2014

Giftedness and overexcitability : investigating the evidence

Daniel Lawrence Winkler
Louisiana State University and Agricultural and Mechanical College, dwinkl1@lsu.edu

GIFTEDNESS AND OVEREXCITABILITY: INVESTIGATING THE EVIDENCE

A Dissertation

Submitted to the Graduate Faculty of
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Educational Theory, Policy, and Practice

by
Daniel Lawrence Winkler
B.A., Louisiana State University, 2007
M.A., Louisiana State University, 2009
Ed. S., Louisiana State University, 2010
May 2014

ACKNOWLEDGEMENTS

Within this small space, I would like to thank many people. I would like to thank my adviser and dissertation committee chair, Dr. Rita Culross. Your mentorship and advice have always been sterling, and you have helped to guide me through an array of challenges, allowing me to grow intellectually and professionally. Additionally, you guidance regarding the bureaucratic, more quotidian aspects of graduate school have been invaluable. My impotence in these realms of life is truly breathtaking, and without your assistance, I probably would never have graduated. I would also like to thank my committee members, Dr. Jennifer Jolly, Dr. Keena Arbuthnot, and Dr. Charles Shindo. Your willingness to read my work and offer insight and advice has been essential to my education. I am especially grateful, as I understand that this process has consumed much of your time and effort.

I also would like to thank Louisiana State University's School of Education for providing me with a great deal and variety of assistance, Allison Raguse for helping to edit my dissertation, and lastly my family for serving as my first educators, helping me to learn how to question and explore the world.

TABLE OF CONTENTS

ABSTRACT

Many scholars of gifted education have often argued and believed that gifted individuals are neurologically overexcitable while non-gifted persons are not (Chang & Kuo, 2013; Harrison & Haneghan, 2011; Piechowski, 1979, 2006; Silverman, 2000a; Siu, 2010; Tieso, 2007a). This means that gifted persons are more sensitive, intuitive, empathic, and physically and emotionally aware. Some scholars have suggested that this significant degree of overexcitability may even mean that gifted persons are morally superior to non-gifted persons (Silverman, 1994). Over the past thirty years, this relationship between overexcitability (OE) and giftedness has become increasingly popular, as many websites, textbooks, and researchers have asserted it as true. These resources have also advocated a particular treatment and understanding of gifted persons due to their overexcitable nature.

Recently, however, some scholars have questioned the validity of the giftedness-overexcitability relationship (Mendaglio, 2002; Pyrt, 2008; Tillier, 2009a). So, while the past thirty years have seen a rise in the perception that gifted persons are overexcitable (Silverman, 2008), these scholars have contended that there is actually little empirical data demonstrating this relationship (Mendaglio; Pyrt; Tillier).

Using a systematic review of studies that compared gifted and non-gifted samples' OE scores, this dissertation attempted to provide some clarity to this burgeoning debate. This process involved a research synthesis that used *a priori* established criteria to identify, describe, and evaluate the findings and methodologies of a body of literature's most rigorously conducted studies (Petticrew, 2001). The evaluation phase of the systematic review included both qualitative and quantitative techniques. These findings revealed that it is unclear that gifted individuals are significantly more overexcitable than non-gifted individuals. Consequently,

researchers, practitioners, and gifted persons themselves should reconsider the relationship between giftedness and overexcitability.

CHAPTER 1: INTRODUCTION

A systematic review of those studies comparing the overexcitability (OE) scores of gifted and non-gifted samples, comparative studies, was conducted. Prior to discussing this systematic review's particularities, this chapter provides information on this project's theoretical framework, the history of the giftedness-OE relationship, current disputes in the literature, and the current portrayal of the relationship between giftedness and OE. After this background information, a series of research questions, the need and importance of the proposed study, a definition of terms, and limitations for the proposed study are provided. Each of these topics is discussed in its own section below.

Theoretical Framework

The review and analysis of giftedness-OE literature includes two theoretical frameworks, one for OE and one for giftedness. The current study of giftedness and gifted education originated from biology and research and educational psychology (Eysenick, 1981) while OE originated from clinical, psychiatric practice (Tillier, 2008). This section will briefly discuss the theoretical frameworks of giftedness and OE.

Giftedness

As scholars have noted (Hernstein & Murray, 1994; Renzulli, 1978), the ideas of gifts and giftedness have probably existed for as long comparisons between people have been made. Modern researchers would label those performing among the best in such comparisons as "gifted". These individuals would be better at or possess more of something than others, such as having a significant degree of intelligence(s) and/or talent(s). While such comparisons and probably other, more sophisticated analyses of exceptional individuals have existed for centuries (Hernstein & Murray), the modern study of gifted individuals began in England with Sir Francis

Galton (Eysenick, 1981). Inspired by his half-cousin's, Charles Darwin, work in biology, Galton studied exceptional men and families (Fancher, 1985). This research tradition continued and spread to the United States, where a number of scholars studied gifted persons (Hollingworth, 1926; Terman, 1926). Research in the United States increasingly focused on gifted school-age children, as efforts were made to educationally accommodate this exceptional subpopulation.

The field of gifted education is still active today. Currently, though, the theoretical nature of giftedness is disputed (Sternberg & Davidson, 2005). The earlier researchers operationalized giftedness using anthropometric (Galton, 1978/1892) and psychometric (Terman, 1926) definitions. Consequent instruments using these definitions were developed to identify gifted persons. However, over time, it appeared that these definitions and instruments failed to fully describe the nature of giftedness (Renzulli, 1978; Terman & Oden, 1947; Wissler, 1901).

While some current theoretical notions of giftedness still rely on refined psychometric ideas (Hernstein & Murray, 1994; Robinson, 2005), a number of other theoretical conceptions of giftedness have emerged. Some of these conceptions consider qualities like creativity, persistence, and practicality as essential elements for gifted behavior (Renzulli, 1978; Sternberg, 2005). A number of other scholars have focused on how individuals can be gifted in non-academic areas, such as athletics and music (e.g., Gagne, 2005; Gardner, 1983).

Because of this history and current theoretical variety, it is difficult to concisely and briefly discuss the theoretical framework of this study. For instance, the studies reviewed in this prospectus' literature review operationalized giftedness in many ways, relying on different theoretical frameworks. However, most studies focusing on the relationship between giftedness and OE rely on a psychometric, academic notion of giftedness (Piirto, Montgomery, & May, 2008). Predominantly, this included studying gifted students who succeeded or have the potential

to succeed in school and/or participate(d) in gifted programs at school. Such school programs have a number of requirements, such as psychometric test scores and GPA thresholds. This operationalization of giftedness, then, provided the theoretical framework for this dissertation.

Overexcitability

The construct of OE encapsulates five overexcitabilities (OEs) that are part of a theory of psychological development called the Theory of Positive Disintegration (Dabrowski, 1964). Dabrowski (see Appendix A for a short biography) was a clinical psychiatrist who worked with the mentally ill, but also spent time studying exceptionally moral persons, such as Antoine de Saint-Exupery, Sir Edmund Hillary, Abraham Lincoln, Yuri Gagarin, and Dag Hammarskjold (Tillier, n.d.a.). From his study on and work with psychologically ill people, Dabrowski found that many of them were experiencing depression or anxiety because they were morally confused (Dabrowski 1964, 1972). This moral confusion manifested in a variety of ways, but often individuals regarded their own behavior as immoral, causing them to experience a variety of psychoneuroses. Dabrowski noted that these individuals were often quite energetic, sensitive, and intense (Tillier, n.d.a.). Dabrowski used the Polish word *nadpobudliwosc* to describe this array of traits (Silverman, 2008). Interpreted, this term literally means neurological superstimulatability, or stronger neurological reactions to material and immaterial stimuli. The English term, "overexcitability" has been most often used in translations.

In his historical case studies of moral exemplars, Dabrowski also found individuals who demonstrated OEs and had a desire to become their own distinct, unique person (Tillier, n.d.b.). This often caused them to have personal differences with others and endure conflict within themselves. Like some of Dabrowski's mentally ill patients (1964), they thought others and even their own behavior failed to meet a particularly high moral or behavioral standard (Tillier,

n.d.b.). Because of this observation, they occasionally and even frequently regarded their values in conflict with their actions. This conflict was often consistent and prolonged, causing these people to develop psychoneuroses including anxiety, depression, nervousness, and social isolation. Rather than regarding the mentally exceptional or ills' psychoneuroses as mental health illnesses or problems, though, Dabrowski viewed them as outgrowths or symptoms of a healthy conflict (1964, 1972). These individuals had a high moral standard for their own behavior, and while this did cause some mental health problems, it also helped them alter their undesirable behavior and character elements and transform into a better, more moral person. Over the course of a lifetime, some, rare individuals, like the moral exemplars Dabrowski studied, would progress through Dabrowski's five developmental stages and become a profoundly moral person. Some characteristics, such as the five OEs, helped these individuals develop and become moral exemplars.

OE and its five forms originated in this theoretical context (Mendaglio & Tillier, 2006). Dabrowski described five forms of OE, all of which are theoretically largely independent of one another (Ackerman, 2009). Because of this independence, researchers have reported five different OE scores rather than one composite score. Additionally, the emphasis in the literature is placed on which of the five OEs distinguishes gifted from non-gifted samples.

The five OEs that exist and could differentiate between gifted and non-gifted groups are: psychomotor (POE), sensual (SOE), imaginational (MOE), intellectual (TOE), and emotional overexcitability (EOE). Various abbreviations for the five OEs have been used, but those in parentheses appeared to be the most commonly used abbreviations in recent literature (Falk & Miller, 2009; Pyrt, 2008; Wirthwein & Rost, 2010). No formally established abbreviations appear to exist. For Dabrowski, OE entailed "higher than average responsiveness to stimuli,

manifested either by psychomotor, sensual, emotional (affective), imaginational, or intellectual excitability, or the combination thereof" (1972, p. 303). These responses were physiological in nature, resulting from especially sensitive neurology.

