be returned to their scheduled activity). Participation is expected to take about 5 to 10 minutes.

RISKS
This study is not expected to have many risks; however, a child may become frustrated trying to name examples or choose a prize.

BENEFITS TO TAKING PART IN THE STUDY
Your child will not likely benefit directly from participating in the study. The results of this study, however, will benefit the fields of psychology and education by establishing characteristics of choice and decision-making in children and its impact on classroom and intervention procedures.

INCENTIVES
Your child will receive a prize of their choosing for participating.

CONFIDENTIALITY
Once data is collected your child's name will be separated from all other information (i.e., child's name will be torn or blackened out beyond identification on any material where it is

written), and his/her name will not be used when data from this study are published. Every effort will be made to keep records and other personal information confidential; paper documents will be stored in a locked file cabinet in an office at the researcher's clinic. Only the researchers will have access to data and records, which will only be used for research purposes. Records will be stored for at least 3 years, and will be securely destroyed.

RIGHTS AS A RESEARCH PARTICIPANT

Participation in this study is voluntary. You and your child have the right not to participate at all or to leave the study at any time. Deciding not to participate or choosing to leave the study will not result in any penalty or loss of benefits to which your child is entitled, and it will not harm his/her relationship with Minnesota State University, the Therapy Center, or their school.

If you complete and return the necessary forms, but would like to withdraw consent later you may contact the secondary researcher. If your child decides to leave the study early after beginning, they will be immediately escorted back to their scheduled activity.

CONTACTS FOR QUESTIONS OR PROBLEMS

If you have questions about this study please contact, the secondary researcher, Liesa Klein at (262) 490-6887 or email her at Liesa.Klein@gmail.com; you may also contact the primary researcher, Carlos Panahon at (507) 389-2815 or the Therapy Center at (316) 636-1188.

If you have any complaints about you or your child's experience as a participant in this study, please call or write:
Barry Ries
IRB Administrator
Institutional Review Board for the Protection of Human Subjects
Graduate School, Minnesota State University, Mankato
115 Alumni/Foundation Center
Mankato, MN 56001
(800) 722-0544 phone
(507) 389-5974 fax

Although Dr. Barry Ries, Interim Dean, will ask your name, all complaints are kept in strict confidence.

As parent or legal guardian, I authorize _____
(print child's name)

to participate in the choice and decision-making research study described in the enclosed materials.

_____ _____
Parent or Legal Guardian's Signature Date

APPENDIX C

Demographic Questionnaire

Please fill out the following questions as they apply to your child.

---

1) **What is your child's date of birth**: _____

2) **Gender** : _____ Male _____ Female

3) **Current Grade Level** (e.g., Pre-K, K, 1st, 2nd…) _____

4) **Race** _____

5) **Please list any diagnoses given to your child by a mental health professional or physician.**

_____

_____

_____

6) **Please list medications currently taken by your child.**

_____

_____

7) **Has your child been diagnosed with a developmental disability or cognitive impairment** (e.g., Autism, Pervasive Developmental Disorder, Mental Retardation, impairment due to a traumatic brain injury, etc…)

____ Yes **____ No**

APPENDIX C (continued)

8) **School or Daycare your child attends**

_____

9) **Name of the primary teacher**

_____

APPENDIX D

Vanderbilt Assessment Scale - Parent Form

Directions: Each rating should be considered in the context of what is appropriate for the age of your child. When completing this form, please think about your child's behaviors in the past 6 months.

0 = Never	1= Occasionally	2 = Often	3 = Very Often

1.	Does not pay attention to details or makes careless mistakes with, for example, homework.	**0**	**1**	**2**	**3**
2.	Has difficulty keeping attention to what needs to be done.	**0**	**1**	**2**	**3**
3.	Does not seem to listen when spoken to directly.	**0**	**1**	**2**	**3**
4.	Does not follow through when given directions and fails to finish activities (not due to refusal or failure to understand).	**0**	**1**	**2**	**3**
5.	Has difficulty organizing tasks and activities.	**0**	**1**	**2**	**3**
6.	Avoids, dislikes, or does not want to start task that require ongoing mental effort.	**0**	**1**	**2**	**3**
7.	Loses things necessary for tasks or activities (toys, assignments, pencils, or books).	**0**	**1**	**2**	**3**
8.	Is easily distracted by noises or other stimuli.	**0**	**1**	**2**	**3**
9.	Is forgetful in daily activities.	**0**	**1**	**2**	**3**
10.	Fidgets with hands or feet or squirms in seat.	**0**	**1**	**2**	**3**
11.	Leaves seat when remaining seated is expected.	**0**	**1**	**2**	**3**
12.	Runs about or climbs too much when remaining seated is expected.	**0**	**1**	**2**	**3**
13.	Has difficulty playing or beginning quiet play activities.	**0**	**1**	**2**	**3**
14.	Is "on the go" or often acts as if "driven by a motor".	**0**	**1**	**2**	**3**
15.	Talks too much.	**0**	**1**	**2**	**3**
16.	Blurts out answers before questions have been completed.	**0**	**1**	**2**	**3**
17.	Has difficulty waiting his or her turn.	**0**	**1**	**2**	**3**
18.	Interrupts or intrudes in on others' conversations and/or activities.	**0**	**1**	**2**	**3**

