

THE EXECUTIVE FUNCTIONS OF REJECTED CHILDREN IN AN URBAN
ELEMENTARY SCHOOL

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Abstract

The relationship between Executive Functions and Peer Rejection was explored. Thirty-Five students in an urban elementary school, (mean 10.7 years of age (sd=2.8), 34% male, and 88% African American) completed measures of executive functions: KABC-II Rover, The Wisconsin Card Sort and NEPSY-II Statue (below age 9) or The Iowa Gambling Task (age 9 and up).

Classmates reported who was not a preferred play mate: a measure of rejection. Executive Functions were not significantly related to Rejection across the sample, but among the children with the lowest Executive Functions, The Wisconsin Card Sort was significantly negatively related to Rejection (-0.61 , $p = .04$) suggesting poor Cognitive Flexibility may be a risk factor for Rejection. Performance on the Iowa Gambling Task was found to be positively correlated with Rejection (0.4 , $p = .008$) suggesting that high impulse control may also be a risk factor for rejection among adolescents. This was consistent with a finding of a positive correlation between Office Discipline Referrals and popularity ($.4$, $p = .008$) among the sample. Implications for practice are also discussed including the difficulty of managing behavior when bad behavior is related to popularity.

Keywords: Iowa Gambling Task, Wisconsin Card Sort, Peer Rejection, Executive Functions,
Urban children

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CHAPTER 1

INTRODUCTION

Certain children fail to bond with peers and instead remain isolated. Over the course of their lives, these isolated children will be less satisfied with their relationships and have less academic and occupational success (Rubin, Coplan & Bowker, 2009). A child who is actively harassed or rejected by peers will face even greater difficulty (Bierman, 2004). Those rejected in early childhood are more likely to show violent and delinquent behavior (Vitaro, Pedersen & Brendgen, 2007), while those who remain rejected in middle childhood are more likely to be arrested as adults (Nelson & Dishion, 2004).

The effects of peer rejection may be worse for those in under-served urban communities. Lambert, Bradshaw, Cammack and Ialongo (2011) found that students in low income communities responded to violence around them by lashing out at peers who then rejected them, leading to delinquency and school failure. In a longitudinal examination of rejected children, Lansford, Malone, Dodge, Pettit and Bates (2010) found a cyclical pattern whereby aggression can increase rejection and rejection can increase aggression.

Bierman (2004) noted that aggression has been one of the strongest predictors of rejection, yet aggressive children are not always rejected. This has led to a line of research into how aggression may be a good social strategy. Hanish and Guerra (2000), for example, found a complex relationship between aggression and rejection among students in an urban elementary school. The authors found that aggressive students were more likely to be rejected as playmates, yet aggressiveness also protected them from being victimized by peers. These results suggest that

the aggression observed in these cases may be less the cause of rejection than a rational response to it.

Graham and Juvonen (2002) examined the role of aggression in peer rejection among ethnically diverse students in an urban middle school and found it different from that described in studies of suburban populations. Among African-American students in their sample, aggressiveness was common enough that students faced greater risk of rejection if they were not aggressive. The authors hypothesized that when aggressive behavior is noted as frequently as it was among the African-American students in their sample, those who are not aggressive risk rejection for not adhering to behavioral norms. They point out that peer rejection and social norms among urban students have been so little studied that they can draw no firm conclusions, but it still leaves the question of what factor may put students at the greatest risk of rejection when aggression is not an adequate predictor.

Even among the students from middle-class backgrounds who make up the majority of subjects in current research, rejection is not always a consequence of aggression (Bierman, 2004). In high school, aggressive students can even be popular (Borch, Hyde & Cillessen, 2011). Dijkstra, Cillessen, Lindenberg and Veenstra (2010) argued that when aggression is used strategically, it can enhance popularity. This may indicate that it is not so much aggression that is associated with peer rejection as it is uncontrolled aggression tied to a more general lack of control over behavior.

This association between poor behavioral control and rejection is consistent with the finding that poor control over negative emotions is also robustly associated with rejection

(Bierman, 2004). Unlike aggression, the association between difficulty controlling emotion and rejection remains consistent for urban children (Kelly, Schwartz, Gorman & Nakamoto, 2008).

The importance of behavioral and emotional control also shows in the entry behavior of rejected students. The strategy that a child uses to join a group is referred to as “entry behavior” and many rejected children are impulsive or unskilled during entry (Bierman, 2004). Wilson (2006) reports that rejected children were significantly more likely to use disruptive entry behavior, such as making demands or taking toys. Crosby, Fireman and Clopton (2011) demonstrated that this unregulated style of interaction will likely continue throughout socialization as rejected children were found to be more likely to interrupt and make irrelevant self-disclosures.

The characteristics of rejected children form a clear pattern of poorly controlled behavior. They may show overt aggression (Bierman, 2004), and anger more often than their peers (Hanish et al., 2004). When they involve themselves in the play of others, they approach in a way that may illicit hostility (Wilson, 2006) and when they interact, they interrupt and choose their words poorly (Crosby, Fireman & Clopton, 2011). It follows that further exploration of behavioral regulation (also referred to as Executive Functions) and peer rejection is needed to clarify the relationship of the two, yet research into the two areas has remained almost entirely separate.

Best and Miller describe the Executive Functions as those abilities that “allow for goal directed behavior” (2010, p.1641), so the poorly regulated behavior seen in rejected children is consistent with difficulty in this area. Behaviors among rejected children are also correlated to deficits in executive functions to such a degree that some have suggested improving executive functions as a means of improving social outcomes (Riggs, Jahromi, Razza, Dillworth-Bart, &

Mueller, 2006). It remains unclear, however, whether the behaviors seen in rejected children are more often due to a specific deficit in social skills rather than executive functions.

Investigations of whether students with lower executive functions will face greater rejection remain scarce. This is problematic, as assessment of executive functions is now a common part of psychoeducational evaluation of students in school and clinical contexts, yet clinicians may not be aware of the social importance of their information (Dawson & Guare, 2010). Data on the social outcomes of students with lower than expected executive functions can lead practitioners to better anticipate social and emotional difficulties of students in their care.

The current investigation, therefore, examined a sample of urban students to identify the relationship between their social success (acceptance and rejection by peers) with their performance on measures of executive function. Specifically, this study will address the following research questions:

1. Will a group of rejected children show a pattern of worse executive functions than their non-rejected peers?
2. Will a group of more accepted children show a pattern of better executive functions than their non-accepted peers?
3. Among the different aspects of Executive Functions, how related is each to peer rejection and acceptance?
4. Will the relationship between executive functions and rejection be different at different levels of performance on tasks of executive functions, such that a minimal level of ability is required to avoid rejection, but additional ability does not confer additional benefit?

CHAPTER 2

LITERATURE REVIEW

Peer rejection can have a devastating impact on children's lives. Behaviors and traits of rejected children have been widely studied, and such traits as aggression, poor emotional control and poor entry behavior have frequently emerged as being closely associated with rejection. The current chapter elucidates indications from current research that these are all behaviors that can also be associated with poor Executive Functions. The current investigation more directly examined whether socially rejected students have corresponding problems with executive functions.

Peer Rejection

The importance of friendships is well documented, and ranges from creating feelings of self-worth in childhood (Gest, Graham-Bermann, & Hartup, 2001), to protection against depression across the entire life span (Patterson & Bettini, 1993). However, certain children fail to bond with their peers and instead remain withdrawn or isolated. These children may have had limited socialization prior to school, or may find interaction with their peers difficult or distressing to navigate (Ruben, Coplan & Bowker, 2009). Over the course of their lives, these isolated children will likely be less satisfied with their relationships and have less academic and occupational success (Ruben, Coplan & Bowker, 2009). These difficulties are compounded for children from urban or lower socioeconomic backgrounds as positive peer relationships are important predictors of their graduation rates (Véronneau, Vitaro, Pedersen & Tremblay, 2008). In effect, a child in an urban setting who does not have the support of a group of peers who encourage academic success is considerably less likely to graduate.

A child who is ignored by peers will not receive the benefits of friendship, but a child who is actively harassed or rejected by peers will face even greater difficulties (Bierman, 2004). In one of the most recent reviews of the literature on rejected children, Asher and McDonald (2009) noted the increased risk of poor outcomes across the lifespan for children. The authors note that rejection has been found to be associated with practically any negative outcome studied in connection to it, and that the essential plight of rejected children is that they grow up never learning how to have positive relationships and instead become increasingly hostile and distrustful.

Further research found that in addition to a lack of access to the benefits of friendship, rejected children will also experience higher levels of victimization in school and less willingness to participate in class (Buhs & Ladd, 2001). While the finding of greater incidents of victimization (such as verbal harassment) is not surprising it is worth noting the greater connection to class participation. Buhs and Ladd (2001) identified rejected elementary school children through a survey measure of preferred playmates and then observed these children in their classrooms. Those who were rejected were less likely to contribute to class discussion or ask for help, perhaps due to anxiety about the reaction of classmates.

The immediate unhappiness and damage to academics are compelling reasons to attempt to understand and prevent peer rejection, but the lifetime outcomes for rejected children may be even more disturbing. Certainly, some rejected children will have the resilience or family support to overcome the damage done by rejection (Rubin et al., 2004) but many will grow to be dangerous to others. Those rejected in early childhood are more likely to affiliate with a deviant peer group and show violent and delinquent behavior (Vitaro, Pedersen & Brendgen, 2007) as they seek out anyone who will be a friend and protect them from victimization. Those who

remain rejected in middle childhood often retain this pattern of antisocial behavior which culminates in a significantly increased likelihood of arrest as adults (Nelson & Dishion, 2004).

The outcomes for those children who cannot find even delinquent or violent peers may be just as bad. Over their lifetimes, children who remain friendless are significantly more likely to be depressed (Epkins & Heckler, 2011). Obviously, this can impose a deep cost on their family and professional lives, but the ultimate outcome, above and beyond for uncomplicated depression, is an increased risk of suicide, even late into adulthood (Meltzer, Vostanis, Ford, Bebbington, & Dennis, 2011).

Rejection in Urban Settings

Lambert, Bradshaw, Cammack and Ialongo (2011) found that students in low income communities responded to the violence around them by lashing out at peers and that the subsequent rejection led to delinquency and school failure. Given the already depressed graduation rates of students in urban settings (Verdugo, 2011) it becomes even more urgent to consider means to reduce dropout rates and school disengagement. The potential association of rejection and dropping out is more than reason enough to work to understand the nature of peer rejection among children in urban schools. Dropping out, however, is not the only risk exaggerated for rejected children in urban settings; there may also be a uniquely powerful connection to violent behavior.

Children in urban settings are already at increased risks of engaging in violent behavior particularly if they feel disconnected with school (Frey, Ruchkin, Martin, & Schwab-Stone, 2009). Among urban youth who already show aggression, peer rejection can then lead to an increase in aggression over time (Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003). Given

these circumstances and the lack of supports endemic to such settings, children in under-served communities find themselves in a cycle where their aggression alienates most of their peers, so the only friends they can keep are those who will encourage further aggression. Dishion, Véronneau and Myers (2010) demonstrated this pattern of escalating deviancy over-time and point to the unique contributions of a deviant peer group to both encourage violent behavior and increase the likelihood that otherwise rejected children will be unable to join a different peer group later.

Understanding and then potentially preventing peer rejection among urban children can then serve multiple functions. If students can maintain positive peer relationships with friends who have at least some connection to school and motivation to achieve, then they will experience less risk of dropping out. If they do not find themselves forced to affiliate with peers who positively sanction violent behavior, then they will be less likely to perpetrate this behavior. The combined potential for lower dropout rates and lower levels of violence means that there are compelling reasons to work to identify those students who will likely be rejected by their peers. Current understanding of the characteristics of these children is, however, limited.

Characteristics of Rejected Children

Identifying children at risk for rejection can be simple when the risk factor is physical. For example, obese children face a substantial increased risk (Gray, Kahhan, & Janicke, 2009) as do children of a different ethnicity from the large majority of peers (Barron, 2009). Many authors find other, less obvious correlates of rejection. Rubin, Bukowski and Parker (2006) explored patterns of behavior. The authors note that while pro-social behavior (helping, turn-taking etc.) and verbal facility are associated with high levels of acceptance, aggression predicted rejection

across the span of childhood. As aggression is not only linked to rejection, but self-evidently problematic as well, it merits some further exploration.

Examining the relationship between aggression and rejection at a single time point is problematic, as correlation in this case leaves two plausible possibilities: either children reject those who behave aggressively, or rejected children lash out aggressively at the peers who victimize them. Current research suggests that rejection and aggression exacerbate each other. In a longitudinal examination of rejected children, Lansford, Malone, Dodge, Pettit and Bates (2010) clarified the relationship between aggression and rejection by showing cyclical patterns whereby aggression can increase rejection and rejection can increase aggression. The authors followed 585 children from the American South and Midwest from kindergarten through third grade. Every year, teachers reported on the participants' aggression, peers reported on whether the participants were preferred playmates and the participants themselves viewed vignettes of children interacting and reported their interpretations of the scenes and what they thought they would do. Over the course of the study, children who showed either initial aggression or initial rejection would report increasingly hostile interpretations of the social vignettes and then proportional increases in rejection and aggression.