Because of this neurological basis, Dabrowski never directly observed OE. Instead, he observed or read about the five OEs. Dabrowski and others have attempted to describe and define the five OEs. They are each complex, multifaceted phenomena, each a distinct variable with its own definition. Below five definitions are provided.

1. Psychomotor overexcitability (POE): POE is a high degree of physical energy (Piechowski, 1979). This energy can include loving to move, speaking quickly, frequent impulsivity in action, a strong aversion to boredom, and significant stamina.
2. Sensual overexcitability (SOE): SOE is depicted as intense, prolonged, or heightened responses to sights, fragrances, tactile sensations, and sounds (Piechowski, 1979). This can include an exceptional fondness or dislike for particular stimuli or sensations, like the sensation of a shirt's tag on one's neck. Also, individuals with high SOE often strongly relate personal memories with certain sensations.
3. Intellectual overexcitability (TOE): Individuals with high TOE have exceptional interest in theories and explanations, curiosity, analysis, and the desire to know regardless of the benefits of knowledge (Piechowski, 1979). Additionally, such individuals often ask a great deal of questions, are quick thinkers and observers, and offer unexpected, novel opinions about conventional society. When a lack of stimulating learning material is present, boredom can result for high TOE individuals. TOE is distinct from intelligence.
4. Imaginational overexcitability (MOE): Fantasizing, day-dreaming, craving novelty, and dramatizations are all aspects of MOE (Piechowski, 1979). Individuals with high MOE

often use and enjoy metaphors when speaking, fantasy fiction, have or had imaginary friends, and sometimes become confused between their fantasies and reality.

5. Emotional overexcitability (EOE): Individuals with high EOE are often shy, enthusiastic, have vivid memories of emotional experiences, and experience longer than average periods of anxiousness, sadness, loneliness, and fear (Piechowski, 1979). High EOE can cause individuals to become upset or hurt by seemingly innocuous circumstances or comments. Individuals with a high degree of EOE can be very compassionate, responsible, and often self-critical. Such individuals can and do behave altruistically.

Background and Setting

As noted earlier, some scholars have argued that intellectually gifted persons are overexcitable, meaning that their behavior demonstrates these five OEs to some degree. However, other scholars are skeptical, and they have begun to dissent from this proposition, asserting that there is not enough evidence. In order to provide the background to this current dispute, the history of the five OEs and their relationship with giftedness is discussed below. Afterwards, the current dispute within the literature and the portrayal of the giftedness-OE relationship is discussed.

Michael Piechowski and the Origin of the Giftedness-OE Relationship

While many scholars (Bouchet & Falk, 2001; Harrison & Haneghan, 2011; Tieso, 2007a; Roeper, 2009; Silverman, 2000a) have believed that gifted persons are overexcitable, it is important to note that this belief did not begin with Dabrowski. While Dabrowski did study the intellectually gifted and exceptional historical characters and thought that intelligence could be an asset in his theory of development, his primary work was with the mentally ill (Tillier, 2009a,

2009b). Instead, the giftedness-OE relationship and literature was inspired by one of Dabrowski's co-workers and students, Michael Piechowski.

Michael Piechowski (1979), and to a lesser extent Ogburn-Colangelo (1979), introduced the five overexcitabilities to the gifted education community. These two researchers each wrote a book chapter about Dabrowski's theory. Ogburn-Colangelo's (1979) chapter was a case study about an individual patient with a high degree of conflict in her life, similar to some of Dabrowski's psychiatric case studies (1964). Piechowski's chapter was primarily concerned with OEs and how he thought they were better predictors of giftedness than other methods of identification, such as IQ tests (1979). In his chapter, Piechowski extensively described each of the five OEs and how gifted individuals demonstrated them.

Before he wrote that chapter and before he studied OEs, Piechowski was a professor of molecular biology at the University of Alberta (Piechowski, 2008). In 1967, he met Dabrowski and became his translator and co-researcher. Sharing a Polish heritage and language, Piechowski was ideally suited to work with Dabrowski. Early on, Dabrowski's work had been clinical rather than empirical (Silverman, 2008). So, the two men decided to create some empirical tests to help understand development, development potential, the OEs, and to meet the requirements of a grant that Dabrowski was working on at the time (Piechowski, 2008).

Doing so, Dabrowski and Piechowski developed a variety of qualitative research methods (Piechowski, 2008). The scholars used verbal stimuli, open-ended questions, autobiographical material, case studies, and other methods to collect data about participants' lives. Content analysis was used to understand the amount of development potential, including the OEs, that respondents had. These initial studies were published in a two-volume work, *Theory of Levels of Emotional Development* (Dabrowski & Piechowski, 1977).

After his six-year collaboration with Dabrowski, Piechowski enrolled in the University of Wisconsin's counseling program (Piechowski, 2008). There, he met Nick Colangelo. Colangelo was editing a book, *New Voices in Counseling the Gifted* (Colangelo & Zaffrann, 1979), and knew of Piechowski's work with Dabrowski. So, Colangelo asked Piechowski to write a chapter about giftedness and emotions (Piechowski, 2008). Piechowski did, and incorporated much of Dabrowski's thinking, especially the OEs.

This appears to have been the first publication in the gifted literature about OEs (Piechowski, 2008; Tillier, n.d.b.), and a number of scholars have recalled that the chapter introduced the OEs to them (Mendaglio, 2008; Silverman, 2008). As noted earlier, Dabrowski had written about OEs, talents, and even a little about giftedness, but his work was unknown in the gifted literature, as well as in much of American academia (Tillier, 2008). However, anecdotal evidence has suggested that the response to Piechowski's work was strong. For instance, Tolan (2009) vividly remembered the article:

> I remember very well how much impact that reading had on me. Dabrowski's "overexcitabilities" were immediately recognizable, not only in the lives of gifted children I knew, but in my own as well…In a single afternoon, my view of my own life was turned upside down. I was here being offered an explanation that, for the first time, allowed me to accept and even value aspects of myself that had caused considerable difficulty for me…When I shared the overexcitabilities with audiences of parents, the majority found their views of their children, their own life experiences, and the whole subject of giftedness changing as quickly as mine had (p. 225-226).

After the book chapter, during the 1980s, Piechowski and others began working on the relationship between OEs and giftedness (Piechowski, 1979, 2008). And as awareness spread, more publications began appearing (Piechowski, 1986; Silverman, 1993). To further this research, though, a more practical way to measure OEs needed to be developed. Dabrowski and Piechowski's (1977) use of verbal stimuli, patient history, case study, autobiography, and other measures were time consuming and required a great deal of expertise. Other researchers who

were curious in the giftedness-OEs relationship had few means to study the phenomenon (Silverman, 2008). Piechowski recalled the dilemma, worrying that OEs would fade from researchers' awareness unless new findings could be produced (2009).

For years, researchers and school districts had used IQ tests and gifted programs to identify gifted students (Piechowski, 2008). As a result, identifying gifted students for OE research was not difficult. The first effort at a solution to practically measure OE was Piechowski's Overexcitability Questionnaire I, the OEQ I. In creating the instrument, Piechowski examined 433 examples of OEs in his and Dabrowski's study of six individuals' case studies (Piechowski, 2006). By observing what questions and stimuli allowed patients to demonstrate their OEs, Piechowski was able to develop a standard set of open-ended questions.

Ultimately, a quantitative, Likert scale instrument was developed to enable additional research on giftedness and the five OEs (Silverman, 2008). The Likert scale, the Overexcitability Questionnaire II or OEQ II, was easier to administer and took significantly less time to score. Consequently, it became popular amongst researchers and is currently the instrument of choice to measure OEs (Falk & Miller, 2009). Other instruments were developed as well, including Bouchard's checklist instrument, the ElemenOE (2004), and a Chinese-language, adapted version of the OEQ II, the Me Scale (Chang & Kuo, 2013).

With these instruments, researchers have studied intellectually gifted individuals and their OEs by measuring and comparing gifted and non-gifted samples' OE scores (Piechowski, 2008; Silverman, 2008). Recently, however, some scholars have questioned some of these instruments and research efforts, arguing that they have not shown that gifted individuals are overexcitable. Their arguments, as well as those supporting the giftedness-OE relationship, are presented below.

The Current Scholarly Dispute

After Piechowski's book chapter (1979), the development of the OEQ I and OEQ II, and the appearance of a number of studies, clinical cases, and opinion articles (Hafenstein & Tucker, 1995; Silverman & Ellsworth, 1981), many scholars appeared to believe that gifted persons were overexcitable. Piirto, Montgomery, and May summarized this scholarly consensus, noting that "one of the emerging ideas about academically talented students has been that they possess higher OE – that they are more sensitive and intense than students who do not have high scores on IQ or achievement tests" (2008, p. 142). However, some scholars have begun to dispute the existence of the giftedness-OE relationship.

Though it is unclear exactly when this dissension began, some researchers have claimed that OE and giftedness' relationship is not as firmly established as many think (Piirto, 2010; Pyrt, 2008). This position appears to be a reaction to the field's early understanding that gifted persons are definitely more overexcitable, and it has appeared in several scholars' writing (Mendaglio, 2002; Mendaglio & Tillier, 2006; Pyrt, 2008). Generally, these authors critiqued the early research on giftedness and OEs, noting that it did not definitively show that gifted persons were overexcitable. For example, Pyrt argued that gifted persons sometimes have higher TOE than non-gifted persons, but stated that the literature failed to show that gifted persons consistently have higher EOE, MOE, POE, and SOE scores (2008). Opposing this position are those scholars who have claimed that the research has consistently shown that gifted persons are significantly overexcitable (e.g., Falk & Miller, 2008).