APPENDIX D (continued)

Vanderbilt Assessment Scale - Parent Form

Performance Scale

1= Excellent	2 = Above Average	3 = Average	4 = Somewhat of a Problem	5 = Problematic

19.	Overall School Performance	**1**	**2**	**3**	**4**	**5**
20.	Reading	**1**	**2**	**3**	**4**	**5**
21.	Writing	**1**	**2**	**3**	**4**	**5**
22.	Mathematics	**1**	**2**	**3**	**4**	**5**
23.	Relationship with parents	**1**	**2**	**3**	**4**	**5**
24.	Relationship with siblings	**1**	**2**	**3**	**4**	**5**
25.	Relationship with peers	**1**	**2**	**3**	**4**	**5**
26.	Participation in organized activities (e.g. teams)	**1**	**2**	**3**	**4**	**5**

APPENDIX E

Vanderbilt Assessment Scale - Teacher Form

Directions: Each rating should be considered in the context of what is appropriate for the age of the child you are rating and should reflect that child's behavior since the beginning of the school year. Please indicated the number of weeks or months you have been able to evaluate the behaviors: _____.

0 = Never	1= Occasionally	2 = Often	3 = Very Often

1.	Fails to give attention to details or makes careless mistakes in schoolwork.	**0**	**1**	**2**	**3**
2.	Has difficulty sustaining attention to tasks or activities.	**0**	**1**	**2**	**3**
3.	Does not seem to listen when spoken to directly.	**0**	**1**	**2**	**3**
4.	Does not follow through on instructions and fails to finish schoolwork (not due to oppositional behavior or failure to understand).	**0**	**1**	**2**	**3**
5.	Has difficulty organizing tasks and activities.	**0**	**1**	**2**	**3**
6.	Avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort.	**0**	**1**	**2**	**3**
7.	Loses things necessary for tasks or activities (school assignments, pencils, or books).	**0**	**1**	**2**	**3**
8.	Is easily distracted by extraneous stimuli.	**0**	**1**	**2**	**3**
9.	Is forgetful in daily activities.	**0**	**1**	**2**	**3**
10.	Fidgets with hands or feet or squirms in seat.	**0**	**1**	**2**	**3**
11.	Leaves seat in classroom or in other situations in which remaining seated is expected	**0**	**1**	**2**	**3**
12.	Runs about or climbs excessively in situations in which remaining seated is expected.	**0**	**1**	**2**	**3**
13.	Has difficulty playing or engaging in leisure activities quietly.	**0**	**1**	**2**	**3**
14.	Is "on the go" or often acts as if "driven by a motor".	**0**	**1**	**2**	**3**
15.	Talks excessively.	**0**	**1**	**2**	**3**
16.	Blurts out answers before questions have been completed.	**0**	**1**	**2**	**3**
17.	Has difficulty waiting in line	**0**	**1**	**2**	**3**
18.	Interrupts or intrudes on others (e.g., butts into conversations/games)	**0**	**1**	**2**	**3**

APPENDIX E (continued)

Vanderbilt Assessment Scale - Teacher Form

Classroom Behavioral Performance

1= Excellent	**2 = Above Average**	**3 = Average**	**4 = Somewhat of a Problem**	**5 = Problematic**

19.	Relationship with peers	**1**	**2**	**3**	**4**	**5**
20.	Following directions	**1**	**2**	**3**	**4**	**5**
21.	Disrupting class	**1**	**2**	**3**	**4**	**5**
22.	Assignment completion	**1**	**2**	**3**	**4**	**5**
23.	Organizational skills	**1**	**2**	**3**	**4**	**5**

APPENDIX F

Data Collection Sheet

NUMBER of ITEMS: _____ **DATE:_____**

Item selected	Lid closure/time

Child Rating of Difficulty and Enjoyment of Choice

Was picking a prize…….

1	2	3	4
Hard	Sort of Hard	Sort of Easy	Easy

1	2	3	4
Boring	Sort of Boring	Sort of Fun	Fun

How much do you like the prize you chose?

1	2	3	4
Don't	Very Little/okay	I like it	Like it a lot

Animals	Foods and Drinks

APPENDIX G

Tentative Treasure-box Prizes

1. Silly putty
2. Finger puppets
3. Rubber/jack ball
4. Silly string
5. (mini) Yo-yo
6. Top (spinning)
7. (star) Sun-glassess
8. Paddle ball
9. Bubbles
10. (mini) Slinky
11 Jiggly puffer balls
12. Plastic harmonica
13. Ball-maze puzzle
14. Ice-cream foam ball shooter
15. (animal) giggle/silly bands
16. Glow-in-dark bracelets
17. Magic grow objects
18. Play-dough
19. 3 Smiley stickers
20. (rainbow soccer/star) ball

APPENDIX H

Exit Survey