Aggressive children are also perhaps uniquely vulnerable to peer rejection as their peers will view this treatment of them as appropriate or justified. In one notable study of this effect, (Park & Killen, 2010) a sample of 397 Korean and 333 American students in the 5th to 8th grade read brief stories in which a child was excluded from play or rejected as a friend. The stories gave different reasons for the rejection and then investigators interviewed the students regarding how justified the aggression was. Across both nationalities and genders, children agreed that it was generally unacceptable to reject other children based on their ethnicity or traits such as

shyness, but that rejecting an aggressive peer was appropriate. The impression from the literature thus far shows several factors working to keep rejected children in that state. Over time, they become more aggressive, and as this happens, their peers become more likely to reject them, leading to further aggression. They are also developing reputations as deserving whatever victimization they experience and learning to distrust their peers and view them as potential tormentors.

The relationship between aggression and rejection is by now very clear, but it is worth considering how aggression functions in an urban setting. When students feel little hope or connection to school and where teachers may lack the resources to effectively manage the behavior of students, aggression tends to be more common (Frey, Ruchkin, Martin, & Schwab-Stone, 2009). Other lines of research suggest that it may also be more functional. Graham and Juvonen (2002) examined the role of aggression in peer rejection among ethnically diverse students in an urban middle school and found it very different from that described in previous studies. The authors collected self-reports and peer nominations from 406 middle school students (116 African-American and 118 Latino) attending an urban school. Data analyzed included peer nominations of acceptance, rejection, victimization and perceived aggressiveness as well as self-reports of feelings of self-worth and loneliness. In this context, the data appeared to show that across the population of the school, aggressiveness was still associated with rejection but among African-American students, aggressiveness was common enough that these students may have actually been at greater risk of rejection and victimization if they were not aggressive. The authors hypothesized that when aggressive behavior is typical among a population (as it was among African-American students in their sample) those who are not aggressive may be at risk of rejection for not adhering to behavioral norms. When school personnel are unable to

adequately manage the behavior of students, these non-aggressive children may also just be seen as easy targets for victimization.

Examinations more focused on rejected children in urban settings also fail to find the kind of direct connection between aggression and rejection that is found in suburban schools. Hanish and Guera (2000), for example, found a more complex relationship between aggression and rejection among students in an urban elementary school. Across a sample of 1,119 urban students, the authors collected peer nominations for rejection and acceptance as well as teacher ratings of aggression and withdrawal. These were collected initially when the sample was in grades, 1, 2 and 4 and again two years later when the sample was in grades 3, 4 and 6. The authors found that students reported to be aggressive at the first time point were more likely to be rejected, yet aggressiveness also protected them from being victimized or harassed by peers.

The study is particularly important considering that it examined the students' social success over time and demonstrated an increase in aggression among the rejected. Taken with other investigations of rejected children in urban settings such as Dishion, Véronneau and Myers (2010) it begins to appear that rather than being a pre-requisite for rejection as in settings where it is less common, aggression may be a functional response to the victimization of rejected children in urban settings.

There are also phenomena in current findings that suggest that many students, not all of them rejected, may make such strategic use of aggression. Even among the students from middle-class backgrounds who make up the majority of subjects in current research, rejection is not always a consequence of aggression (Bierman, 2004). Especially among high school students, investigations have found that some students can be aggressive without it negatively

affecting their status among their peers (Borch, Hyde, Cillessen, 2011). In an effort to explain such surprising findings, Dijkstra, Cillessen, Lindenberg and Veenstra (2010) have argued that when aggression is used strategically, it can actually enhance popularity. Dijkstra and colleagues surveyed 3,312 Dutch students, aged 12-14, on which of their peers they liked and how they perceived them in terms of aggression, athleticism and other traits. The results were complex, but showed that boys, especially those perceived as athletic, could show aggression and it would benefit their peer acceptance. The authors concluded that in such cases the boys may be judiciously using aggression to enhance their social status. With the association of athletics and aggression in that investigation, it is easy to imagine a young man with a reputation as an aggressive and competent athlete occasionally asserting his toughness and receiving peer approval. This may indicate that it is not so much aggression that is associated with peer rejection as it is uncontrolled or poorly thought-out behavior, as may be seen in the emotional outburst of child who is already rejected and attacks a peer out of anger or desperation.

An association between poor behavioral control and rejection is consistent with the common finding that even when children are not overtly aggressive toward their peers, poor control over negative emotions is also robustly associated with rejection (Bierman, 2004). Hanish and colleagues (2004) used observations and parent and teacher reports to assess kindergarten and preschool students' emotional displays and ability to self-regulate. Those students who were most often observed displaying anger (as coded by two trained observers) were also most often identified by teachers as being rejected by peers (defined as being excluded from play, hit or called names). While most of these students were also aggressive, displays of anger predicted rejection even beyond aggressive behavior. Finally, self-regulation was also noted as an important factor. Girls who frequently showed anger were more likely to face

rejection, while those who showed better management of their emotions were at significantly reduced risk.

Unlike aggression, the association between difficulty controlling emotion and rejection remains consistent for urban children. Kelly, Schwartz, Gorman and Nakamoto (2008) investigated the relationship between victimization in the community, emotional dysregulation and peer rejection and victimization. The authors collected data on 199 children at two low income schools in Los Angeles, with a mean age of 9.2 years. At two points approximately one year apart, students self-reported victimization in the community, teachers provided data on emotion dysregulation and peer nominations provided a measure of rejection as the authors interviewed students and asked them to identify peers they disliked. The authors found that emotion dysregulation predicted rejection by peers and those students who were victimized in the community and identified as dysregulated were at substantially greater risk of further victimization and peer rejection at the second data point.

The lack of behavioral and emotional control shown by rejected children also manifests itself in observable differences in behavior, with entry behavior being among the most commonly studied. Over the course of play, children need to approach others to join games or conversations. The strategy used to initiate contact is referred as the child's "entry behavior" and poor entry behavior is a hallmark of rejected children (Bierman, 2004). Wilson (2006) demonstrated that rejected children were significantly more likely to use riskier or more disruptive entry behavior such as making demands or taking toys.

Crosby, Fireman and Clopton (2011) demonstrated that this unregulated style of interaction continues for rejected children beyond entry behavior. The authors paired 80 fifth and

sixth grade children, some popular and some rejected (as identified by reports from the students' classmates). The dyads were then required to cooperate on a series of problem solving tasks and their speech was recorded and analyzed. The authors noted a significant difference in the types of phrases the two groups used. Popular students asked more questions and offered more phrases related to the tasks, but rejected children were more likely to interrupt and make irrelevant self-disclosures.

Throughout the literature, the characteristics of rejected children form a clear pattern of poorly controlled behavior. They may show overt aggression (Bierman, 2004), or simply anger more often than their peers (Hanish et al., 2004). When they attempt to involve themselves in the play of others, they do so by barging in a way that may elicit hostility (Wilson, 2006) and when they do interact, they interrupt others and choose their words poorly (Crosby, Fireman & Clopton, 2011). The regulation of behavior and thought has actually been richly studied, typically under the rubric of The Executive Functions.

Rejection and Executive Functions

Best and Miller (2010) provide a succinct description of the Executive Functions as those abilities that “allow for goal directed behavior” (p.1641). Packwood, Hodgetts, and Tremblay (2011) recently reviewed extant research on the Executive Functions and found the current literature mired by the number and types of abilities identifies as executive functions. They note however agreement on important themes such as the ability beginning important tasks to the exclusion of preferred ones, restraining a prepotent response, and planning complex, behaviors.

Although the executive functions are typically studied in the context of their importance in school or cognitive tasks, the current review argues that it is also reasonable to consider their importance for social interaction. Consider the earlier example of entry behavior. For a child to successfully enter a group, he or she must first inhibit the impulse to simply jump in, and then must identify the relationships of the peers already playing, then plan out to whom he or she should speak and what to say. A review of current research confirms that many behaviors seen among rejected children are also robustly correlated to deficits in Executive Functions.

As discussed previously, numerous reviews of research on rejected children support the connection between aggression and rejection (Bierman, 2004). Ellis, Weiss and Lochman (2009) provided one of several investigations that established the link between aggression and Executive Functions. The authors administered tests of Executive Functions, including Planning, Impulse Control and Cognitive Flexibility to a sample of 83 fourth and fifth graders. The results of these measures were then analyzed in relation to teacher reports of aggression. Impulse Control and Planning were both found to predict observed aggression. Although this investigation did not directly examine social success, it does help establish that children with poorer executive functions are more likely to be aggressive and more likely to face rejection.

Exploring the link between aggression and rejection has even led others to look for a relationship between Executive Functions and rejection. Pope and Bierman (1999) looked at peer reports of rejection, aggression and Executive Functions. The authors used peer rating scales of behavior to measure 145 boys in various areas of problem behavior, first in grades 3-6 and then four years later when the participants were in grades 7-10. Based on peer reports, students were sorted into categories of problem behavior, including “aggressive” (students that peers reported engaged in violence) “dysregulated” (identified as impulsive or inattentive) and “aggressive-

dysregulated” (those showing both types of behavior). At both time points, students also provided ratings of their “most liked” and “least liked” peers. At both time points those students in the group showing both types of problematic behaviors were the most likely to be nominated as “least liked” by their peers. It is notable, however, that the second most likely group to be nominated as “least liked” was the dysregulated group and not the aggressive group. The authors suggest that this shows that it is not aggressive behavior itself that leads to peer rejection, but rather it is the impulsive behavior often associated with aggression that causes children to be rejected. The study was problematic, however, in that all measures of Executive Function were based upon peer reports and so it becomes impossible to determine whether those children who were identified as dysregulated actually did show behavioral difficulty, or if their peers were merely ascribing negative characteristics to those they disliked.

The relationship between Executive Functions and emotional control also strengthens the case for a connection between rejection and the former. As described earlier, poor control over emotional displays or a tendency to display negative affect are associated with peer rejection (Hanish et al., 2004), but research also shows they are associated with poor Executive Functions. Carlson and Wang (2007) administered tests of impulse control to 53 preschool children and collected parent reports of the children’s impulsivity. The authors then elicited emotional reactions from the same children by presenting them with a disappointing gift and encouraging them to keep an exciting secret. Those children who performed best on the measures of impulse control were also able to best conceal their emotions, particularly their negative reaction to the disappointing gift. Although this investigation’s test of Executive Function is limited to impulse control and there was no direct measure of the link between Executive Functions and peer

rejection, the relationship between impulsivity and difficulty controlling emotions strongly suggests that impulsive children would be more likely to face rejection.

With the mutual correlates of rejection and poor Executive Functions, it is not surprising that there is some research on their direct connection. The results are rather complex. With a sample of one-hundred and four children with a mean age of sixty-four months, Monks, Smith and Swettenham (2005) examined the relationship between executive functions and victimization. While victimization (in this case defined as being bullied or teased by peers) is not fully synonymous with rejection (being disliked by peers), the two are clearly related. Participants completed questionnaires in which they identified peers who bully others, who are victims of bullying, and who defend peers from bullying. Participants then completed tasks assessing impulse control and planning and their parents and teachers completed rating scales of the same Executive Functions. Those identified as victims of bullying were also rated by their teachers as having significantly worse Executive Functions.

These results support the connection between Executive Functions and rejection, and suggest several important considerations for future research. The correlation between observed impulsivity and victimization is consistent with a link between that aspect of Executive Functions and rejection. However, victims did not perform significantly worse on Executive Function tasks. The authors suggest that this may be due to the fluidity of social roles at this age, whereby victimization is not yet stable. It should also be considered that children as young as the sample used in this study may not be expected to have well developed executive functions and that the test of impulsivity may not have been ecologically valid enough to relate to the children's real world behavior as it assessed the ability to inhibit automatic naming (children

were required to say “day” when they saw a picture of a night scene) rather than the types of behavior reported through the parent and teacher questionnaires.

In a similar investigation to the current study, Diamantopoulou, Rydell, Thorell and Bohlin (2007) examined the role of Executive Functions in social success. The authors administered measures in several areas of Executive Function, including impulse control and verbal and nonverbal working memory and collected teacher and peer nominations of impulsivity and aggression for 112 middle class Swedish students aged 8-9. Social success was measured by collecting survey data from students wherein they were asked to nominate peers with whom they liked to spend time and those with whom they did not like to spend time. A social success score was created from these survey data whereby the number of times a student was nominated as being disliked was subtracted from the number of times a student was nominated as being liked.