While there is very probably diversity within and between these two positions, it is helpful for the sake of this dissertation and clarity to label these groups so that one term can represent the general belief about the relationship(s) between giftedness and OEs. Those arguing

that gifted persons are significantly more overexcitable than the general population are called "proponents". Those arguing against the proposition that gifted persons are significantly more overexcitable than the general populations are referred to as "skeptics". Below, these two camps of researchers' perspectives on the giftedness-OE literature is briefly described and summarized.

Proponents

A number of researchers have argued that gifted persons are significantly more overexcitable than the general population (Piechowski, 1979; Silverman, 2000a; Tieso, 2007a). This broad claim is not specified to any one of the five OEs in particular, though some have argued that the gifted individuals have higher TOE, MOE, and EOE levels than POE and SOE levels (Piechowski, 2006). The supporters of these claims have argued that gifted samples have scored significantly high on quantitative and qualitative measures. These measures are usually the OEQ I and the OEQ II (Falk & Miller, 2009). Supporters also claim that in comparative studies, gifted samples have scored significantly higher than control groups drawn from the non-gifted, general population (Bouchet & Falk, 2001; Tieso, 2007a).

In a comprehensive literature review of comparative and non-comparative studies, Falk and Miller claimed that gifted individuals were significantly more overexcitable than non-gifted persons (2009). Their review catalogued 19 OEQ I studies (N=1,051) and 9 OEQ II studies (N=5, 497). Of the OEQ I studies, 12 were published articles, 5 were dissertations, 1 was a master's thesis, and 1 was a master's research report. Of the OEQ II studies, 5 were published articles, 2 were dissertations, and 2 were master's thesis. According to Falk and Miller, these nine OEQ II studies were the only such studies existing in 2009. In analyzing the OEQ I and OEQ II literature, Falk and Miller found that the studies repeatedly showed that gifted samples were significantly overexcitable, especially in EOE, TOE, and MOE.

Other researchers have concluded similarly to Falk and Miller (2009). Tieso (2007a) noted that "researchers have found differences in OEs among children and adolescents, with those identified as gifted scoring higher than the nongifted" (p. 12). Harrison and Haneghan (2011) observed that "many studies have found a relationship between giftedness and overexcitabilities, and all have been able to differentiate between gifted individuals and nongifted individuals in areas of overexcitabilities" (p. 675). And again, Colangelo and Piechowski (1984) summarized the literature, noting that "OEs are consistently and reliably present in a gifted group of any age (i.e., as low as age 9)" and that TOE, MOE, and EOE are "critical contributors to the creative power and productivity of gifted people" (p. 87).

Proponents are not limited to North American scholars either. Kuo and Chang (2013) reviewed OE-giftedness research that has predominantly been conducted in Taiwan since 2001 and concluded that gifted persons are significantly overexcitable. The authors reviewed 11 master's theses and 1 doctoral dissertation. In these studies, alternative instruments to the OEQ I and II were used. Summarizing the literature, Kuo and Chang (2013) noted that gifted elementary school students scored strongly on MOE and TOE and that junior and senior high school gifted and academically talented students scored highly on TOE, MOE, SOE, and EOE. In some studies, gifted students significantly outscored non-gifted students on various OE measures, but especially so on TOE. Chang and Kuo concluded that overexcitabilities are "correlated to IQ, [they] predict cognitive abilities" (p. 62).

In addition to these literature reviews, a number of scholars have cited their work in counseling and with the gifted to support the presence of OEs in gifted persons. Silverman (1994, 2000a, 2012) and Roeper (1983), both experienced researchers and practitioners, have argued that gifted children are more intense, sensitive, overexcitable, and even moral than the

general population. Also citing their personal and professional experience, Daniels and Meckstroth (2009) noted that gifted persons had a high degree of OEs. This, they claimed, made gifted people more prone to depression and other psychological difficulties. Daniels and Meckstroth claimed that gifted persons with OEs are "qualitatively" different from the general population (p. 33).

Skeptics

Dissenting from these proponents' claims and analyses of the literature are the skeptics. The skeptics seemed to have emerged after the proponents, or at the very least published after them, and have argued that the research does not definitively show that gifted persons are overexcitable.

Surveying and calculating a number of studies' effect sizes, Pyrt (2008) observed that according to Cohen's (1988) recommendations for classifying effect sizes, few of the OEs demonstrated large or medium effect sizes between gifted and non-gifted groups. Some of these differences between gifted and non-gifted OEQ I scores were "small" and "trivial" (Pyrt, 2008, p. 176). The largest effect sizes were those between gifted and non-gifted TOE scores, causing Pyrt to argue that the evidence only supported that gifted individuals had slightly more TOE than non-gifted students. He cited the three largest effect sizes (all TOE) of .48 (Ackerman, 1998), .41 (Bouchet & Falk, 2001), and .74 (Bouchard, 2004) to support his claim (Pyrt, 2008).

In another, earlier literature review, Mendaglio and Tillier (2006) also noted that gifted samples did not always significantly outscore non-gifted samples. The authors observed that when gifted groups did significantly outscore non-gifted groups, the participants were often adults. In the four studies of children and adolescents that Mendaglio and Tillier reviewed, only two found that the gifted group significantly outscored the non-gifted, control group in multiple

OEs. The two studies with the largest numbers of adolescents and children (Ackerman, 1997; Bouchard, 2004) showed the least significant results (Mendaglio & Tillier, 2006).

And like the proponents, skeptics have also offered their professional opinions about that gifted individuals' OEs. In her self-ethnography, Piirto reflected on her 21 years of research with Dabrowski's theories, including OEs and giftedness (2010). She noted, "in my thinking and research on the theory, I have looked for studies with over eighty participants in each group… [but] almost all the studies in the journal literature have small numbers of participants and so the findings are probably tendencies, in a post-positivist sense, and certainly in a positivist sense" (p. 84). Piirto (2010), in concurrence with Pyrt (2008), also noted that TOE had been repeatedly found in high IQ students, but none of the other OEs were able to differentiate between gifted and non-gifted individuals.

In addition to offering dissenting opinions and criticizing the literature, some skeptical scholars have argued that the most common instrument used to measure OEs, the OEQ II, has significant limitations harming studies' validity. Warne noted that the OEQ II's technical, test information is "slight—almost nonexistent" (2011, p. 673). Additionally, the OEQ II's construct validity also has critics. In an online discussion, Ackerman (2001) noted that the OEQ II's items did not well represent the diversity of OE manifestation. Whereas the OEQ I had all of its responses analyzed for every OE, the OEQ II's items only measured one OE at a time, and only one aspect of each OE. What results is that the OEQ II under-represents the construct it attempts to measure.

Another major problem with the OEQ II, Mendaglio (2012) claimed, is in how researchers use parametric statistics like MANOVA and ANOVA to analyze their data (e.g., Bouchet & Falk, 2001). Strictly speaking, parametric statistics should be used only with

continuous variables, with interval and ratio data (Mendaglio, 2012). But, the OEQ II does not collect interval or ratio data, it collects ordinal data. Parametric analyses should not be used to analyze ordinal data, because ordinal data does not satisfy the assumption of normality needed in statistical procedures such as ANOVA. Instead, non-parametric tests should be employed to analyze OEQ II data.

The Current Portrayal of the Giftedness-OE Relationship

While this scholarly history and current dispute is important, it is also important to provide information on how parents, teachers, and others understand gifted persons' OE levels. Unfortunately, no direct survey of such attitudes exists, making definitive conclusions impossible. However, a variety of resources directed at laypersons and professionals who work with gifted individuals do exist. In order to demonstrate how gifted individuals' OE levels are portrayed to the general public, a small literature review was conducted.

Search Procedures for Internet and Text Sources

In order to attempt to portray how the general public might perceive the giftedness-OE relationship, a number of sources were reviewed. Search methods collected both Internet and book sources.

A Google search using the following key terms was conducted: "overexcitabilities + parenting", "overexcitabilities + parenting tips", "what to do if your child is overexcitable", and "how to tell if your child is overexcitable". This search was conducted under the assumption that interested parties often use Google or another online search engine to learn more about a topic. Also, it was assumed that some non-experts, such as some practitioners and parents, might be more likely to use such search options. From these searches, a number of Internet websites were identified, including hoagies.org, seng.org, and others. Websites that validated or discussed the

giftedness-OE relationship in anyway were included in the following literature review. A number of websites that discussed the giftedness-OE relationship were found.

After the Internet sources are reviewed, a number of book sources are presented. These sources helped to illustrate how book chapters in handbooks and textbooks directed at professional audiences depict the giftedness-OE relationship. A review of books and textbooks was conducted for two reasons. First, they are more easily available to many teachers and non-university employees as they are not paywall restricted (unlike many academic articles that can be found via Internet searches). They can be purchased on a number of easily accessible sites such as amazon.com, and they are available in some universities' libraries. Secondly, books and textbooks are often used to teach courses about gifted education. It is unclear how many if any of the books in this literature review are used for college instruction; however, many of them explicitly stated that part of their intended audience was a college-level class.

The books were found using the following search terms in the LSU Libraries' catalog and on Amazon.com: "gifted education", "gifted education handbook", "handbook for gifted education", and "social and emotional + giftedness". A number of books related to gifted education were found using this search. Those with chapters or sections about overexcitabilities were included in this literature review. At the end of the Internet and book review, the various aspects of the portrayal of gifted persons as overexcitable are discussed.

Internet Sources

Many individuals often use Google or other search engines to learn about unfamiliar phenomena. The selected search methods found several informational websites describing OEs and giftedness. One such site was Hoagiesgifted.org. This website for parents, educators, and gifted persons, has a page dedicated to Dabrowski's theory (Kottmeyer, 1997-2012). While

Hoagies.org provided little information about the giftedness-OE relationship explicitly, it currently lists 12 resources about Dabrowski's theory of Positive Disintegration, 5 of which are predominantly about OE. Several of the other articles discussed psychoneuroses, including existential depression, mid-life crisis, and perfection. Hoagies.com reported that the resources are designed to help clinicians, educators, and gifted persons themselves understand and appreciate their OEs and psychoneuroses.