Analyses showed that while performance on measures of Executive Functions did predict social success, it did not add to the predictive ability of reports of impulsive behavior (Diamantopoulou et al., 2007). Among those students with high reports of disruptive behavior, those who scored better on the Executive Function tasks were reported to show less aggression. These results strongly suggest that students with worse Executive Functions than their peers will face rejection, but they leave open the question of whether there is a unique role for Executive Functions, or whether their relationship to rejection is entirely mediated by aggression. Given Sweden’s low rate of violence compared to many other industrial nations, (Dijk, Manchin, Van Kesteren, Nevala & Hideg, 2005) this investigation becomes particularly difficult to generalize to urban schools or other populations where aggression may be more normative.

Current research on whether students with poorer Executive Functions face worse peer rejection is not yet conclusive. Mounting evidence shows that two of the strongest predictors of rejection (aggression and emotional dysregulation) are predicted by poor Executive Function, but investigation is lacking as to whether poorer Executive Functions alone are sufficient to increase the likelihood of rejection. Even when Executive Functions are examined, it is too often only through peer or teacher reports. The reliance on reports leaves the possibility that rather than true measures of Executive Functions, these data really reflect the negative appraisals of rejected children by their peers. Research is also lacking among urban schools, even though rejection is both more difficult to predict and potentially more damaging. With this in mind, the current study examined Executive Functions through multiple tests, and measured whether those students who perform more poorly than their peers are more rejected. The study also focused on an urban population, as rejection among these children remains vastly understudied.

The first step, then, in meeting the goals of this investigation is the selection of appropriate tests for relevant areas of Executive Functions. Unfortunately, the selection of a tests is not an easy feat in the current state of Executive Function research. Packwood and colleagues (2011) in their review of current research on Executive Functions are especially critical of the extreme glut of tests used to measure different abilities. The authors found 98 (p 460) distinct tasks. They also note that while some authors were careful to create comparison samples for their tasks or base tests on more established measures, it was also common for a given author to simply make an argument for the use of test and interpret it accordingly, without much empirical validation. Hence, a great deal of the current paper is devoted to describing each test used and why it was appropriate from among the many possible options.

Impulse Control

For the purposes of the current investigation, impulse control refers to the construct identified by Ramani, Brownell and Campbell (2010), that encompasses the ability to inhibit automatic responses and respond instead in a manner consistent with rules and expectations. Poor impulse control in children is associated with a host of negative outcomes, both immediately and over the course of development (Monahan, Steinberg, Cauffman & Mulvey, 2009). Impulse control has been linked repeatedly to aggression (Jensen, Youngstrom, & Steiner, 2007), and as previously discussed in the current review, emotional dysregulation (Trentacosta & Shaw, 2009).

Gomes and Livesey (2008) performed one of the more direct examinations of the relationship between impulse control and peer rejection. The authors administered performance measures as well as teacher report forms on impulsivity to a sample of children aged 5-6 years. Although the authors found no predictive power to the performance based measure, they did note a relationship between teacher reports of impulsivity and peer rejection. This supports the importance of impulsivity in the potential peer rejection of young children, but as the authors point out in their discussion, the selection of an appropriate performance task is critical.

Multiple popular tests of impulse control were evaluated for use in the current investigation. The Stop Signal Task (Logan & Cowan, 1984) is one of the more common tests for children and adults. The computer-based task requires an examinee to perform a sequence of button presses indicated by on-screen cues, but to refrain from responding at the presentation of a specific audio signal. The original authors and multiple replications have established the reliability and validity of the task as a measure of impulse control in children (Soreni, Crosbie, Ickowicz & Schachar, 2009). The task is not, however, commercially available, thus limiting the utility of the stop signal task in schools or other applied settings. Additionally, normative data

are not available for the stop signal task, limiting the ability to compare the performance of children across ages. The Stop Signal Task has also been previously applied to attempt to predict peer rejection among school aged children and was found not to be related to rejection (Gomes & Livesy, 2008). The authors suggest that as the task requires behavior that does not resemble the type of impulse control assessed through questionnaires or required in social interaction, it may lack ecological validity, at least for assessing behavior relevant to social interaction.

First developed in 1935, the Stroop Task also seeks to measure impulse control. The task presents the examinee with an array of the written names of colors, in different colored ink (such as the word “blue” written in red ink). Examinees are instructed to inhibit the automatic impulse to read the names of the colors and to recite the color of the ink instead (Morton & Chambers, 1973). Forms of the Stroop Task are commercially available, such as that used in the Delis-Kaplan Executive Functioning System (Delis, Kaplan & Kramer, 2001), but these are unsuitable for young children, as they rely on the assumption that word reading will be the automatic response to seeing a word. Modifications of the task for young children are available that present different colored objects, but the evidence base for their utility in predicting behavior remains minimal and the automaticity of naming the object over the color is questionable (La Hejj & Boelens, 2011). As with the Stop Signal, there is also the question of whether the behavior inhibited in the Stroop task is ecologically valid enough that it would predict socially relevant behavior.

The correlation between teacher ratings of impulsivity and rejection (Gomes & Livesy, 2008) suggests that the behaviors rated on these scales are those relevant to social interaction. Tremblay, Pihl, Vitaro, and Dobkin (1994) even found that reports of impulsivity in kindergarten could predict aggression throughout the rest of a child’s time in school. White and colleagues

(1994) developed one of the most widely used of these questionnaires. While it is not widely available in its entirety, the authors note several of the items that could describe a child (offered to teachers in a three point, Likert-Type scale) that they found particularly relevant. Several of the items, such as “Demands must be met immediately,” “Talks out of turn,” “Wants to have things right away,” and “Impatient” (p. 196), suggest that at least for young children, the most important impulses to be controlled are simply movement and talking. Fortunately, there is a recently developed test that examines this type of impulse control without relying on teacher report for an indirect measure of impulsivity.

“Statue” is a subtest from the NEPSY-II battery of Neuropsychological tests (Korkman, Kirk & Kemp, 2007). Normative data are available for the task allowing for comparison across ages. The test is widely available for purchase and review, allowing for application of findings from the current investigation to clinical practice and research across multiple settings. Administration is brief and specialized training is not required, suggesting the appropriateness of administration of Statue by school psychology graduate students. More important than any of these, however, Statue addresses the issues of ecological validity created by the abstract nature of other tests of impulse control.

The task requires the child to remain in a fixed position and keep his or her eyes closed, while the examiner makes sounds at set intervals. Although the behavior does not completely correspond to what would be observed in a child’s actual environment, the types of behaviors that must be inhibited (speaking, orienting to sound etc.) are more relevant to real world behavior than the behaviors elicited by the Stop Signal or Stroop tasks. Although research using Statue is currently limited, extant findings are consistent with the advantages of its more ecologically valid approach.

Youngworth, Harvey, Gates, Hashim and Friedman-Weieneth (2007) administered a battery of neuropsychological measures, including Statue, to 237 preschool aged children, along with parent completed, norm-referenced surveys of childhood externalizing behaviors. Findings showed that those participants who scored the worst on Statue showed the highest rates of parent reported externalizing behaviors. In addition to supporting the validity of Statue at predicting behavior across settings, the types of externalizing assessed in the parent questionnaire are exactly the type of aggressive and emotionally dysregulated behavior that has previously been associated with peer rejection. There is, however, no direct examination available of a correlation between Statue and peer rejection. Additionally, the study's population was preschool children, which highlights a limitation of both this test and tests of impulse control more generally.

Examination of impulse control as a trait has shown that it develops rapidly compared to other aspects of executive function, such that most children should be able to meet the demands of Statue well before adolescence (Klenberg, Korkman & Lahti-Nuuttila, 2001). Statue's authors write that children past age six will often achieve a perfect raw score (Korkman, Kirk & Kemp, 2007). This limitation suggested the need for a more complex measure of impulse control for older children.

Statue is appropriate for younger children because the type of behavior it measures (excessive movement, and talking, inability to wait) correlates with so many negative outcomes, so an equivalently deleterious set of impulsive behaviors must be measured for older children. The impulsive decisions of young children are limited by their physical and mental capabilities. While they can earn the ire of teachers or parents by yelling or leaving their seats, they are not capable of the level of harm that adolescents can cause when they fail to consider the consequences of their actions. Reyna and Farley (2006) reviewed adolescent risk taking

behaviors, and discussed the importance of developing an orientation to future rewards and consequences and the ability to accurately judge what these would be in predicting adolescent behavior. This perspective is consistent with previously discussed findings on aggressive, but popular adolescents (Dijkstra et al., 2010), who use their aggression strategically. Whereas when they are young, it is enough to simply hold back an initial aggressive or emotional urge, (and then rely perhaps on teachers to tell them what they should do) adolescents must be able to quickly weigh the outcomes of their decisions; it is those who cannot or do not do so who may face rejection.

White and colleagues (1994) were among the first to attempt to distinguish and test this more demanding form of impulse control, and coined the distinction between “Behavioral Impulsivity” and “Cognitive Impulsivity.” As they reviewed the literature, the authors found that while impulse control was typically discussed as a unitary construct, individual authors actually tended to discuss it as containing two separate sets of elements. At times, it was described as related to valuing current enjoyment over future rewards (Cognitive Impulsivity) while in other research, it was conceptualized as having more to do with simple difficulty in controlling behavior (Behavioral Impulsivity). The authors sought to clarify the role of impulse control in the potential delinquency of 430 young men between 12 and 13, half of whom were in “high-risk” living situations based on socioeconomic and family factors. The authors used teacher and parent rating scales along with the Stroop Task and other classic measures of impulsivity to measure the participants’ Behavioral Impulsivity. They supplemented these with tasks that assessed the participants’ Cognitive impulsivity by requiring that they forgo immediate rewards to achieve greater rewards later. Both constructs were found to be related to delinquency, including the aggression so closely associated with peer rejection.

Since then, and across a number of populations, the Iowa Gambling Task (IGT) has emerged as the pre-eminent assessment for this type of impulsivity. The computer-administered task requires that a participant select a card from one of four decks, each of which presents a reward and a penalty in play money. Two of the decks produce short term gains but greater penalties over time, while the other two do the opposite, and produce limited immediate rewards but greater long term gains.

The task was initially developed in 1994 at the University of Iowa by Bechara, Damasio, Damasio and Anderson, in order to examine the unique difficulties of individuals with damage to the Ventromedial Pre-Frontal Cortex. The authors describe how most IQ tests found these individuals to have average intelligence, but they could not function in society due to their poor decision making. After several applications of the task to individuals from various populations, and the addition of measures of physiological arousal, Bechara, Damasio, Tranel and Damasio (1997) argued that the IGT accessed the most basic and fundamental aspects of decision making; sometimes even relying on an emotional or preconscious response to outcomes. Even reviews that disagree with the developers regarding the specifics of the task and what it measures agree that it is sensitive impulsive decision making or a lack of consideration and that performance on it has numerous real life correlates (Dunn, Dalgleish & Lawrence, 2006). In this way, it perfectly fills the role for adolescents that Statue fills for younger children. It measures the most basic, essential first step in any problem solving model. For young children, it may be sufficient to simply stop, for older children it becomes necessary to stop and also to think.

Reviews of the test acknowledge its ecological validity based on the fact that nearly any population that evidences a difficulty in decision making (gamblers, substance users and many more) will show impaired performance (Hartman, 2008). For the purposes of the current study, it

is not unreasonable to say that this across the lifespan difficulty in problem solving could be called a deficit in Executive Functions. Numerous studies have found impaired performance among aggressive adults (Bass & Nussbaum, 2010; Levi, Nussbaum & Rich, 2010) and when research has been extended to adolescents, the findings remain consistent, with those with histories of aggression or behavior disorders performing worse than peers (Ernst et al., 2003). Hence, while applications of the IGT have focused on adult and clinical populations, and no studies have considered the potential of the instrument to relate to peer rejection, it remains the best tool for assessing cognitive impulsivity.

It is worth addressing a brief concern of the task in regards to its reliability. The actual published version of the test makes no mention of the reliability of the measure (Bechera, 2007) but this is a unique case where arguably, reliability is not entirely desirable and not entirely possible. The task always requires the participant to learn the nature of the task and the nature of which decks will punish and which will reward over time. Hence, there is no reason to expect good test-retest reliability as most participants will have learned at least the general nature of the task, and split-half reliability will similarly not be meaningful. At least one review, however, argues that this can also be considered a virtue. Beulow and Suhr (2009) review the construct validity of the test from numerous perspectives, but did also note the nature of the reliability of the IGT. They point to numerous studies that have compared the performance of different populations over time. They note that typical participants perform much better on the second administration, but clinical groups often do not, so while there is not necessarily reliability as it would typically be measures, performances remain consistent and the change in performance is very predictable. Hence, in both their review and others (Hartman, 2008) the lack of typically conceptualized reliability is not considered to affect validity.

Planning

Planning ability is a construct related to, but distinct from, impulse control. Impulse control involves inhibiting an initial response, but success depends on more complex behavior. In an overview of current research on planning ability, Unterrainer and Owen (2006) describe planning as the ability to visualize or otherwise imagine the steps in solving a problem and then execute them. Both abilities are of interest in the current investigation as navigating a complex social interaction may rely equally on inhibiting an initial impulse, and then considering the steps involved in a new solution.

Planning asserts itself as potentially related to rejection as it has already shown a relationship to aggression. The previously discussed work of Ellis, Weiss and Lochman (2009) administered multiple measures of Executive Functions to a group of 83 boys with mean age of 10.25 and examined the relationship of the participants' performance to aggressive behavior as measured by standardized reports from multiple informants. Participants also listened to descriptions of ambiguous social situations. The authors reported a significant relationship between planning ability and both reactive aggression and a tendency to focus on hostile or violent speech. Reactive aggression (as distinct from strategic aggression) is most strongly related to peer rejection (Morrow, Hubbard, McAuliffe, Rubin & Dearing, 2006).

Olvera, Semrud-Clikeman, Pliszka, and O'Donnell (2005) assessed planning ability in a battery of tests examining differences in Executive Functions between juvenile offenders and community controls. The authors tested 52 Adolescents, 36 incarcerated juvenile offenders and 16 matched controls on impulse control, planning and cognitive flexibility. Significant differences appeared between the groups with the offenders scoring lower than the community sample in all areas. However, the authors note that among those offenders without concomitant

major affective disorders, the greatest deficit was in planning ability. Like research on aggression, research on delinquency establishes only a connection with another behavior that is associated with rejection, so no firm link has been established between Planning and Rejection. Nevertheless, the fact that two such dramatic negative outcomes are associated with poor Planning ability suggests that a direct link between Planning and Rejection may emerge.

Ellis and colleagues (2009) measured planning ability with the Tower of London test (ToL), which has served as the primary test of planning ability for several decades (Unterrainer et al., 2004). Shallice (1982) first developed the tests to assess planning after observing the distinct loss of planning ability in patients with injuries to the pre-frontal cortex. The test presents participants with colored beads on columns in one arrangement and requires them to move the beads to match a target arrangement, with the caveats that a bead cannot be moved with another bead on top of it, and that the re-arrangement be accomplished within a limited number of moves. Success on the task requires the participant to plan several moves in advance and performance is largely predicated upon the time spent deciding on a sequence of moves before actually moving beads (Phillips, Wynn, McPherson & Gilhooly, 2001).

In spite of its prevalence in research, the ToL is not the ideal instrument for measuring planning ability in the current investigation. Normative data are not available for performance on the ToL and as success on the task increases dramatically with age (Luciana, Collins, Olson, & Schissel, 2009), a lack of age-adjusted scaled scores would limit the number of analyses that can be performed. The test also has poor reliability (Humes, Welsh, Retzlaff & Cookson, 1997). Norm referenced measures are available that have similar tasks to the ToL such as the Tower subtest of the Delis-Kaplan Executive Function System (D-KEFS) (Delis, Kaplan & Kramer, 2001) and the Tower subtest of the NEPSY (Korkman, Kirk & Kemp, 1998) but these too are

problematic. Normative data for the D-KEFS are only available starting at age 8 and the Tower test was removed from the revised NEPSY - II (Korkman, Kirk & Kemp, 2007), making the older normative data of the original test problematic.

To both overcome the limitations of the ToL, and use a task that would be more appealing to children, the Rover subtest of the Kauffman Assessment Battery for Children, Second Edition (KABC-II) (Kaufman & Kaufman, 2004) was used in the current investigation. Although Rover remains unused in research as a stand-alone test of planning, Dawson and Guare (2010) identify Rover as a widely used test of Planning ability among practitioners. It also has the essential feature of any test of planning in that each move will impact subsequent moves and so a failure to plan multiple steps ahead will dramatically affect performance (Unterrainer and Owen, 2006).

Rover presents the participant with a board divided into squares and a dog-shaped plastic token the examiner identifies as “Rover.” The examiner places the token at a designated starting point on the board, and demonstrates how it is to be moved to a square on the board with a bone in the fewest number of moves. The need to plan moves is comparable to that of Tower tasks. On either of the Tower tasks, moving a bead or disk without planning enough moves ahead will result in the need to move the piece back and performance will suffer. In the same way, moving Rover in the wrong direction will result in the need to move “him” back and performance will suffer in this way as well.

The design and development of the task were also both quite rigorous. The testing manual provides normative data from ages 3 to 16 and split – half reliability is never below .73 even for the youngest of examinees (Kaufman & Kaufman, 2004, p. 88). Rover also has the

distinct advantage of having been developed such that there would be minimal influence of race or socioeconomic status on performance (Kaufman & Kaufman, 2004). Although the authors describe the process of development in some detail in the manual, the most important figures they provide are the comparisons among the normative sample of performance as impacted by ethnicity and parents' education level. They report, for example, a mean score of 10.3 on Rover for Caucasian participants and a mean score of 10 for African American participants, with race accounting for 1.3% of the variance based on a partial eta squared analysis (p. 94).

Cognitive Flexibility

While impulse control is needed to suppress an automatic inappropriate response and planning is required to generate a better solution, cognitive flexibility is needed to come up with a new solution if the initial one fails. Cognitive flexibility refers to the ability to change behavior or thought in the face of shifting demands or contingencies, and underlies much of the behavior required to successfully navigate social and academic life (Barcelo, Parianez & Knight, 2002). Children who peers perceive to be inflexible in their behavior or unresponsive to cues that they need to behave differently have been identified as having low social success (Sterry, Reiter-Purtill, Gartstein, Gerhardt, Vannatta, & Noll, 2010). Similarly, those who can think of fewer solutions to hypothetical social situations are also significantly less popular (Warden & Mackinnon, 2003).

Although initially developed as a measure of prefrontal cortical function, the Wisconsin Card Sorting Task (WCST) has become the preeminent performance-based test of Cognitive Flexibility (Kongs, Thompson, Iverson & Heaton, 2000). The task presents participants with a stack of cards showing shapes of varied colors and in varied numbers. The participant is asked to match these to sample cards the examiner displays, but the participant is not told the rule for

matching them, rather they receive feedback on whether their matches are correct with the rule for correct matching changing periodically.

The test manual for the latest edition of the 64 card version attempts to address the criticism of limited reliability (Paolo, Alxerod & Troster, 1996). The authors argue that while large gains in scores over repeat occasions are to be expected as participants learn the task, relative performance tends to be stable with typically developing adults showing an expected level of learning and individuals with traumatic brain injury or focal frontal lobe lesions showing particular stability in low scores (Kongs et al., 2000). They therefore report a generalizability coefficient of .74 (Kongs et al., p. 46) indicating evidence for stability of relative performance, but acknowledging that the use of more typical forms or reliability would be inappropriate due to the need to learn the task.

Among adult and clinical populations, the WCST has demonstrated the role of Cognitive Flexibility in a variety of impairments. Bishara and colleagues (2010) provide one of numerous applications of the test to individuals with histories of substance abuse and found them to demonstrate significantly less cognitive flexibility and consistency than matched controls. LeGris and Van Reekum (2006) found a strong association between impaired performance on the WCST and suicidal or self-injurious behavior among psychiatric patients.

As use of the WCST has expanded to include adolescent populations, a deficit in performance has been associated with a similar range of negative outcomes. Lane, Cherek, Tcheremissine, Steinberg & Sharon (2007) found poor performance on the WCST to be strongly associated with heavy marijuana use among adolescents. Miura (2009) found that violent offenders in a juvenile detention facility performed significantly worse on the task than their

nonviolent peers, while McBurnett and colleagues (1993) found performance related to disruptive and impulsive behavior.

Use of the WCST in research on typically developing children is yet to directly address a connection between performance on the task and peer rejection, but has established that performance on the task is related to behaviors important for social interaction in school. Wilding, Munir and Cornish (2001) administered the WCST to a group of 100 boys with a mean age of 10 years. The authors sorted the participants into two groups based on teacher reports of hyperactive and disruptive behavior and compared the groups' performance. Those identified as having worse behavior, performed significantly worse on the WCST. Although the authors did not assess peer rejection, the known association between teacher reports of conduct problems and peer rejection among children (Perren, VonWyl, Stadelmann, Burgen & Von Klitzing, 2006) tentatively suggests the potential for a relationship between WCST performance and peer rejection.

In the only study known to directly assess the relationship between WCST performance and social skills (that may directly impact peer rejection), Bonino and Cattelino (1999) found that the task could predict the ability of children to cooperate in a controlled task. One hundred fifty-three children, aged 7 years, were administered the WCST and then placed into pairs with children who had performed similarly to themselves, and asked to complete a task that required sharing materials and taking turns. The pairs of children with higher performance on the WCST showed significantly more verbalization and willingness to share and wait while the other child worked.

Current research shows that nearly every behavior or trait associated with peer rejection is also associated with poor executive functions. Aggression, for example, is strongly associated with rejection, (Bierman, 2004) but is also with impulsivity (Jensen, Youngstrom, & Steiner, 2007), poor planning ability (Olvera et al., 2005) and poor cognitive flexibility (Miura, 2009). The current study investigates whether performance on measures of these areas of Executive Functions is directly associated with peer rejection.

CHAPTER 3

METHODS

Participants

Participants for this project were drawn from a larger study looking at friendships among elementary school students in an urban public elementary school in the American Northeast. School records indicate that the population identifies as over 99% African-American with 81% qualifying for reduced-price lunches. The school from which participants were recruited had previously established a service-based relationship with Temple faculty and graduate students in school psychology. Several years prior to data collection, school personnel had contacted Temple regarding possible supports. As of the time of the study, Temple school psychology was administering a program of Positive Behavior Support, providing informal mentorship to students across ages, providing academic screening and intervention in early grades and providing behavioral consultation to teachers.

As part of data collection for the Positive Behavior Support program, surveys were conducted twice yearly for each classroom, asking students to identify preferred playmates, and student whom they disliked. 388 students responded. This measure of social connectedness allowed for the identification of students who may have benefitted from mentoring services or be in need further behavioral support. Although full details on this procedure are provided in the section on Measures, the identification of the most accepted least accepted students in each classroom through this survey then served to identify those students sought out as participants in the current study, and others related to social success. Students and faculty from Temple School Psychology sought out these students at either end of the spectrum of social success and provided forms for parental

consent. When the return rate of parental consent forms proved lower than expected, other children who expressed an interest in participating and returned positive parental consent forms were also allowed to participate.

A total of 35 students were recruited from 1st through 8th grade classrooms. Students were an average of 10.7 years of age ($sd=2.8$), 34% male, and 88% African-American, with an additional 12% of students self-identifying as having mixed ethnicity. The sample reflects the school demographics in terms of ethnicity very well, but is still below what would be ideal for most statistical analyses.

Measures

Friendship Survey: Peer rejection was measured through a free recall survey. Survey data were collected as part of a larger Positive Behavior Intervention and Support program and to evaluate the schools efforts at inclusive education. This is important to the current investigation, in that it means responses were collected from every student in the school (not just participants in the study). This allowed the measurement of degree of acceptance and rejection based on the input of entire classrooms.

The survey asked participating students “Are there kids in your class who you do not like to hang out with?” Responses to this served as the raw score for a child’s level of Rejection. To allow for the differences in age of participants and classroom environments, each participant’s score was converted to a z-score for each classroom.

A similar procedure was followed to determine a child’s peer acceptance. The survey also asked “Are there kids in your class you like to hang out with?” and the number of times a child was nominated was converted to z-scores for each class. Collecting these data from across an

entire classroom allows for a reliable aggregated measure of acceptance, or rejection even with as little as half of a classroom participating (Cairns & Cairns, 1994). It is also correlated to, but more useful than, teacher reports of friendship, and tends to remain stable over the course of a year (Cairns & Cairns, 1994).

Z-scores for each classroom were required because children at different ages and in different classrooms tend to more or less readily identify peers they like or dislike, (Cairns & Cairns, 1994) so the use of classroom z-scores allowed for comparisons of students' social success compared to their same-aged peers, without age-related differences confounding results. In the current sample for example, students in one seventh grade classroom nominated an mean of four peers as preferred playmates, whereas students in a third grade class nominated a mean of eight as preferred playmates. Hence, comparing raw scores would skew results such that all of the children in the seventh grade would appear less accepted, whereas the real issue is a typical reduction in the size of social networks.

NEPSY-II: Statue. For Children aged eight and younger, the current investigation included the Impulse control test "Statue." Statue requires a child to maintain a pose with his or her eyes closed for one minute and fifteen seconds. At set intervals, the examiner will make a sound (drop a pencil, cough and other common sounds) and record how well the child inhibits the automatic orientation to the sound.

The NEPSY-II manual also lists a robust test-retest stability coefficient for even very young children of .82 (Korkman, Kirk & Kemp, 2007). Youngworth and colleagues (2007) found that performance on "Statue" predicted clinically significant hyperactivity and defiant behavior among pre-school students.

Kaufman Assessment Battery for Children, Second Edition (KABC-II) Rover. The Rover subtest from the KABC-II requires a child to move a small plastic dog across a series of game boards in as few moves as possible. Superior performance on the subtest requires a child to plan several moves in advance so the test provides a fun and easy sample of planning behavior.