The organization Supporting the Emotional Needs of Gifted Children (SENG) also provided an informational webpage about OEs and giftedness (Lind, n.d.a.). There, the organization stated that, "a small amount of definitive research" has shown that OEs are "primary characteristics of the high gifted" (Lind, n.d.a., para 1). The website also offered strategies for coping with OEs, including suggestions for parents like planning outside time, exploring curiosity, and being patient with melodrama. Also, SENG featured a webpage that discussed how overexcitable gifted children were also more moral, compassionate, sensitive, and kind than other children (Silverman, 2012).

Several other informative websites about giftedness also provided brief synopses of OEs, all stating the gifted persons are overexcitable. These included Duke's Talent Identification Program (Rinn, n.d.), the Davidson Institute (Lind, n.d.b.), and the current Wikipedia articles on giftedness (Intellectual Giftedness, n.d.) and overexcitability (Overexcitability, n.d.). *Parenting for High Potential's* blog also had post about giftedness and overexcitability, however a paywall restricted access.

Book Sources

While these websites appeared to be largely directed at parents and laypersons about how gifted persons are more overexcitable, professional literature directed at teachers, practitioners,

and researchers of the gifted, has also asserted that gifted persons are overexcitable. As noted in the previous section, this appeared to begin in 1979 with Piechowski's book chapter, Development Potential in *New Voices in Counseling the Gifted* (1979). The book featured a collection of writers discussing the then current thinking on giftedness. Its intended audience was "practicing school counselors; personnel who may serve in a 'counseling' capacity (e.g.,— teachers, administrators, parents); and counselor educators, for use in their counselor training programs and in consulting on gifted" (p. xix). In his chapter, Piechowski argued that gifted persons were overexcitable, and half of the chapter (i.e., 15 of the 30 pages) described OEs and how they manifested in gifted persons.

Later resources for educators continued discussing OEs and their relationship with giftedness. *The Handbook of Gifted Education* (Colangelo & Davis, 1991), was a book "conceived" with "educators in mind" to be "a text for college senior and graduate courses" and to serve as "a sound resource for university educators and scholars/practitioners in the field" (p. vii). Again, Piechowski wrote a book chapter in which he outlined how gifted persons are overexcitable (1991). In the chapter, Piechowski encouraged practitioners and gifted persons to understand their behaviors and feelings as manifestations of the five OEs. Piechowski wrote a similar book chapter in the second (Piechowski, 1997) and third (Piechowski, 2002) editions of *The Handbook of Gifted Education* (Colangelo & Davis, 1997, 2002).

In another chapter in the first edition of *The Handbook of Gifted Education* (Colangelo & Davis, 1991), Silverman discussed helping gifted children and their families through family counseling (1991). Silverman noted that because gifted children are overexcitable, they are labeled as too intense, perfectionist, and sensitive. Silverman also noted that parents and other family members sometimes label their children as such and as a result, gifted children may

internalize these messages and think that there is something wrong with their mental health and/or personality.

The *International Handbook of Giftedness and Talent* (Heller, Monks, & Passow, 1993) also stated that gifted individuals were overexcitable. The text claimed to provide "a comprehensive handbook designed to provide a synthesis and critical review of the significant theory and research dealing with all aspects of giftedness" (p. xv.). Its intended audience was "researchers, practitioners, program planners, and policy makers, among others" (p. xvi). In the text, Silverman wrote a chapter that discussed how OEs were related to giftedness (1993). She reviewed some research and Dabrowski's work and concluded that gifted persons had "extraordinary levels of sensitivity and compassion […] a capacity for rich, intense emotions [that] remain in the personality throughout the lifespan" (p. 642). In *Counseling the Gifted & Talented* (Silverman, 2000b), Silverman again noted that gifted individuals are significantly more overexcitable than their non-gifted peers (Silverman, 2000a). Because of this, gifted individuals have "a unique inner life which marks the gifted as different from their peers" (p. 12). Part of this difference is that disturbing events impact overexcitable, gifted adolescents more significantly than others in their peer group and society. Silverman (2000a) noted that this causes gifted adolescents to perceive themselves as overly sensitive, strange, immature, and potentially even mentally unstable. These perceptions, Silverman said, can lead to severe depression. In the same textbook (Silverman, 2000b), Lovecky (2000) stated that gifted children's OEs meant that they needed less sleep than others, had high energy, enjoyed taking risks, and had a great deal of empathy and compassion for others.

The book *The Social and Emotional Development of Gifted Children: What Do We Know?* (Neihart, Reis, Robinson, & Moon, 2002) also had a chapter dedicated to the

relationships between Dabrowski's Theory, OEs, and gifted students. The book claimed to be authoritative and directed towards a broad audience. In its foreword, Cross stated that the text had value in three ways "[as a] logical synopses of differing subsets of the literature base…it provides guidance for researchers…[and] it establishes a watermark of our level of understanding at this time in history" (2002, p. ix-x). Additionally, Cross hoped that the book would share "important information that will enable caring professionals the opportunity to act on what they know about the social and emotional lives of gifted students" (2002, p. x). In the introduction, Nancy Robinson stated that "this book is addressed to a broad audience of adults who are engaged—or may decide to become engaged—with a population of young people" (2002, p. xii).

In a later book chapter, O'Connor outlined Dabrowski's levels, development potential, and OEs (2002). In doing so, O'Connor noted that, "those providing counseling services to the gifted should consider adding Dabrowski's concepts to their knowledge [base]" (2002, p. 57). He also noted that educators interested in alternative identification methods of gifted students should consider using OE scores, as the gifted population is more overexcitable than the non-gifted population. In a more recent text, *Living with Intensity* (Daniels & Piechowski, 2009), a number of contributors discussed the Theory of Positive Disintegration (TPD), OEs, and giftedness. Like other texts, the book argued that it merited a broad audience, with Mendaglio stating in the forward that the book would be "of great interest to parents, teachers, researchers, and gifted individuals themselves" (2009, p. xi). He also noted that the book helped to emphasize the whole of positive development rather than just OEs. In a number of the book chapters, OEs and giftedness are said to co-occur in individuals (e.g., Meckworth, 2009).

One of the book's predominant themes is that many gifted persons' psychological experiences, especially problematic ones, should be understood through an OE lens (Daniels & Piechowski, 2009). Consequently, self and professional treatment should follow this theoretical understanding. This includes a number of methods for coping with and managing OEs, including Dabrowskian-centered therapy (Jackson & Moyle, 2009a, 200b), spiritual exploration (Gatto-Walden, 2009), managing environments (Daniels & Meckworth, 2009), being patient with one's own and others' OEs (Jackson & Moyle, 2009b), and understanding some conditions such as Attention Deficit Hyperactivity Disorder (ADHD), anxiety, depression, and stress as potential results of OEs (Amend, 2009; Roeper, 2009).

Of all the identified and surveyed texts, only two offered contrasting, skeptical opinions about the relationship between the five OEs and giftedness (Mendaglio & Tiller, 2006; Neihart, Reis, Robinson, & Moon, 2002). And of these opinions, only one book (Mendaglio, 2008) presented a chapter-length argument (Pyrt, 2008) that questioned the relationship between giftedness and overexcitability. The other skeptical opinion was a quote: "Some (e.g., sensitivities and excitabilities), however may indeed be qualitatively special traits of gifted students. We need considerable research, first, to determine whether in fact these characteristics are more common to gifted than non-gifted youngsters" (Robinson, Reis, Neihart, & Moon, 2002, p. 271). This quote appeared in a book chapter in *The Social and Emotional Development of Gifted Children: What Do We Know?* (Neihart, Reis, Robinson, & Moon, 2002).

Themes from Sources

On the whole, the Internet and textbook sources presented gifted individuals as significantly overexcitable. There were two exceptions that disagreed with this depiction, and

they are included in this literature review. No found Internet sources disputed the relationship between OE and giftedness.

It is possible that many resources were missed in the search methods used by review. There are many texts about gifted individuals, particularly gifted children, and there are many websites on the Internet. The search terms may have been inadequate to identify all viable sources, and some such unidentified, uncollected sources might argue that gifted persons are not overexcitable. However, of the sources identified, collected, and summarized above, it is clear that the presentation to the general public, including educators, therapists, parents, and gifted persons themselves, is that gifted individuals are overexcitable and warrant a degree of understanding and treatment. The debate present in the scholarly literature is largely absent for whatever reason.

Need for and Significance of a Systematic Review

As noted above, two distinct scholarly viewpoints on the relationship between giftedness and the five OEs have emerged. In the more popular resources, Internet and text, gifted individuals are presented as definitively overexcitable and a variety of recommendations are given due to this condition. Yet, currently, no efforts have been made to provide a thorough evaluation of the most current, comparative giftedness-OE literature in order to provide clarity to this debate. Such clarity could not only help inform scholars, but also those resources consumed by wider audiences.

Some secondary analyses and research syntheses have been conducted to evaluate the research on gifted persons and their OEs. The first such attempt was Ackerman's (1998) meta-analysis on OEQ I data. Ackerman evaluated the OEQ I's psychometric qualities, as well as how gifted and non-gifted groups performed on it. However, Ackerman did not review the quality of

the collected studies, and since 1998, a large number of studies have been conducted. Also since 1998, the OEQ II was developed, which has now become the predominant instrument in the literature (Falk & Miller, 2009). Falk and Miller emphasized this, noting that only one study has used the OEQ I since 1998.