The test's split half reliability coefficient ranges across ages but never goes below .73. The test manual reports that concurrent validity with other cognitive assessment measures is strong and in examinations of the performance of children independently diagnosed with Attention Deficit Hyperactivity Disorder, these children performed significantly worse than matched controls as did children classified as emotionally disturbed (Kaufman & Kaufman p 96. 2004). Finally, "Rover" is appropriate to use with diverse populations as the test developers have verified the minimal impact of a child's race on performance (Dale, McIntosh, Rothlisberg, Ward, & Bradley, 2011).

The Iowa Gambling Task (IGT): This computerized task presented participants with four decks of cards; the participant chooses a card from one of the decks, which will incur either a reward or penalty of play money. The participant's goal is to have as much play money as possible after a set number of cards are drawn. Those decks that produce the highest initial payout will incur larger penalties on subsequent draws and so as the participant samples the different decks he or she will need to resist the initial preference for the cards that offer the largest initial reward. Buelow and Suhr (2009) reviewed the reliability and validity of the IGT and found them adequate with the caveat that it was difficult to assess test-retest reliability or learning effects when learning is an expected component of performance. The test has established validity as a test of the most foundational abilities of decision making (Hartman, 2008).

The Wisconsin Card Sorting Task (WCST). The participant was presented with a set of four cards displaying different numbers of shapes of different colors. Cards are then drawn which must be matched to the four originals by shape, color or number, (the participant is not told which category to use beforehand) with feedback provided as to whether the match is correct. At irregular intervals, the rule for which match is correct changes with the participants responses tracked over the course of the test. Participants, aged 9 and younger, were administered the 64 card paper version (WCST-64) and those aged 10 and above completed a computerized administration of the WCST with 128 cards.

The test manual provides test-retest generalizability data and finds that overall, scores provided had a mean test-retest generalizability coefficient of .74 (Kongs et al., 2000 p.46). The authors point to the validity of the test as a clinical measure based on the significantly lower scores of multiple clinical populations (including children with ADHD and focal brain lesion) compared to typically developing control subjects matched for age and IQ (Kongs et al., 2000 p.47).

Procedures

As part of ongoing research on children's peer relations, friendship surveys were collected. Parental consents to participate in cognitive testing related to research in social success were distributed to homeroom teachers in the spring of 2009. Graduate students and faculty in school psychology remained in contact with students' homeroom teachers and provided copies of consent forms as needed and asked them to remind students to return consents.

Students who returned the consent forms signed by parents (whether consent was given or denied) received five school reward dollars that, as part of the school's larger positive

behavior support program, they could redeem for goods at the school store. The principal investigator of the larger study also paid for a pizza party for the top three classrooms that returned the most signed consent forms (whether consent was given or denied). Students were contacted for their assent to participate during free periods or when their teacher indicated would appropriate for them to be away from class without missing instruction.

Over the course of the spring of 2009, as consents were returned, 55 students in grades k-8 were administered cognitive testing unrelated to the current study. Testing was conducted by one of two graduate students in school psychology, both with documented training and supervision on the administration of all measures. One examiner conducted testing on children grades k-3 and the other on grades 4-8.

Testing took place in the school library during times arranged with teachers at the beginning of the school day. Examiners approached students at the beginning of class periods and explained the nature of the testing procedure in age appropriate terms, including explaining the opportunities for bathroom breaks and the child's right to leave testing if needed. Examiners then obtained signed assent from the children and conducted testing in designated corners of the school library. Testing halted if other groups were using the library at the time, or if administration threatened to interfere with programming that examiners had agreed not to interrupt, such as lunch, reading or math. At the completion of administration, examiners walked students back to class, thanked teachers with minimal disruption and asked the next available student (if any) to accompany him or her for testing. The length of testing varied as a function of student performance and age and ranged from ten minutes for lower performing and younger students to thirty minutes for older students who performed well.

The following spring, administration of measures of Executive Functions began. A total of 35 students who had participated in the larger research project at the end of the previous year were identified as still attending the same elementary school and still having valid parental consent to participate in testing. Additional approval for supplemental testing was applied for and received from Temple's University's IRB. Under a similar format to the previous testing administration, students were administered KABC-II Rover, and depending on their age, NEPSY-II Statue or the IGT and the computerized WCST or paper WCST-64.

Test Administration

Students in the fifth grade and above completed the Friendship Survey as a whole class. Those in younger grades completed the survey in small groups or individually, as needed for the reading comprehension of the student. Faculty or graduate students in school psychology contacted teachers during free periods of those set aside for preparation to familiarize them with the nature of the surveys and arrange an appropriate time to administer them. One to three graduate students in school psychology and one faculty member would then arrive at the agreed upon time and, following an introduction by the teacher, distribute surveys to the students and instruct them to fill them out honestly and without sharing or discussing their answers. Students were prompted to raise their hands if they had questions or were finished.

During administration, faculty and graduate students circulated among the students completing the surveys to discourage talking and assist in completion. Upon completion of the survey, students were given seatwork, drawing paper or reading material at the discretion of their teacher, and their completed surveys were collected and checked for completeness. Surveys that were completed correctly were then placed into envelopes marked with the name of their homeroom teacher.

All Tests of Executive Functions were administered by either advanced graduate students or faculty in school psychology. All paper WCST-64s were administered by one graduate student, one other graduate student with previous experience in its administration performed all administrations of Statue.

Students were led between examiners as they became available, with administration occurring at opposite corners of the library and in the case of statue, in an adjacent room with a closed door through which other testing procedures were not audible.

Computerized measures were administered on one of two identical laptops with the students monitored by either the faculty or graduate students. Instructions were read from a standardized script drawn from the manual for the paper version of the WCST and previous research using the IGT. The length of testing sessions varied based on the performance and age of the participants.

CHAPTER 4

RESULTS

Scoring Statue

Scores for the WCST and Rover are available based on national norms, but for the IGT and Statue, standard scores were created based on available data. The manual for Statue provides the expected performance across ages and demonstrates a mean increase in performance of 1 to 2 raw score points every six months. This suggests a fairly linear increase in raw scores and allows for a projection of the level of performance to be expected in the ages beyond which norms are provided. The linear model indicates that a perfect performance would be expected starting at the age of nine years and six months. The table below shows the scores provided in the administration manual as well as the projected additional scaled scores, presented in italics.

In keeping with the format of the test manual, the Scaled Scores corresponding to a given raw score are presented across the top row and the raw score equivalents are presented in the same row as the age given.

Table 1

Statue Scoring Table

Age X Scaled Score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
36 months				0	1-2	3-4	5-7	8-10	11-13	14-16	17- 18	19- 21	22- 24	26- 26	27- 28	29- 30
42 months			0	1-2	3-5	6-7	8-10	11-13	14-16	17-19	20-21	22-24	25-27	28-29		30
48 months		0-2	3-5	6-8	9-10	11-13	14-15	16-18	19-20	21-22	23-24	25-26	27-28	29-30		
54 months	0-2	3-5	6-7	8-10	11-13	14-15	16-17	18-19	20-21	22-23	24-25	26-27	28-29		30	
60 months	0-3	4-5	6-8	9-10	11-13	14-16	17-18	19-20	21-22	23-24	25-26	27-28	29	30		
66 months	0-4	5-6	7-9	10-11	12-14	15-17	18-19	20-21	22	23-24	25-26	27-28	29	30		
72 months	0-6	7-8	9-11	12-13	14-16	17-18	19-20	21-22	23	24-25	26-27	28	29	30		
78 months	0-7	8-10	11-12	13-14	15-17	18-19	20-21	22-23	24	25-26	27	28	29	30		
84 months	0-8	9-10	12-13	14-15	17-18	19-20	21-22	23-24	25	26-27	28	29				
90 months	0-9	10-11	13-14	15-16	18-19	20-21	22-23	24-25	26	27-28	29	30				
96 months	0-10	11-12	14-15	16-17	19-20	21-22	23-24	25-26	27	28-29	30					
102 months	0-11	12-13	15-16	18-19	20-21	22-23	24-25	26-27	28	30						
108 months	0-12	13-14	16-17	19-18	21-22	23-24	25-26	27-28	29	30						
114 months	0-13	14-15	17-18	19-20	22-23	24-25	26-27	28-29	30	30						

The scores are potentially problematic as they restrict the range of scaled scores on the task considerably. However, they are acceptable for the current analysis for several reasons. The first is that a ceiling effect is to be expected from Statue and is considered in subsequent analyses. The authors of the test acknowledge that in contrast to most intelligence tests, measures on the NEPSY-II will not have a Gaussian Distribution of scores; rather most participants will have no problem with them, but those who may require considerable follow-up will perform very poorly. Additionally, as the data below show, that was the distribution of scores on Statue found in the current sample. The majority of participants were older than the normative sample, so their scores are presented in Italics.

Table 2

*Statue T-Scores and ages**of participants*

Id #	Age in Months	Statue T-Score
	90	
9653		40
	81	
7081		60
	91	
5476		53
	104	
4104		50
	85	
3521		60
	114	
1164		20
	76	
9507		58
	115	
1292		50
	94	
4719		58
	136	
5428		23
	112	
315		43

The table demonstrates that even with the simple estimation based on typical growth, the distribution is in line with what would be expected. Most participants were able to complete the task without any difficulty, but two, ID numbers 1164 and 5428, performed very poorly. Hence, it appears that almost any other analytical strategy such as scoring participants at the oldest age for which norms are available or comparing raw scores would have produced a similar distribution of scores and similar relative performance among participants.

Scoring the Iowa Gambling Task

Fully representative normative scores are not available for the IGT, but the ability to compare the performance of participants to the performance of similarly aged peers is the cornerstone of nearly all academic and cognitive assessment. The raw score on the IGT can be referred to as “Net Advantageous Picks,” and was calculated by subtracting the number of times the participant selected a card from one of the dis-advantageous decks (those with immediate gains but worse long-term losses) from the number of times the participant picks from one of the advantageous decks (those with the better long term payoff). This is one of the most common measures used in research on the IGT ranging from early studies (e.g. Beschera et al., 1997) to the most recent (e.g. Prencipe et al., 2011).

To create scores that allowed analyses that factor in age-related development, a survey of current literature was undertaken to find studies that had included typically developing children of the ages of the participants in the current study (aged 9-15). While there were minimal results, information obtained from contacting the authors of the extant studies provides what is effectively the most comprehensive set of data on the performances of children on the IGT.

From the authors listed as contact persons on two studies that administered the IGT to typically developing American Children, T-Scores were derived based on the following data. Data are first presented based on the results of individual studies and then as combined scores weighted based on the number of participants.

Table 3

IGT Scores provided by other researchers

Smith et al.				Prencipe et al.			
Age	N	Mean	SD	Age	N	Mean	SD
9	18	-1	33.99	9	10	-15	21
10	14	-7.85	11.24	10	19	-8.84	17.71
11	16	-1.5	17.10	11	8	3	24.56
12	12	-16.09	17.56	12	15	-3.2	29.81
13	14	-5.43	13.62	13	7	-12	20.13
14	7	-1.43	12.21	14	11	-5.27	22.22
15	9	1.11	22.30	15	16	7	16.1

Table 4

Total Weighted Scores for the IGT

Age	N	Weighted Mean	Weighted SD
9	18	-8.77	26.49
10	33	-8.42	15.25
11	24	0	19.47
12	27	-8.92	25.29
13	21	-7.62	14.94
14	18	-3.78	18.33
15	25	4.87	18.17

While this is not a nationally representative sample, it is enough to provide a comparison group that can be used as a metric against which to measure the performance of participants in the current study. Also, based on the fact that published norms for the IGT cover ages 18-79 with a sample of 932, it can be inferred that even the official scoring software relies on a sample of about fifteen participants per year (PAR Inc, 2010). Hence, the current sample is not out of line with that used in clinical practice. Creating T-Scores via comparison to peers allowed for better controlling for age since participants' scores reflected their performance relative to a sample of their same aged peers rather than their peers in the current sample of widely varied ages.

Following the calculation of weighted means and standard deviations, these were used to calculate z-scores with the scores reported from other studies used as the population means and standard deviations. From there, a basic formula for z-scores was used (raw score minus the population mean, divided by the population standard deviation) to convert the participants' scores to a form that could be more easily compared across ages, with a mean of zero and a standard deviation of one. The scores were converted to T-Scores with a mean of 50 and standard deviation of 10. This was accomplished algebraically by multiplying the z-score by 10 and adding 50. A T-Score was used to express the results of this task, both because the distribution of the participants' scores remains unknown and the sample size was actually small enough that it was unlikely that it would have reached a normal distribution of raw scores. Unlike a Standard Score, a T-Score is typically accepted as implying only distance from the mean and not a normal distribution. The table below shows the raw scores of each participant and contrasts them with the T-Scores derived from extant data.

Table 5

Scores of Participants on the IGT

ID Number	Age In Years	Net Advantageous Picks (Raw Score)	T-Score
1454	14	-4	49.88
4537	15	-4	45.11
553	12	4	55.11
6417	12	-12	48.79
2947	12	-6	51.16
5606	15	-10	41.81
6916	14	6	55.34
7876	10	-2	54.21
134	10	-6	51.59
9490	9	6	55.58
3521	9	-24	36.47
6905	10	0	55.52
7858	13	-28	36.36
6817	13	16	65.81
6255	11	-10	44.86
3260	14	0	52.06
9757	12	-2	52.74
1318	15	-4	45.11
8459	12	-6	51.16
9904	9	4	54.82

Table 5 (continued)

5774	10	2	56.84
9616	11	0	50
2579	13	-8	49.75

Visual inspection of the data shows that for several participants, the use of age referenced T-Scores created a meaningfully different score than if raw scores had been used in the analysis. Participant 6417, for example, had a raw score of -12, which would appear quite poor in comparison to the overall sample. Considering that the sample performances suggest a mean score of -8.93, it is now clear that the participants performance is not far below what would be expected of a child of twelve and hence receives a T-Score of 48.79.

Creating a Composite of Overall Executive Functions

To create a composite of overall executive function, the current study adapted the procedure outlined by Schneider and McGrew (2011). The authors advocate that rather than basing composite scores of ability in a particular area on the mean standard score of a set of subtests, unusually high or low performances are better identified through a system that incorporates knowledge of the intercorrelation of performance on each subtest and produces a composite with the same mean and standard deviation as the scores from which it was derived. The current study followed a similar procedure, with the exception that published intercorrelations are not available for the measures used, hence the intercorrelations of measures within the sample were used.

The Formula as provided by Schneider and MCGrew (p 18, 2011) was applied as follows. Where, C = Executive Function Composite for a given participant, k = Number of tests

administered, μ = Mean standard score of all measures (converted to the same scale for all measures), r = mean intercorrelation between tests, s = mean Standard Score for the participant.

$$C = \frac{k(s - \mu)}{\sqrt{k} + rk(k - 1)} + \mu$$

In calculating an estimated composite, the tests of Impulse control were not included as they were found within the sample to be uncorrelated to the other measures. Tests of Planning and Flexibility were correlated at approximately .40. A brief review of intercorrelations on current measures can put this in some perspective.

The absolute closest intercorrelations on subtests of tests of cognitive abilities tend to be those that obviously measure acquired knowledge such as Vocabulary and Information on the WISC-IV which correlate at a robust .75 (p 279, Sattler, 2008). Below these will be tests that have been specifically designed to measure similar underlying constructs such as Concept Formation and Analysis – Synthesis (both designed to measure fluid reasoning) on the WJ-III which correlate at a still strong .56 (p 9, Shneider & McGrew, 2011). Below these, however, a .40 is in the middle range of intercorrelations between subtests that are combined for composites on the WISC-IV (p 279, Sattler, 2008) and is actually stronger than the correlation between tests that measure constructs that are less well defined such as Spatial Relations and Picture Recognition on the WJ-III, which are accepted as both measuring Visual-Spatial Processing, but correlate at only a .17 (p 9, Schneider & McGrew, 2011).

Even more relevant for the current study, these intercorrelations are not dissimilar from those that Rover shows with other KABC-II subtests that confirmatory factor analysis by the test developers demonstrates are the most related measures on the test.

Table 6

Rover's Intercorrelations with Other Tests (Kaufman & Kaufman, 2004 p 102-103)

	Ages 7-12	13-18
Triangles	0.42	0.42
Block Counting	0.32	0.42
Gestalt Closure	0.19	0.31

Evidence of the underlying relationship between the two tests comes from one of the few studies to date to explore the relationship between the WCST and a prominent IQ test. Mayes, Calhoun, Bixler and Zimmerman (2009) administered the WCST along with the Wechsler Intelligence Scale for Children Fourth Edition (WISC-IV) to 214 elementary school students. The authors then conducted confirmatory factor analysis and found that the WCST appeared to measure a construct that was relatively independent of the WISC; most notable for the current study, the Block Design subtest of the WISC-IV which is widely accepted as reasonably closely related to Rover as a measure of visual spatial processing (Flanagan, Ortiz & Alfonso, 2007) loaded only minimally (.13) on the factor comprised otherwise of the sub-scores of the WCST. By way of comparison, this is a similar level of loading seen from Processing Speed Subtests of the WISC-IV on factors such as the Perceptual Reasoning Index, with which they have only weak correlations. Although actually exploring the intercorrelations and finding them to be less than that found on the current study would be more compelling evidence that the relationship between the WCST and Rover is meaningful, the apparent independence found by other authors does suggest that the significant correlation in the current study is indicative of an underlying connection.

Returning then to the original formula from which the composite is to be derived, those variables universal to the sample can be entered to show the general dimension of the formula.

The generic structure of the formula is as follows.

$$C = \frac{k(s - \mu)}{\sqrt{k} + rk(k - 1)} + \mu$$

For the Executive Function Composite in the current sample then, the formula for all participants can then be constructed as follows.

$$C = \frac{2(s - 100)}{\sqrt{2} + .4 * 2(2 - 1)} + 100$$

This can be simplified to:

$$C = \frac{2(s - 100)}{\sqrt{2.8}} + 100$$

Upon calculating the square root, formula becomes:

$$C = \frac{2(s - 100)}{1.637332} + 100$$

As Schneider and McGrew (2011) describe, the effect of this procedure is to transform the composite score into one with the same mean and standard deviation as the subtest scores from which it is derived. Furthermore, this means that the farther from the mean both of a participant's scores are, the farther from the mean his or her composite score will be relative to simply averaging their subtest scores. This better reflects the fact that it is more uncommon to score particularly high or low on multiple subtests. In the current study, this means that the procedure will more effectively identify those students who have shown consistently poor or consistently impressive performances on the subtests. The table included below demonstrates the

differences between the created composite scores of the participants and their mean test scores.

The composites included have been rounded to the nearest whole number.

Table 7

Executive Functions Composites of Participants

Participant ID #	Rover Score	WCST	Mean Score	Created Composite
1454	65	80	72.5	66
4537	60	87	73.5	68
9653	105	96	100.5	101
7081	80	69	74.5	69
553	105	109	107	109
6417	100	118	109	111
2947	80	69	74.5	69
5606	100	112	106	107
6916	85	70	77.5	73
7876	105	74	89.5	87
5476	100	106	103	103
134	100	131	115.5	119
4104	90	86	88	85
3758	95	69	82	78
9490	105	86	95.5	95
3521	90	76	83	79
4835	80	96	88	85

Table 7 (continued)

Executive Functions Composites of Participants

Participant ID #	Rover	WCST	Mean Score	Created Composite
6905	65	75	70	63
7858	100	93	96.5	96
6817	90	85	87.5	85
6255	95	76	85.5	82
3260	55	69	62	54
9757	100	85	92.5	91
1164	75	98	86.5	84
1318	55	74	64.5	57
8459	70	75	72.5	66
9507	100	73	86.5	84
1292	105	114	109.5	112
9904	95	80	87.5	85
4719	90	72	81	77
5428	75	70	72.5	66
315	75	82	78.5	74
5774	70	102	86	83
9616	85	89	87	84
2579	85	102	93.5	92

A significant difference in sample composite scores between rejected and non-rejected participants would also support the association between poor executive functions and peer rejection. However if only the composite was significantly different, it would suggest the importance of overall executive functions rather than a single factor such as Planning.

Quantifying Rejection

The basic measure of Rejection was derived from classroom-wide responses to the friendship survey that asked students whom they “Do not like to hang out with.” While the rejection score was a continuous variable, the data suggest that it may also be useful to treat it as dichotomous; that is, to consider a student either “rejected” or not. Rather than a continuous or smoothly distributed range of values, the raw scores in rejection show a modal value of “0.” Partly because they were selected on the basis of the more variable level of acceptance, seventeen of the 35 participants received no nominations at all as rejected, and even factoring in the most rejected participants (two with scores of nine and the one with a score of ten) the mean value is 1.89, and the standard deviation is 2.76. A Pearson’s First Skewness Coefficient of 2.05 indicates significant positive skewness. Taken together, the tendencies of the data suggest that the typical child in the sample would receive zero or one rejections. Hence, in certain analyses students will be divided into the rejected group or non-rejected group based on whether their rejection score is at or above or below their classroom mean, respectively.

For certain analyses, however, the data suggested that it was appropriate to consider both the substantial range in the rate of rejection, and the degree of importance in a given factor. With this in mind, Rejection was also considered as a Z-Score derived from the mean and standard deviation of the number of rejections (that is, the number of times children in that classroom are nominated as someone peers do not like to play with). As a further safeguard to prevent a

classroom with an unusually high or low typical rate of rejection from skewing results, the raw scores of rejection were also considered in any correlational analyses.

Quantifying Acceptance

Similar to the procedure for quantifying rejection, acceptance was also measured via the number of times a child was nominated, but this time in response to the question on the friendship survey “are there kids in your class that you like to hang out with? Who are they?” Nominations for each child were counted and served as the measure of acceptance. In a manner similar to ratings for rejection, scores were normalized for each classroom and those above the mean were identified as being “accepted.” Having social success defined as a categorical variable allowed for comparisons that may reveal trends strong enough to be significant between groups (such as differences between rejected and non-rejected students). Examining as a continuous variable meanwhile allowed for more analysis of the strength of connections between variables.

Table 8

Full List of Variable Considered in Primary Analyses

Variable Name	Variable Type	Derived From
Rejected or Not	Dichotimous/ Categorical	Whether a Participant is Above or Below the Mean for the Number of Times he or she is Nominated by Peers as an Undesirable Playmate.
Accepted or Not	Dichotimous/ Categorical	Whether a Participant is Above or Below the Mean for the Number of Times he or she is Nominated by Peers as a Desirable Playmate.
Rejection	Continuous	Z-Score of the Number of Times a Student is Nominated by Peers as an Undesirable Playmate.
Acceptance	Continuous	Z-Score of the Number of Times a Student is Nominated by Peers as a Desirable Playmate.
Impulse Control	Continuous	The Projected T-Score of Statue (Up to Age 8) or The Iowa Gambling Task.
Planning	Continuous	The Scaled Score on Rover, Converted from a Mean Score of 10 and Standard Deviation of 3 to Mean Score of 100 and a Standard Deviation of 15.
Cognitive Flexibility	Continuous	The Standard Score on The Wisconsin Card Sorting Task.
Executive Functions Composite	Continuous	A Score that Factors in Both Scores the WCST and Rover to Estimate Overall Ability in these Higher Executive Functions.

Will a group of rejected children show a pattern of worse executive functions than their non-rejected peers?

A comparison of means between two groups (those above and below the mean level of rejection in each class room) was conducted. If the main hypothesis of the current study was correct and poor Executive Functions were associated with rejection, then once the participants were separated by their level of Rejection, some differences should have emerged between the Executive Functions of the groups. With a larger sample, it would be possible to control for factors that may complicate the relationship between Rejection and Executive Functions, but given the small size in the current study, these were simply measured and interpretations made accordingly.

An Independent Samples t-test was first performed to determine whether the two groups were significantly different by age. There were no significant differences in age by rejection (see Table 9). Given the small sample size of the current study, these results were confirmed with a Mann-Whitney U test as well.

Table 9

Comparison of Ages Between Reject, Non-Rejected Groups

Group	Mean Age in Months (SD)
Rejected	127.32 (31.25)
Non-rejected	141.36 (36.11)

Next, a Chi-Square determined whether the groups differed by gender. With the Rejected Group having nine boys and ten girls and the Non-rejected group having eight of each, there was no significant difference by gender.

With these two potentially confounding variables not appearing to be impacting the grouping of students, the comparison of means proceeded via Mann-Whitney U tests. Results are reported along with Means and Standard Deviations of both groups in Table 10.

Table 10

Comparison of Likely Scores for Rejected vs Non-Rejected Students

	Rejected Participants, Mean (SD)	Non-Rejected Participants, Mean (SD)	Significance Via Mann-Whitney Test
Impulse Control, M=50, SD=10	51.16 (9.13)	50.20 (6.25)	0.55
Planning, M=100, SD=15	86.58 (15.00)	86.56 (16.09)	0.96
Flexibility, M=100, SD=15	88.22 (17.60)	85.75 (15.35)	0.86
Composite, M=100, SD=15	85.26 (16.36)	83.81 (14.80)	0.78

As is visible in Table 10, there were no significant differences between the groups. Thus, there was not a tendency toward lower Executive Functions among Rejected students.

Will a group of more accepted children show a pattern of better executive functions than their non-accepted peers?

A similar procedure was followed for analyzing differences between accepted and non-accepted children. The groups did not differ significantly by age or gender.