More recent literature reviews have also attempted to clarify the nature of the giftedness-OE relationship. These were noted earlier, in the proponents and skeptics section. These literature reviews have largely been narrative. Falk and Miller (2009), Tieso (2007a), Harrison and Haneghan (2011), and Mendaglio and Tillier (2006) all reviewed a number of studies and then offered interpretations on the studies' findings and general research trends. Pyrt (2008) conducted such a narrative review, but as noted earlier also calculated some studies' effect sizes. These narrative reviews have attempted to aggregate the research and demonstrate common themes. However, it is noteworthy that these evaluations of the same body of literature have produced two contradictory interpretations. Both proponents and skeptics survey the same studies and data, yet disagree on their meaning and significance.

Amplifying scholarly dispute's importance is the current portrayal of gifted persons on the Internet and in texts. This portrayal uniformly presents gifted persons as overexcitable. If the proponents are correct, then this is not problematic. But, if the skeptics are correct or even partially correct, then this unanimous portrayal of gifted persons as overexcitable becomes problematic. Such a portrayal may be unduly influencing the way teachers, parents, and others treat gifted children. Additionally, it may be inaccurately influencing the way gifted persons think about and interpret their own lives.

In order to help resolve this scholarly debate, and consequently evaluate the validity of the claims made to general audiences, a new synthesis of the literature comparing the OE scores

of gifted and non-gifted samples will be conducted. This new synthesis is a systematic review using quantitative and qualitative methods to evaluate the literature comparing the OE scores of gifted and non-gifted samples.

Systematic Reviews

The systematic review methodology began in the United Kingdom in the healthcare industry (Evans & Benefield, 2001). To better inform policy and practice, government officials desired more succinctness and clearer summarizations of the country's medical research. To do this, researchers adopted a best-evidence approach, which involved collecting some of the best constructed and administered studies. Then, researchers could evaluate those studies' methodologies and findings. This was conceived as an effort to assemble the best possible evidence in a single review, providing the clarity that policy makers sought. For instance, in some healthcare systematic reviews only double-blinded, randomized trial studies using placebo treatment for at least one control group were collected (Boaz, Ashby, & Young, 2002). While initially only British healthcare researchers used systematic reviews, social scientists have adopted the methodology (Evans & Benefield, 2001; Petticrew, 2001).

To evaluate a body of literature, the United Kingdom's Centre for Evidence Based Policy and Practice suggested that researchers first identify studies with sound methodologies and then evaluate those studies' methodological rigor, findings, and anything else established *a priori* (Boaz, Ashby, & Young, 2002). This two-part process of identification and evaluation is guided by a series of *a priori* criteria. In the healthcare systematic reviews, identification criteria were often established as double-blinded, randomized trials using placebos in the control. Often evaluation of studies' methodological procedures has included ordinal ranking (Petticrew, 2001), though this has not always been the case (Boaz, Ashby, & Young, 2002). Those systematic

reviewers choosing to evaluate their samples' findings can include qualitative and/or quantitative procedures.

A systematic review of the literature comparing gifted and non-gifted persons' OE scores would be a helpful procedure towards providing some clarity about the relationship between giftedness and OE. For the systematic review, identified and collected studies had to compare gifted and non-gifted OE scores. This excluded a body of literature only measuring gifted individuals' OEs (e.g., Piechowski, 2006). For the evaluation procedures, the studies' findings were evaluated using quantitative procedures and the studies' methodologies were evaluated using qualitative techniques.

This systematic review helped to illustrate the strengths and weaknesses of the comparative studies' methodologies, sampling procedures, and findings. At times, scholars have commented on the nature of the comparative literature's sampling (Piirto, 2010) and its findings (Pyrt, 2008), however no comprehensive synthesis on the studies' quality has ever been conducted. An analysis of the quality and rigor of these comparative studies, then, could help to provide a better understanding of the current evidence of the giftedness-OE relationship which could help inform academic debate as well as a variety of resources offering information about the affective nature of gifted persons to broader audiences.

Problem Statement

Currently, there is some debate about whether gifted individuals are significantly more overexcitable than non-gifted persons. Also, current resources portray gifted persons as definitively overexcitable. The consequences of this portrayal and debate have implications for how scholars, practitioners, and others conceive of giftedness and interact with gifted persons. In order to address to help resolve this debate, a number of research questions are proposed.

Research Questions

1. What are the various characteristics of these comparative studies?

    a. When were the studies conducted?
    b. Where were the studies conducted?
    c. How many comparative studies have been conducted?
    d. How did researchers operationalized giftedness?
    e. What instrument did researchers use?
    f. What was the size of the gifted and non-gifted samples?
    g. What were the significant scores?
    h. What were the *p* values?

2. How many of the conducted studies found significant differences for each individual OE?

3. Are some scholars' critiques of the comparative studies accurate?

    a. Do the comparative studies have small sample sizes (Piirto, 2010)?
    b. Do the studies have mostly trivial and small effect sizes (Pyrt, 2008)?
    c. Is TOE the only OE on which gifted individuals consistently, significantly outscored non-gifted individuals (Piirto, 2010; Pyrt, 2008)?

4. How methodologically rigorous were the comparative studies?

5. Is the gifted population more overexcitable than the non-gifted population?

Definition of Terms

The prospectus uses the following definition of terms:

1. Gifted/Giftedness: As noted above, giftedness is operationalized in this study as exceptional intellectual and/or academic ability. Often this includes a psychometric component. This definition is broad so it can conform as well as possible to the collected studies' various definitions of giftedness. Each study's definition/operationalization of giftedness is discussed. A table lists each study's definition of giftedness.
2. Meta-analysis: Meta-analyses are a kind of research syntheses in which a number of studies are collected as a sample (Glass, McGaw, & Smith, 1981). The data from these

studies is collected and a variety of quantitative procedures are used to answer old or new research questions.

3. Methodological rigor: This term is common in systematic reviews (Petticrew, 2001; Boaz, Ashby, & Young, 2002). Typically, methodological rigor refers to the soundness with which studies are conducted. Systematic reviews often evaluate studies' methodological rigor based on their use of appropriate data analyses procedures, methodologies, treatments, and accurate reporting of experimental efforts. An ordinal ranking such as "good" or "great" can be given to demonstrate the studies methodological rigor, or the studies various features can be described.
4. Overexcitability: Dabrowski defined overexcitability as "higher than average responsiveness to stimuli, manifested either by psychomotor, sensual, emotional (affective), imaginational, or intellectual excitability, or the combination thereof" (1972, p. 303). These responses can take a variety of forms, the five OEs. Each of the five OEs also has a great deal of variety in manifestation. Chang and Kuo provided a metaphor to explain the five OEs, noting that "overexcitabilities can also be imagined as tubes. All of the information flows within the tubes. The five types of OEs can then be imagined as filters. All stimulation, inward or outward, must go through the filters before processing" (2013, p. 53).
5. Systematic review: A systematic review is a kind of research synthesis that has two phases: identification and evaluation (Boaz, Ashby, & Young, 2001). In the identification and collection phase, a series of criteria are established to exclusively identify methodologically rigorous studies. In the evaluation phase, the collected studies findings

and methodologies are reviewed. This review can include qualitative and/or quantitative procedures.

Limitations

The proposed study has a number of potential limitations. These limitations are discussed individually below.

Generalizing Limitations

It is difficult to generalize to all gifted populations from the proposed systematic review, because the collected studies largely defined giftedness as intellectual and academic ability. This study has chosen to operationalize giftedness in this manner and collect such studies because there are few studies and little data about many other gifted individuals' OE scores. There are some studies that investigate musicians, artists, and many other exceptional persons' OE scores (Falk, Manazarro, & Miller, 1997). But, there is no debate in the literature about the relationship between creativity and OE; it is largely agreed that the two variables are strongly correlated (Mendaglio & Tillier, 2006; Falk & Miller, 2009). This systematic review is not concerned with creativity, but rather with intellectual giftedness and OE. The current scholarly debate about this relationship, as well as the common portrayal of gifted persons as overexcitable, warrant an investigation into this relationship. Perhaps the relationship between creativity and the five OEs also warrant a research synthesis, but those variables are not the topic of this study.

Publication Bias

Publication bias (Glass, McGaw, & Smith, 1981), also called the grey literature problem (Boaz, Ashby, & Young, 2002), is a common limitation of research syntheses. This limitation occurs when the studies collected in the research synthesis' sample are only those that have been published. Studies not published may have been more likely to demonstrate null findings.

Consequently, the collection of only published studies, which are far easier to collect than unpublished studies, would bias the research synthesis towards showing that the studied relationship or treatment was significant. In the case of the comparative studies, published articles would presumably demonstrate that gifted individuals would significantly outscore non-gifted individuals, while non-published articles would be more likely to show the opposite.

This kind of limitation is a common challenge for research syntheses (Glass, McGaw, & Smith, 1981). In order to address the publication bias, unpublished studies were searched for. To do this, a variety of search procedures were used, including checking bibliographies and Internet databases for unpublished articles. The exact search procedures are described in Chapter 2.

Sampling Procedure Bias

Systematic review's process of only sampling rigorously conducted studies has limitations, two of which Weed noted (2005). First, systematic reviews' selection criteria can exclude studies using unusual methodologies, instruments, or other unusual processes. Such studies may have significant findings regardless of their irregular nature. Secondly, flawed studies may be able to provide data or insight about a phenomena or treatment. This is the same rationale that Glass, McGaw, and Smith (1981) gave to argue that quantitative meta-analytic procedures be as comprehensive as possible, including data from severely methodologically flawed studies, and then only afterwards considering methodological flaws. In a sense, this would be a sort of *a posteriori* kind of systematic review.