Table 11

Comparison of Likely Scores of Accepted Vs Non-Accepted Participants

	Accepted Participants, Mean (SD)	Scores for Non-Accepted Participants, Mean (SD)	Significance Via Mann-Whitney Test
Impulse Control, M=50, SD=10	50.61 (9.35)	50.77 (6.93)	0.95
Planning, M=100, SD=15	82.69 (13.48)	88.86 (16.10)	0.23
Flexibility, M=100, SD=15	88.08 (19.36)	86.5 (14.87)	0.80
Composite, M=100, SD=15	82.92 (17.31)	85.59 (14.59)	0.64

As can be seen from Table 11, the groups sorted by their level of acceptance did not differ significantly along any of the aspects of Executive Function that were measured. Mann-Whitney tests of scores in each area also did not indicate a difference in the distribution of scores between the two groups.

Among the different aspects of Executive Functions, how related is each to peer rejection and acceptance?

Correlations between the standard scores for each test of Executive Functions and rejection and acceptance were conducted.

Table 12

Spearman Rank Order Correlations Between Executive Functions and Social Success

Measure	Rejection	Acceptance
Impulse Control	0.119	-0.106
Planning	-0.105	-0.002
Flexibility	0.051	-0.058
Composite	0.02	0.029

There were no significant correlations between any of the tested aspects of executive function and either Acceptance or Rejection.

Will the relationship between executive functions and rejection be different at different levels of performance on tasks of Executive Functions?

Considering that a good deal of previous research has found that students with significantly lower than expected executive functions (such as those diagnosed with ADHD) tend to be rejected (Bierman, 2004), it is possible that rather than being related continuously across the entire sample to peer rejection, executive functions may be related at the lower levels of performance, but having above average Executive Functions may not convey additional benefits. The final analysis tested this hypothesis by sorting the students into groups based on their performance on tests of executive functions. Those whose composite scores in Executive

Functions were at least one standard deviation below the sample mean were grouped as the Lower Executive Functions Group while the remaining participants were the Typical Executive Functions Group. A Mann-Whitney U Test determined whether the two groups differed significantly based on age and a Chi-Square determined whether one group was composed of significantly more female participants.

Table 13

Comparison of Acceptance and Rejection for Low Compared to Typical Levels of Executive Function.

	Typical Executive Functions, M (SD)	Low Executive Functions, M (SD)	Significance Via Mann-Whitney Test
Age in Months	126.88 (32.32)	149.09 (32.22)	0.08
Acceptance	-0.19 (0.97)	0.00 (1.11)	0.66
Rejection	0.31 (1.17)	0.23 (1.17)	0.86

There were no significant differences in acceptance or rejection based on students' level of Executive Functions. A threshold effect may still be detectable if a correlation appears with rejection among those who scored lowest on the composite. The following tables examine the relationship of all relevant Executive Function constructs to the measures of social success among the lowest performers. The group was composed of 11 children.

Table 14

*Spearman Rank Order Correlation Between Social Success and
Executive Functions Among the Lowest Performing Participants.*

Measure	Rejection	Acceptance
Impulse Control	0.224	0.11
Planning	0.129	0.134
Flexibility	-0.605*	0.044
Composite	-0.267	-0.051

The limited sample available at this level of performance discourages over-interpretation, but at this point, there is tentative support for a relationship between Cognitive Flexibility and Peer Rejection. The -0.61 value was significant at the 0.05 level (see Table 14). The small sample size also permitted an examination of the performance of participants and their level of rejection. As can be seen in Table 15 below, the results are consistent with a threshold effect as several of the lowest scoring participants on the Cognitive Flexibility task, such as 7081, and 3260 had high z-scores in Rejection.

Table 15

Cognitive Flexibility and Rejection in the Low Executive Functions Group

ID Number	Flexibility Score	Rejection Z –Scores
1454	80	-0.42
4537	87	-0.8
7081	69	2.31
2947	69	-0.93
6916	70	0.7
6905	75	0.12
3260	69	2.2
1318	74	-0.42
8459	75	0.24
5428	70	0.65
315	82	-1.14

Figure 1 shows the correlation between scores on the WCST and peer rejection among the students who performed in the typical range for the sample. The trend line shows a very shallow slope and what may be a positive correlation, but given that the relationship is non-significant, this should only be taken to show the weakness of the correlation.

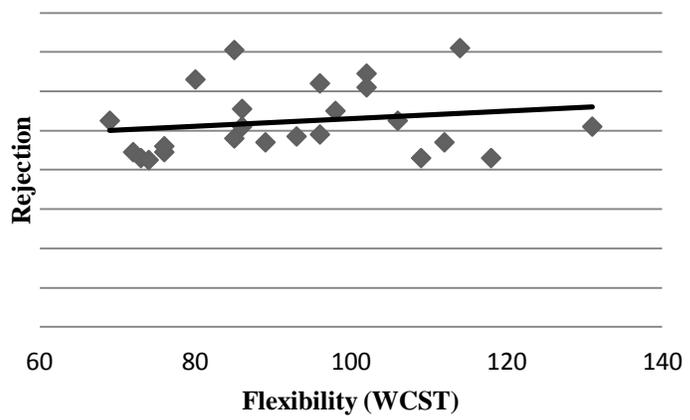


Figure 1 *Non-Significant Correlation, Typical Executive Functions Group*

Figure 2 shows the relationship between the two variables among the students who scored lower than expected on the WCST. The trend line has a steeper slope, indicating a closer correlation. The correlation is also negative for this group, indicating that at this level of performance on the WCST, better performance is associated with lower levels of rejection.

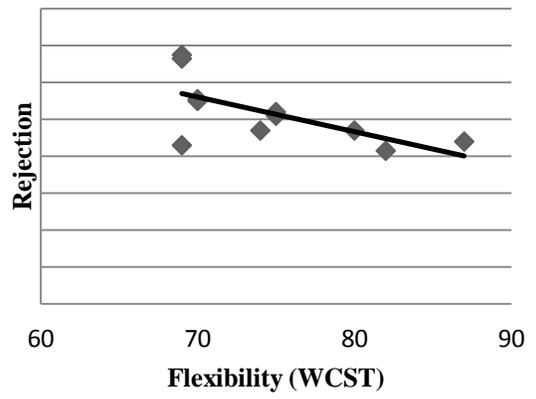


Figure 2 *-.61 correlation, lower Executive Functions Group*

Secondary Analyses

As Statue and the IGT were initially used as measures of the same basic construct, they were separated out for certain secondary analyses. In this case, several significant results emerged.

Statue and office discipline referrals. Statue was administered to 11 participants. For brevity's sake, the following table includes only those variables with a significant correlation. Although Statue's correlation was assessed with acceptance and rejection, it was not found to be significantly correlated with either. Statue was, however, very closely linked to office discipline referrals with a Spearman Rank Order Correlation Coefficient of $-.777$ and a p-value of $.005$. Values for both measures are presented below.

Table 16

*Performance on Statue and Office
Discipline Referrals*

ID Number	Statue T- Score	Office Discipline Referrals
9653	40	0
7081	60	0
5476	53	0
4104	50	1
3521	60	0
1164	20	7
9507	58	0
1292	50	1
4719	58	0
5428	23	5
315	43	1

It appears that the few students who performed poorly on Statue were responsible for most of the office discipline referrals in their part of the sample.

The IGT, office discipline referrals and Social Success. Measures of social success were next analyzed with the group to whom the IGT was administered (N=24). Results showed a

significant positive correlation (0.46, $P = 0.027$) with rejection and the IGT, meaning that the better a participant's performance on the IGT, the more likely peers were to report not wanting to spend time with him or her. Notably, this runs counter to other published research such as Carlson and Wang (2007) and Monks, Smith and Swettenham (2005), which suggested that better executive functions would protect children from peer rejection.

None of the measures of Executive Functions were significantly correlated with acceptance; however, office discipline referrals (initially explored for their possible relationship with measures of Executive Functions) were positively correlated with acceptance. This indicates that the more office discipline referrals a participant had, the more likely his or her peers were to report that they like spending time with him or her. See Table 17 below.

Table 17

Correlations of IGT and Office Discipline Referrals with Dimensions of Social Success

	IGT	Office Discipline Referrals
Rejection	0.461*	0.097
Acceptance	0.109	0.470*

Note: * $p < 0.05$

CHAPTER 5

DISCUSSION

Overview

The current study sought to clarify the relationship between Executive Functions and peer Rejection among children in an urban school. Multiple tests of Executive Functions (Impulse Control, Planning and Cognitive Flexibility) were administered to a sample of 35 students and the results of these were analyzed for their relationships to reports of preferred and non-preferred playmates. Although there was no evidence overall that students who were rejected by their peers had poorer Executive Functions, there was tentative support for the idea that students required at least a minimal level of Cognitive Flexibility to avoid Rejection. Secondary analyses showed that older students who possessed better than expected levels of Impulse Control were more likely to be rejected while younger students with low levels of Impulse Control were more likely to be referred to the Principal's office.

Impulse Control and Changes in Friendship. Statue, the test of Impulse Control administered to the younger part of the sample, functioned more as a meaningful criterion measure than a test with a normal distribution of scores. There was a non-trivial negative correlation between performance on Statue and office discipline referrals. Most of the participants scored actual or projected scaled scores within one standard deviation of the population mean and also had zero or one office discipline referrals for the year. This is in contrast to the two lowest performers on Statue, who received more office discipline referrals than the rest of the sample combined (with five for one and seven for the other). This suggests

that among most children, motor inhibition is reasonably well developed, and that at least a minimal amount of it may be required to maintain appropriate behavior in class.

Statue's correspondence with behavior may also have benefitted from its ecological validity. The task requires the child to demonstrate Impulse Control, but in a way that closely resembles the type of interaction that he or she might have with a teacher. The child must remain still, must respond to feedback when the tester reminds the child to keep his or her eyes closed and must not talk. It is not difficult to imagine classroom rules against roaming the classroom and talking. The students who performed poorly on Statue showed that they effectively could not or would not do these for even the brief span of the test. It only remains surprising, then, that there was no apparent relationship between these students' performance on Statue, and rejection or acceptance. The performance of the older students in the population might serve to explain this lack of significance.

In the older part of the sample, there was a significant correlation of .4 between IGT performance and rejection; however, it was in the opposite direction than the literature review suggested: the better a participant did on the IGT, the more likely he or she was to experience peer rejection. There was also an almost equal positive correlation between office discipline referrals and acceptance, so the more a child was sent to the office, the more likely he or she was to be a preferred playmate (see Table 17).

Before continuing to interpret these results, it is important to review the scores of the samples used as the normative population for the current sample's scores. Overall they suggest that children tend to respond to the IGT either randomly or with a preference for the disadvantageous decks (those that confer more gains at first, but larger losses over the long-term). The mean net advantageous selections for age twelve, for example, is -8.93, meaning that

the participant at this age will probably favor the disadvantageous decks significantly. In fact, it is not until the age of fifteen that the mean net advantageous picks would be expected to be more than 0, and even then the population mean was only 4.88. When a participant in the current investigation performed well on the IGT then, he or she was showing a better than expected degree of Cognitive Impulse Control. Participants who achieved high t-scores had to carefully consider their selections or else have a very well developed ability to understand and plan for long term gains. It is not difficult to conceive that they may appear careful and thoughtful in other situations as well.

Although contrary to the initial hypothesis of the current study, these results are meaningful and coherent: those students who think carefully before they act and respond to rules and feedback are rejected and those who break the rules are accepted. This conclusion is not unique. Allen, Porter, McFarland, McElhane and Marsh (2005) previously investigated the relationship between rule-breaking behavior and social success in adolescence. The authors began by looking at popular adolescents (185 participants, aged 13-14), and found that they tended to engage in minor deviant behaviors (such as marijuana and alcohol use) that were positively sanctioned by peers. Considering that poor performance on the IGT is robustly associated with so many forms of deviant behavior among adults (Hartmann, 2008) it is reasonable to suggest examining whether those students who performed well on this task may be at increased risk of rejection due to their lack of engagement in positively sanctioned deviant behavior.

Returning then to the finding that performance on Statue and the accompanying behaviors appear to have no social consequences, a few possibilities emerge from the current research. Perhaps most relevant are those from the work of Rubin and colleagues (2010) who performed one of the few longitudinal studies of friendship among children and into adolescence.

Among the many findings they report, the authors noted that over time, the function of friendships changed from securing preferred playmates to affiliating with peers who help establish social dominance in the increasing competitiveness of adolescence. This may even relate a bit to earlier ideas expressed by some of the same authors (Rubin, Fredstrom & Bowker, 2008) that some power dynamics enter into adolescent friendships whereby leaders emerge in friendship groups and that they tend to more bold and decisive in their attitudes. The picture that emerges suggests that younger children, even those with poor impulse control, may escape rejection if they are fun and active. Older children, on the other hand, must never favor the cautious, thoughtful style of decision making that leads to superior performance on the IGT, or else they risk rejection.

Further support for this interpretation comes from studies such as that of Xie and colleagues (2006), who examined the narratives of youth in urban environments as they explained what made someone popular. The authors here found similarly that younger children could gain acceptance by being good at game playing or funny, but that older children were expected to show more toughness and even anti-social behavior.