Both of the problems noted by Weed (2005) are forms of a sampling bias. And, it may be true that any contrived inclusion-exclusion criteria could omit a number of worthy studies from a systematic review's sample. For instance, in regards to this research study, only studies that compare gifted and non-gifted individuals' OE scores were collected and analyzed. Yet, there are

very many studies on gifted individuals and their OEs without non-gifted control groups (e.g., Piechowski, 2006). Additionally, researchers who have worked with gifted populations for years, including Silverman (2000), Tolan (2009), and Roeper (2009), have reported that gifted children are highly overexcitable, particularly highly gifted children. These researchers also reported that parents of gifted children agree that their children are highly overexcitable. All of these studies and anecdotal data are omitted from this systematic review due to the strategy to only select the comparative studies.

While this is a serious limitation to consider, it is important to note that it is difficult to make useful inferences regarding the difference between non-gifted and gifted populations' OE levels from non-comparative studies and data. This is because the OEQ I, OEQ II, and ElemenOE lack norms. Consequently, it is difficult to interpret gifted students' scores and regard them as significantly overexcitable. While it is true that a number of researchers have done this (Piechowski, 2006), this kind of study is similar to expert opinion. Claiming that certain OEQ I or II responses or scores demonstrated significant excitability levels is difficult when other respected experts (Pyrt, 2008) have disputed such interpretations.

Additionally, there is a logical problem in stating that gifted individuals are significantly overexcitable without a comparison. Significantly overexcitable implies a comparison, and a difference that exists from said comparison. And yet, if there is no control (i.e., non-gifted group), it is difficult to determine if gifted individuals are significantly overexcitable, or even overexcitable. The general population may in fact be more overexcitable than the gifted population, or as excitable. Or, the OEQ I or II may measure large portions of the population as overexcitable due to a low ceiling effect or a number of other psychometric issues that the

instrument/s may suffer from. Without a control group, it is difficult to establish that gifted persons are overexcitable.

Because of this rationale, comparative studies are regarded as more methodologically rigorous. Only comparative studies were sampled for this study. Still, it is important to note that some of the non-comparative studies have findings that demonstrate the nature of the giftedness-OE relationship. This is an important limitation to consider in evaluating this systematic review's findings.

Limitations in Analysis

The methods of data analysis and methodology analysis have a number of limitations. These are all related to the individual procedures, and so will be discussed in the methodology section of the dissertation.

CHAPTER 2: COLLECTION OF SAMPLE AND LITERATURE REVIEW

This chapter presents summaries of a collection of studies that compare gifted and non-gifted samples' OE scores. First, though, the methodology for collecting this sample is discussed. Methodology is discussed in this chapter because, for the proposed systematic review, the sample will be these collected studies. In order to illustrate how the sample was collected, a sampling procedure is presented. After this sampling procedure is discussed, the studies are presented individually. Each study's instrument, sample size, methods, statistical analyses, and findings are discussed. At the end of these summaries, a table with aggregated information about each study is presented.

Systematic Review Methodology

There are two general steps or stages for a systematic review (Boaz, Ashby, & Young, 2002). One is the collection of the studies, the other the evaluation of the collected studies. Below, the methodology for the identification and sampling procedures is discussed. In Chapter 3, the methodology for evaluation of these studies will be discussed.

Sampling Procedure

In order to collect a sample of studies comparing the OE scores of gifted and non-gifted persons, the resources of Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) were used (PRISMA, n.d.a.). PRISMA is a global, non-profit organization concerned with well-conducted research, and in particular, medical, randomized trial research. PRISMA was initially an international group "called QUOROM Statement (Quality of Reporting of Meta-analysis), which focused on the reporting of meta-analyses" (PRISMA, n.d.b., para 3). In 2009, QUOROM updated its research procedures, which included making the procedures more

applicable to fields outside of healthcare. In the same year, QUOROM changed its name to PRISMA.

PRISMA's website offers a flowchart, that helps authors "ensure the transparent and complete reporting of systematic reviews and meta-analyses" (n.d.c., para 1). The flowchart template can be found in Appendix B. In order to collect a sample for the systematic review, the steps illustrated in PRISMA's flowchart were used. Below, the method of this implementation is described.

Search Procedures

The studies were identified using a variety of search engines and methods. The databases of the journals *Roeper Review*, *Gifted Child Quarterly*, and *High Ability Studies* were all searched. These journal databases were selected because they regularly publish articles about gifted individuals. The databases EBSCO and Academic Search Complete were also searched. A variety of other websites were searched, including Louisiana State University's library, Amazon.com, Google Scholar, and positivedisintegration.com. In all searches, the key words "overexcitabilities", "Dabrowski", "overexcitability", "giftedness + overexcitability", and "advanced development" were used. Louisiana State University's Interlibrary Loan office was also used to acquire one study (Breard, 1994).

The website positivedisintegration.com was the most used resource. Its bibliography portal (Tillier, n.d.c.) listed many studies, book chapters, dissertations, master's theses, and conference presentations. Some of the citations provided a live link that was used to acquire the resource. The bibliography was read in order to identify studies comparing gifted and non-gifted individuals' OE scores. Also, the bibliographies of previous literature reviews, including Ackerman (1998), Falk and Miller (2009), and Pyrt (2008), were searched.

Identification

In systematic reviews, identification processes rely on a pre-determined, explicit procedure for sampling studies (Khan, Kunz, Kleijnen, & Antes, 2003). Such procedures help to encourage the researcher to be honest, direct with readers, and most importantly, their work becomes reproducible, allowing for checks on its validity (Boaz, Ashby, & Young, 2002). In practice, many kinds of research syntheses have some kind of selection criteria or deliberate sampling procedure(s). Otherwise, there would be no logical reason to restrict the number and variety of studies included in a given meta-study.

In establishing a selection or inclusion-exclusion criteria for this systematic review, the only criteria is that studies compare the OE scores or levels of gifted samples to non-gifted samples. Giftedness in the studies should be of a cognitive, academic kind as outlined in Chapter One. Non-giftedness, then, entails all those individuals who are not exceptionally cognitively or academically skilled. Additionally, samples of non-gifted individuals should be fairly representative of the general population.

Records identified through database searching. Nine comparative studies were identified through database searching (*n*=9). These studies included: Gallagher (1985); Bouchet and Falk (2001); Bouchard (2004); Yakmaci-Guzel and Akarusu (2006); Tieso (2007a); Siu (2010); Wirthwein and Rost (2011); Wirthwein, Becker, and Loehr (2011); and Harrison and Haneghan (2011).

Additional records identified through other sources. Eleven comparative studies (*n*=12) were identified through other sources, including Tillier's online bibliography (Tillier, n.d.c.), Ackerman's bibliography (1998), Falk and Miller's bibliography (2009), and Pyrt's bibliography (2008). These twelve studies included: Dabrowski (1972); Piechowski and

Colangelo (1984); Ackerman (1993, 1997); Miller, Silverman, and Falk (1994); Breard (1994); Piirto, Assone, Ackerman, and Fraas (1996); Ackerman (1998); Domroese as cited by Ackerman (1998); Chang (2001); Yakmaci-Guzel (2002); Sanz (2006); and Falk, Yakmaci-Guzel, Chang, Sanz, and Chavez-Eakle (2008).

Records after duplicates removed. Combined, 21 comparative studies were found using the established search protocol, terms, and sources described earlier. Several studies, though, were duplicates. Consequently, the following duplicate studies were omitted: Piirto, Assone, Ackerman, and Fraas (1996), Ackerman (1998), and Wirthwein, Becker, and Loehr (2011). The Piirto, Assone, Ackerman, and Fraas (1996) used the same non-gifted and gifted samples as Ackerman (1993, 1997) and reported the same results. Similarly, Ackerman (1998) also reused earlier studies' samples and findings, as did Wirthwein, Becker, and Loehr (2011), which republished the same data as Wirthwein and Rost (2011).

Full text articles assessed for eligibility and full text articles excluded. Eighteen studies were assessed for eligibility (n=18), and four studies were excluded (n=4). These included: Chang (2001), Yakmaci-Guzel (2002), and Sanz (2006). These studies were excluded because they were unavailable in English. ILL requests were made for each study, but no English translation of the studies exists or at least could not be found. However, these studies were summarized in Falk et al.'s book chapter (2008). Chang, Yakmaci-Guzel, and Sanz were each coauthors on that book chapter, which is summarized in the literature review and will be included in the evaluation.

Dabrowski's study was also excluded (1972). This is because while Dabrowski did compare a gifted sample to a non-gifted sample, the non-gifted sample was entirely composed of "mentally retarded" children whom Dabrowski employed as a control group (p. 203). The lack of

a non-gifted, control group comprised of a representative sample of the general population is the reason for omitting Dabrowski's study.

Studies included in quantitative and qualitative synthesis. A total of fourteen studies are described in this chapter and included in the later quantitative and qualitative syntheses (*n*=14) (see Appendix C for a completed PRISMA flowchart). These include: Piechowski and Colangelo (1984); Gallagher (1985); Ackerman (1993, 1997); Miller, Silverman, and Falk (1994); Breard (1994); Domroese as cited by Ackerman (1998); Bouchet and Falk (2001); Bouchard (2004); Yakmaci-Guzel and Akarusu (2006); Tieso (2007a); Falk, Yakmaci-Guzel, Chang, Sanz, and Chavez-Eakle (2008); Siu (2010); Harrison and Haneghan (2011); and Wirthwein and Rost (2011).

Instrumentation

As all but two of these studies used the OEQ I or OEQ II (Bouchard, 2004; Chang as cited by Fak et al., 2008), these instruments are briefly discussed here. As noted earlier, Dabrowski and Piechowski developed empirical methods for measuring the five OEs that were time consuming, laborious, and required a high degree of knowledge about Dabrowski's theory of development (Silverman, 2008). As a result, researchers who were curious about OEs, disintegration, and giftedness, had no means to study those concepts.