Implications for Practice. The single most important finding for practice is the positive social consequences of rule-breaking. Bohanon and colleagues (2012) described a successful case study of using an incentive-based Positive Behavior Support Program in a high school and point to the growing popularity of this approach. In the authors' study, they emphasized the many hours required to train staff and others to respond consistently and appropriately to student behavior. One concern raised by the findings of the current study is that in the case of Bohanon and colleagues (2012), they rewarded students with "snack items" (p. 96). While few would question the likely reinforcing nature of food as a prize for adolescents, the current finding of a

positive relationship between office discipline referrals and acceptance suggests that some of the reasons for inappropriate behavior actually relate to its positive social consequences. In this case, future Positive Behavioral Support Programs might consider the benefits of tying socially relevant outcomes such as sports participation, access to recess or free periods or even the wearing of clothing other than a uniform to earning sufficient tokens.

As it has been shown that that rejected children tend to associate with deviant or criminal peers (Vitaro et al., 2007) the positive relationship between office discipline referrals and acceptance also has implications for attempting to address or counter delinquent behavior. Schwalbe and colleagues (2012) recently conducted a meta-analysis of 27 empirical comparisons of standard (criminal justice) and alternative forms of intervention/ punishment of juvenile offenders. Only involving the family of the offender in treatment actually had a significant effect upon recidivism. The investigation did not find any types of intervention that focused on using peers as a means to reduce recidivism, but family relationships share many characteristics with peer relationships. Family is so often present with the child, they provide social support across a variety of contexts and there is a social bond beyond the order of the court. These contrast with other treatments reviewed such as counseling or case management when supports are court-appointed and minimally involved.

Although suggesting a model is beyond the scope of the current paper, it may prove productive to consider treating adolescent offenders by way of trying to change peer or other social influences, especially if up until the point they entered the criminal justice system, they simply had no other means of gaining popularity or acceptance. The need to break rules for popularity is found more often among students in urban settings (Xie et al., 2006) so this final point has particular salience for the population of the current study.

Finally, the potential showed in be at least a marker for behavioral difficulties may suggest uses for the test beyond the diagnostic ones to which it is currently applied. As stated previously, in the current report the two students who scored poorly on Statue also had the majority of the office discipline referrals of the younger part of the sample. The sample is too small to generalize extensively, but it is possible that Statue or a similar test of Impulse Control (particularly one with substantial ecological validity) could serve as a screening measure to identify students at the greatest risk of behavioral difficulties. Such a test has the advantage over even teacher reports or checklists, in that it actually could be administered at the very beginning of the school year, before a teacher would have had sufficient time to become familiar with the students in his or her care. Statue is also quick to administer (with its 90-second time limit) and requires no materials beyond a stopwatch and a test protocol.

Threshold Effect for Cognitive Flexibility. Among the initial research questions of the current study, only the idea of a Threshold Effect or minimal level of performance needed to avoid rejection found empirical support fully consistent with the literature review. Among the 11 lowest performing participants on tasks of Executive Functions, Cognitive Flexibility did show a relationship with rejection (see Tables 15, 16 & 17), such that very poor performance was associated with Rejection. This finding provides only limited support, but is consistent with other research.

The small sample size alone is enough to discourage over-interpretation. The presence of a few students who scored low on the WCST and were also Rejected by their peers does not necessarily posit a unique role of Cognitive Flexibility in preventing Rejection. The few students may have represented exceptional cases or had some other attribute (such as lower than average intelligence or a disability) that could have led to both lower than expected performance on the

WCST and increased peer Rejection. It also cannot be ruled out that this simply represents a Type-1 error incurred by the large number of analyses.

The threshold effect may be worth some effort at replication, however, given that it is strongly suggested by previous research. The extant literature on Rejected children suggests that any child with obviously atypical behavior is at an increased risk of Rejection (Bierman, 2004). The current study's finding of the negative social consequences of high performance on the IGT is very consistent with this established principle as low performance was rather typical. With this and previous work that has tied the WCST to social skills (Wilding, et al, 2001) in mind it is not unreasonable and not irrelevant for practice to consider whether poor performance on the WCST might indicate more significant difficulties that would increase risk for Rejection.

Explaining Non-Significance

Although several findings with implications for practice did emerge from secondary analyses, and one of the initial hypotheses was supported by the data, the fact remains that in general, the hypotheses of the current study were not supported overall. There were a number of factors that may account for this. The sample size was small, meaning that it had both limited statistical power (Ellis, 2010) and that it may not have included a full enough range of scores to provide an actual picture of the relationships of the variables involved. Particularly considering that there was tentative support for a Threshold Effect, it may be that a larger sample including a significantly higher number of those at the lower end of performance on the tasks included would have found a significant effect. It cannot even be ruled out that there was a significant effect as was initially hypothesized, but that it is small enough not to approach significance until the sample size is significantly larger.

Related to the limited sample size, the sampling procedure may not have been ideal for the research questions. For the current study, participants were recruited based on their level of social success, but given that there are many and varied factors associated with rejection (Bierman, 2004), it may have been that the current sample included a preponderance of rejected or non-accepted students whose Executive Functions were intact, but who possessed completely unrelated risk factors for rejection. It may prove productive in the future to screen for Executive Functions rather than social success and from there assess whether children with poor Executive Functions are more likely to face rejection.

Additional concerns may be due to the nature of the tests used. Neuropsychological testing of narrow abilities of Executive Functions originated largely to explore the difficulties of populations who experiences tremendous difficulty in particular tasks. The Tower of London, for example, was originally developed for research among Traumatic Brain Injury patients who literally could not plan (Shallice, 1982). Shallice reported that completing a Tower of London trial was easy for most and impossible for some of his patients.

For the clinical population examined in the original research on the Tower of London, the test likely represented a pure test of Planning Ability. Factor analytic research among typically developing populations has found that performance on the Tower of London relied at least partly on Fluid Reasoning ability (Unterrainer et al., 2004). Among those whose cognitive abilities and brains are fully intact, there certainly would be a range of performance and the need to plan ahead is certainly preserved, but if no deficit in experience or ability has adversely affected and individual's ability to plan, then it is possible that poor performance on Tower of London was due to poor fluid reasoning or another, as yet unidentified ability.

Among the typically-developing population of the current study, Rover may have been particularly vulnerable to this dependence on multiple abilities. Planning ability is certainly required to succeed at the task, so a participant with poor Planning across any context would do poorly. However, there is a significant amount of performance that hinges on General Intelligence and Visual-Spatial Processing (Kaufman & Kaufman, 2004, p 108). Hence, when participants performed poorly on this task, it may have been due to difficulty in one of these areas rather than a matter of poor Planning Ability.

Rover also demonstrates how, in the absence of a universal difficulty in Planning, a task may not be close enough to real world behavior to relate to the outcome of interest. A child could easily have difficulty planning his or her Rover token's course across the game board, but be able to plan his or her entry behavior into a game on the school yard. Future investigations may find it more productive to use a novel task that more directly assesses social tasks that require planning.

A final surprising finding may underlie the apparent lack of social consequences for poorer Executive Functions: they may just be typical. The sample's mean composite score was 83.91. This would indicate that, overall, the sample performed significantly lower than the national norms of both Rover and the WCST, to the degree to be expected of tests with significant cultural and language demands (Flanagan, Ortiz & Alfonso, 2007). In studies observing correlates of rejection, it has been suggested that the truly important factor is not so much any particular behavior, but rather the degree to which a given child's behavior differs from his or her peers (Rubin et al., 2009). Graham and Juvonen (2002) reviewed the relationship between aggression and rejection in an urban setting and found that when children of a particular ethnicity were typically aggressive, aggression was not associated with rejection. It is not

unreasonable to consider that if poorer Executive Functions are typical of the population as well, that they will also be less likely to correlate to Rejection.

The typicality of poor performance on those measures found to lack significant relationships to outcomes, contrasts with performance on those measures that did demonstrate some utility. The mean performance on the IGT was actually a population mean T-Score of approximately 50 with a standard deviation close to 6. Similarly although the mean T-Score on Statue was somewhat lower, at about 46, this still reflects a trend that the participants could be expected to demonstrate age appropriate competence in a given ability.

Limitations

The first and most obvious limitation is the small sample size. There were only 35 participants in the entire investigation and it had to be further subdivided for several analyses. Hence, those analyses using the IGT (unfortunately those with the most significant results with perhaps the largest implications for practice and further research) included only 24 participants. This had several potential effects. Certain participants may have exerted an influence that will not be seen in replications. The two lowest scorers on Statue for example may have simply happened to be in the current sample and may be entirely atypical of children in other, more representative samples. At the same time, all analyses lacked statistical power, so small effects could go unseen when a Mann-Whitney U Test must compare groups of less than 20 for example. Other analyses such as multiple regressions would be quite problematic with such a small sample and might even be made misleading. Generalizability is also limited by the fact that not only was the sample small, it was also derived entirely from one school, so a factor of management or population peculiar to that school could have accounted for the results.

Another limitation comes from the tests given and, in particular, the use of the created composite. In the development of the KABC-II, the authors examined the factor structure of the

subtests and found that Rover appeared to be primarily a test of Visual-Spatial Processing, but that it had substantial (.54) loading on the first, un-rotated factor, typically conceptualized as General Intelligence (Kaufman & Kaufman, 2004, p 108). The loading of the Wisconsin Card Sort on General Intelligence has, to date, not been established. As a result of this, however, there was no way to establish that the two tests' correlation was not better explained by participants' general intelligence. Ideally, a test of intelligence would have been administered to each participant to allow for contrasting their performance, but as it stands, it cannot be fully ruled out that the composite used in the current investigation could be more accurately viewed as a short test of intelligence.

There is also the need to consider the effect of the socioeconomic and cultural situation of the participants. The development of the KABC-II and the original KABC both took the potential influence of language and culture heavily into account and attempted to measure Cognitive Ability rather than acculturation (Kaufman & Kaufman, 2004). The authors even reported several analyses that demonstrated almost equal scores between members of different ethnicities. In the current minority sample, however, performance on Rover and on The WCST were both close to one standard deviation lower than the population mean, on average. Given the acknowledged legacy of underperformance on intelligence tests and cognitive assessments, it is possible that some influence of either environment or culture better accounts for the performance of the participants than their Executive Functions.

Finally, it is possible that Rover did not do well in testing Planning. Although expert consensus acknowledges it as a test on which Planning ability will exert influence, it is yet to be subjected to more rigorous scrutiny in this capacity. Its concurrent validity in the form of correlation with Tower tests, for example, is yet to be empirically verified.

The current study also suffers the limitations of its cross-sectional approach. The unfortunate reality of the difficulty in maintaining contact with participants and even securing consents meant that although the results suggest some differences in, for example, the role of Impulse Control in friendship success over different ages, it is difficult to tell whether these are fully a function of the developmental levels of participants and not some other factor that is different between the younger and older members of the sample. A longitudinal design would have been significantly more compelling particularly with regard to the posited shifts in what traits are valued among peers at different ages.

Future Research

The most obvious extension of the current study would be replication of the relationship between IGT and rejection with different demographics. A population of Caucasian, middle class students, for example, may or may not show the same effect and could better explore whether the conditions of an urban environment are necessary to show the effect seen here, or whether it is a fact of adolescence that a certain amount of Cognitive Impulsivity is expected and positively socially sanctioned. A larger sample would also permit analyses of whether the effect is consistent across genders, levels of scholastic achievement, or other variables that may exert a more subtle influence.

It would also be productive to examine a sample of students who are closer together in age. An attempt was made in the current study to acknowledge the developmental nature of both friendships and Executive Functions by including two measures of Impulse Control. They functioned so differently at different age levels, however, that it is worth considering whether there would be different or emergent results with larger samples of students of similar ages. This would keep tests consistent across the sample and, with appropriate design, would allow for the

use of tests that have all been designed and normed for the ages to which they were administered rather than relying on created norms or projected scores.

Consideration of the need for two different measures of Impulse Control also raises the question of whether a more consistent measure could be developed. The two used in the current investigation were both excellent for the ages to which they were applied, with both demonstrating significant relationships to important variables, but they would be absolutely inappropriate for other ages. The IGT is task clearly more appropriate for adults and older adolescents as the created norms demonstrate that random responding is the typical outcome. Statue is simply too easy for even most of the students in the current sample. Either the development of a novel task or the application of a current one aside from those used in the current study would do a great deal to further the analyses conducted here.

Finally, and most important for the field of school psychology, it would be wise to examine why the sample performed so poorly on Rover. The KABC-II is touted by its authors (Kaufman & Kaufman, 2004) and others (Dale et al., 2011) as the most appropriate cognitive assessment to use with minorities. In this sample, however, the students performed at an average of one standard deviation below the population mean (see Table 4.7). This then raises concerns about whether Rover is in some way an unfair assessment or is tapping into a genuinely under-developed ability among the participants. In either case further study is important both to consider testing practices and the state of urban schools.

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