The first effort at a solution to this problem was Piechowski's Overexcitability Questionnaire I, or the OEQ I. Piechowski wanted to create a valid, reliable instrument to measure OEs. To do this, he examined 433 examples of OEs in his and Dabrowski's case studies (Piechowski, 2006). By observing what questions and stimuli allowed Dabrowski's patients to demonstrate their OEs, Piechowski was able to develop a standard set of open-ended questions. Instead of a set of verbal stimuli, observations, personal histories, and other qualitative methods,

the OEQ I could now be used to measure OEs (Silverman, 2008). Initially, the OEQ I had 46 questions, but it was reduced to 21 questions (Piechowski, 2006). Some example questions include:

> Describe how you feel when you are extremely joyous, ecstatic, or incredibly happy.
> How well do you visualize events, people, and things—real or imaginary? Give examples?
> What pleasures do you get from different tastes?
> When you ask yourself, "Who am I?" what is the answer?

The answers for these questions are evaluated for all five OEs (Piechowski, 2006). This is because stimuli can produce unpredictable responses for many overexcitable persons. Answers with a high degree of one or more OE would receive a score of a 3 (highest) or 2. Less OE presence would receive a 1 or 0 (lowest). The highest possible score for each of the five OEs is 21 (Piechowski & Colangelo, 1984).

Two trained coders separately spend one or two hours evaluating each questionnaire (Piechowski, 2006). Afterward, they compare scores and settle on one score from both raters. Most studies inter-rater reliabilities exceed 60% (Falk, et al., 2008). Colangelo and Falk noted that inter-rater reliability was most often between .70 and .80 (1984). If raters significantly disagree about scores, the two raters discuss differences and attempt to reach an agreed score. If the dispute is not settled, the scores are either averaged (Falk et al., 2008) or an expert, namely Michael Piechowski or Frank Falk, settles the stalemate (Silverman, 2008).

The Overexcitability Questionnaire II

While the OEQ I was a great advancement, it was still a difficult method to evaluate due to the length of time for evaluation (Silverman, 2008). Additionally, Ackerman (1993) observed that the OEQ I's open-ended, written nature conveyed higher scores to more linguistically fluent populations. So, verbally gifted persons or older persons might receive more 2's and 3's than younger, less verbose groups. Consequently people with high OEs, but poor writing skills might

have artificially lowered scores. Also, the OEQ I is an untimed test, so a participant might write enough to have at least some of responses seem indicative of high OEs.

The test's practical problems were even greater (Silverman, 2008). This was the challenge of scoring respondents' answers, often long and diverse. Consequently, careful reading was always needed to find potential evidence for one or more of the OEs. Making this limitation more severe was that few could provide such a careful reading, as there were still too few scholars capable of accurately interpreting and scoring OEQ I answers (Piechowski, 2008). The fact that rating disputes had to be settled by Falk or Piechowski evidences this. And conducting large sample size studies using the OEQ I was very impractical (Falk et al., 2008).

To address these shortcomings, researchers attempted to create an instrument that was easier to administer and evaluate (Silverman, 2008). With such a tool, non-Dabrowski experts could practically and accurately measure and study OEs and how they related to gifted children and adults. Ideally, it would also help eliminate some writing-related score biases too.

There were early efforts to create a valid, practical quantitative instrument (Lewis, Kitano, & Lynch 1992), but no such instrument became popularly used until the Overexcitability Questionnaire II (OEQ-II). The OEQ II, a Likert scale instrument (Falk et al., 1999), was developed in the late 1990s and almost immediately became the instrument of choice for OE research (Falk & Miller, 2009).

The OEQ II's questions and scoring was created from 300 OEQ I responses (Silverman, 2008). From these responses, 124 items were developed at an eighth grade reading level (Falk & Lind, 1999). Afterwards, a sample of 562 university students piloted these items. Statistical analyses illustrated that 50 items were distributed equally across five factors (the five OEs).

More piloting was conducted using the 124-item instrument (Falk & Lind, 1999). 324 student subjects from Canada and the United States' completed the instrument with similar results to the university student pilot. The two samples were combined (*n*=852), and the test designers conducted a final principal component analysis with varimax rotation on the combined samples' results. This procedure yielded a stable factor structure of five 10-item factors. Each of the five 10-item factors was associated with a separate one of the five OEs. The items on each factor had loadings of .50 or above, and Cronbach's alpha for scale reliability was fairly high: .89 (TOE), .89 (SOE), .86 (POE), .85 (MOE), and .84 (EOE).

The current OEQ II is comprised of these five 10-item subscales, each measuring a different OE (Falk & Lind, 1999). Total, the instrument has 50 questions. Each item is a Likert scale, forced-choice question. The possible answers range from 1 to 5. A response of 1 is "not at all like me" and a response of 5 is "very much like me". Bouchet and Falk (2001) provided some example questions:

> Psychomotor. "When I have a lot of energy, I want to do something really physical." Sensual. "Viewing art is a totally absorbing experience." Intellectual. "Theories get my mind going." Imaginational. "Things that I picture in my mind are so vivid that they seem real to me." Emotional. "I can be so happy that I want to laugh and cry at the same time" (p. 263).

Currently, the instrument is widely used (Falk & Miller, 2009). Falk and Miller (2009) noted that after 1999 and the OEQ II's inception, there was only one study using the OEQ I, while there were nine studies using the OEQ II. Silverman (2008) also noted that the instrument has been translated into Spanish, Chinese, Turkish, and Polish, while Wirthwein and Rost (2011) later conducted a study using a German version of the OEQ II. Also, due to the OEQ II's ease of administration and scoring, researchers are able to now study a variety of variables along with OEs. These studies are largely correlational studies that analyze how OEs correlate with other

variables including gender (Miller, Falk, & Huang, 2009), self-concept (Gross, Rinn, & Jamieson, 2007), ADHD (Mika, 2006), family membership (Tieso, 2007b), and sexuality (Treat, 2006). Some studies have used the OEQ II to compare gifted and non-gifted sample sizes' OEQ II scores (e.g., Bouchet & Falk, 2001). Every such available, comparative study is discussed below.

Literature Review: Comparative Studies

Prior to conducting a quantitative and qualitative synthesis of the comparative studies, each study is described independently. This description includes their sample sizes, how the researchers operationalized giftedness, methodology, instruments, statistical analysis, and findings. These studies use various instruments, statistical procedures, occur in numerous countries, and are unique in several other ways. However, each study attempted to demonstrate that gifted individuals significantly outscore or outperform a non-gifted sample. Some of the studies also attempted to demonstrate that the OEs were significantly related to other variables in some way. These findings are also discussed. Studies are described in chronological order and presented in table form at the end of the chapter.

Individual Studies

Piechowski & Colangelo (1984)

Piechowski and Colangelo (1984) analyzed several studies' findings, comparing the OEQ I scores of 28 gifted adults (Silverman & Ellsworth, 1981), 49 gifted adolescents (Colangelo, Piechowski, & Kelly, 1982), 19 adult artists, and 42 average ability graduate students (Lysy & Piechowski, 1983). The gifted adults were identified based on scoring in at least the 98th percentile of standardized tests (including the GRE, SAT, or IQ tests), membership in a school's gifted program, or distinguishing themselves in the arts. The 49 gifted adolescents identified as

gifted based on a combination of test scores, grades, and teacher nominations The 19 adults artists included writers, poets, singers (rock and classical), film producers, dancers-choreographers, a graphic designer, and a weaver. The researchers assumed that the graduate students were not gifted because "most of them are not gifted, based partly on the content of their responses and partly on the fact that their mean overexcitability scores are nearly identical to those of a sample of community women (n= 51) whose mean number of years of schooling (15.12) and general level of achievement are lower than those of graduate students" (p. 83).

With the subjects' OEQ I data collected, Piechowski and Colangelo (1984) made three comparisons: gifted adults versus (vs.) non-gifted adults, gifted youth vs. adult gifted, and gifted adolescents vs. non-gifted adults. To determine if these comparisons demonstrated significant differences, the researchers used the Mann-Whitney test. Compared to the non-gifted, graduate students, the gifted adults scored significantly higher on TOE ($p < .0000$) and EOE ($p < .01$). Score differences on MOE and SOE scores were almost at a significant level established by the researchers ($p < .11$ for both).

Gifted adolescents scored significantly lower than the graduate students on SOE ($p < .0014$), but significantly higher on TOE ($p < .015$), MOE ($p < .033$), and EOE ($p < .0002$) (Piechowski & Colangelo, 1984). The gifted adults scored higher than the gifted adolescents on SOE ($p < .0000$), POE ($p < .071$) and TOE ($p < .0001$). The authors reported the artists' OEQ I scores, however did not make any comparisons. Piechowski and Colangelo concluded that the gifted samples were significantly more overexcitable than non-gifted samples, and that age impacted OEQ I scores.

Gallagher (1985)

Gallagher (1985) looked for relationships between OEQ I scores and giftedness, verbal creativity, figural creativity (as measured by the Torrance Test of Creative Thinking), and California Achievement Test (CAT) scores on the reading, grammar, and mathematics subtests (1986). Gallagher did this with 12 gifted students and 12 randomly selected, non-gifted students sixth graders. The gifted students were also in the sixth grade and they were in the school's gifted program. The school identified gifted students using a behavioral checklist (completed by teachers), a high academic record, above average performance on the CAT, and a superior score on the Otis Lennon Test of Mental Ability.

Gallagher collected all of the students' test data and then used Pearson's *r* and Mann-Whitney tests of significance to look for relationships between OEs and the other variables (1985). The gifted sample's EOE, MOE, and TOE score means were significantly higher than the non-gifted group ($p < .05$). When looking at creativity, Gallagher divided the students' scores into three stanines: low, medium, and high. She then found that the top third verbal creativity scores had significantly higher MOE score mean than the bottom third of creativity scorers ($p <.05$), and the top third of the figural creativity scorers had significantly higher POE score means($p < .05$).

Gallagher (1985) also divided the students CAT scores on reading, grammar, and math scores into three stanines. Then, she found that the high reading scorers differentiated themselves with a significantly higher inteTOE l OEQ I score means ($p < .05$), and those who performed in the top third on the mathematics subtest had significantly higher TOE and MOE scores than the other children ($p < .05$). Gallagher concluded that the OEs were related in a variety of ways to creativity, achievement, and giftedness.

Ackerman (1993, 1997)

Ackerman conducted a study in 1993 and reported the data in her unpublished master's thesis (1993). Later, she used the study and its results for a publication in 1997. The two studies do have some differences. Namely, the 1993 master's thesis looked more carefully at the relationship between OEQ I scores, culture, and language fluency and verbosity. However, both studies largely use the same data and report the same results. Consequently, they are presented here together.

Ackerman (1993, 1997) used the OEQ I to compare gifted and non-gifted samples' OEs. She also investigated potential relationships between OEs and gender. Ackerman also studied the OEQ I itself. She looked for relationships between OEQ I scores and individuals' bilingual ability and culture. Ackerman also investigated the relationship between OEQ I score and total number of words in response to the OEQ I's questions (1993).

Ackerman (1993, 1997) used a sample of 79 high school students, 42 of whom were identified as gifted while the remaining 35 were classified as non-gifted. Within the gifted group, there were 10 males, 32 females, and in the non-gifted group there were 20 males and 17 females. All of the students were in a Canadian private high school system. The gifted program identified its students based on a number of criteria including achievement test scores, recommendations, grades, and an IQ of at least 120. Ackerman noted that exceptions to this IQ threshold did occur, but did not specify how many such exceptions occurred.

All of the students completed the OEQ I (1993, 1997). Afterwards, Ackerman conducted a discriminate function analysis. The analysis identified three OEs as discriminating between the groups: EOE, TOE, and POE. The discriminate function was $d = .80z$ (POE) + $.44z$ (TOE) + $.35z$ (EOE). Mean discriminate scores were .59 for the gifted sample and -.67 for the non-gifted

sample. Using Bartlett's Chi Square test, they found that the discriminate function separated the two groups significantly (χ_2= 25.73, $p < .001$). But, 35% of the non-gifted group shared the gifted OE profile. This led Ackerman to conclude that additional methods of identification may be necessary for the detection of giftedness in an individual.

When only gifted male or females were compared to their non-gifted, gender equivalent, the discriminating OEs were similar, with POE, TOE, and EOE as the most discriminating (Ackerman, 1993, 1997). Ackerman used Spearman's Rho rank order correlations between the five OEs and lingualism, cultural influence, and word count (1993). She did this for the total sample. In the total sample, significant correlations were found between lingualism and culture and EOE. Word count was significantly correlated with all five of the OEs, meaning that more verbose answers received higher OEQ I ratings. Ackerman felt that the findings indicated that the OEQ I could serve as a discriminating instrument between gifted and non-gifted samples, but the instrument might favor more fluent writers.

Breard (1994)

Breard (1994) attempted to use the OEQ I to differentiate between gifted, near-gifted, and non-gifted groups. Breard was attempting to see if the OEQ I would identify more gifted students than traditional psychometric means could. Also, Breard investigated the relationships between the five OEs and ethnicity and other demographic variables.

Total, Breard sampled 117 fourth and fifth graders, between ages 9 and 12. 72 of the students were African-Americans, while 45 were Caucasians; 69 were female, 48 were male. The students were all drawn from school districts in South Carolina, which used a 100-point scale to identify for giftedness. 90 points are based on standardized test and aptitude scores and the remaining 10 points are determined at individual school district's discretion. The study's gifted

group scored from 89.5 to 100, near gifted 80-89.5, and non-gifted below 80. 39 of the subjects were gifted, 30 were near gifted, and 48 were non-gifted.

Once all of the students completed the OEQ I, Breard (1994) used a predictive discriminant analysis to see if the OEQ I scores would be able to differentiate between the three groups. Breard found that TOE and EOE discriminated the most. She provided two functions: *d= .48269z (TOE) + .75271z (EOE);* λ*=.93* and *d= .92161z (TOE) - .71818z (EOE);* λ*=.91.*The functions were able to accurately classify 23 of the 48 gifted students, 4 of 30 near gifted students, and 24 of the 39 non-gifted students. The functions were able to correctly classify 40.9% of all of the subjects. These functions increased the number of African Americans identified as gifted by 14%. Breard concluded that TOE and EOE reliably differentiated between gifted and non-gifted populations.

Miller, Silverman, and Falk (1994)

Miller, Silverman, and Falk (1994) compared OE scores between a group of gifted adults and a group of non-gifted graduate students from a previous study (Lysy & Piechowski, 1983). The authors were also trying to measure any differences between gender scores and the relationship between OEQ I scores and scores on the Definition Response Instrument (DRI). The DRI measures level of emotional development using six open-ended questions (Gage, Morse, & Piechowski, 1981).

The gifted adults numbered 41 with an average age of 37. They were identified using Mensa membership or through acquaintance with the researchers. 15 of the participants were Mensa members who had an IQ at or above the 98th percentile. 19 of the participants had at least a 1200 on the SAT or the GRE, and 4 of the participants had an IQ of at least 130. The non-

gifted control group was drawn from Lysy and Piechowski's study that had 42 subjects who were an average age of about 29. All of the subjects completed the OEQ I (1983).

Initially, Miller, Silverman, and Falk conducted a MANOVA with gender and giftedness/non-giftedness as independent variables and the five OEs as dependent variables (1994). The test found no significant interaction between gender and giftedness. A stepdown analysis was then performed to determine on what OE/s gifted and non-gifted groups significantly differed. The researchers found that the gifted sample significantly outscored the non-gifted, graduate student sample on EOE (f=7.51, $p < .01$) and TOE (f=11.13, $p < .01$). The groups did not demonstrate significant DRI score differences.

Domroese as cited by Ackerman (1998).

Domroese, as cited by Ackerman (1998), attempted to use the OEQ I to identify gifted students. To do this, Domroese formed three groups of fifth grade students, gifted, near-gifted, and non-gifted. Students were placed in their groups based on their performance on the Ravens Progressive Matrix, the cognitive Abilities Test, and the Iowa Test of Basic Skills. The non-gifted (n=30) scored at or below the 79th percentile, the near-gifted scored in between the 80th and 89th percentiles (n=27), and the gifted group (n=25) scored at or above the 90th percentile. Domroese expected that the gifted group and some members of the near-gifted group would score significantly higher than the other participants. The three groups completed the OEQ I. Their scores were compared using ANOVAs, and no significant OE differences were found.

Bouchet and Falk (2001)

Bouchet and Falk (2001) explored the relationships among giftedness, gender, and OE. The participants in this study were 562 undergraduate students from a university in the Midwest. Within this sample, Bouchet and Falk identified three schooling categories based on the

participants' high school curricula: membership in gifted programs, membership in advanced placement classes, and membership in standard programs. Within the sample, 140 students had been in gifted programs during high school, 129 had been in advanced placement programs, and the remaining 281 had been in standard programs. The students also identified their gender and completed the OEQ II.

To analyze the results, Bouchet and Falk used a MANOVA test with the five OE subscales as dependent variables and school category and gender differences as independent variables (2001). For gender, they found that overall males scored significantly higher than females on the TOE (f=41.96, p < .00), MOE (f=26.77, p < .00), and POE (f=10.77, p <. 01) while females score significantly higher on EOE (f=79.96, p < .00) and SOE (f=3.74, p <. 05). Gender differences within the gifted sample, though, were much less significant, with only EOE (f=5.57, p < .00) and MOE (f=1.94; p < .14) being significant. Gifted females outscored gifted males in EOE and gifted males outscored the females on MOE.

Bouchet and Falk (2001) found that there were significant differences due to school category/grouping. The gifted sample significantly outscored both the advanced placement sample and the traditional schooling sample on EOE (f=6.92, p < .00) and TOE (f=10.38, p < .00). Additionally, the advanced placement sample significantly outscored the traditional sample on the same OE subscales. Bouchet and Falk concluded that the gifted sample was significantly more overexcitable than the non-gifted sample and advanced placement sample.

Bouchard (2004)

Bouchard (2004) created an instrument, the ElemenOE, that allowed adults to rate elementary school children's OEs. She piloted the instrument and employed it in her study, having teachers rate gifted and non-gifted students. She initially had 100 Likert scale items. Five

Dabrowskian scholars rated the items, and the 61 best rated items comprised the ElemenOE pilot. After piloting the ElemenOE in over 300 classrooms, Bouchard reduced the instrument to its 30 strongest items.

After the pilot studies, Bouchard used the instrument to attempt to find significant OE differences between 75 non-gifted children and 96 gifted children (2004). The children were identified as gifted in school districts in the greater Houston area. According to the Texas Association for the Gifted and Talented (2012), gifted children in Texas are identified by the following law:

> Students, children, or youth who give evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who need services and activities not ordinarily provided by the school in order to fully develop those capabilities (Title IX, Part A, Definition 22.)

Multiple t-tests revealed that the gifted group scored significantly higher on TOE (t=22.83, $p < .000$), but significantly lower on POE (t=-6.43, $p < .012$). A discriminant analysis using Wilk's Lambda found that these OE differences accurately predicted students' giftedness 76% of the time. However, the other 24% of the gifted group did not have a significantly higher TOE and lower POE than the non-gifted group. Furthermore, 42.7% of students who had not previously been identified as gifted shared a similar OE profile with the gifted group. Bouchard speculated that some gifted students may have been previously looked over and remained unidentified.

Yakmaci-Guzel and Akarsu (2006)

Yakmaci-Guzel and Akarsu (2006) investigated the difference between overexcitabilities, intelligence, motivation, leadership, and creativity. To measure intelligence, the researchers administered the Raven Advanced Progressive Matrices Test (APM) to 10th graders. These students' scores were then divided into three categories: low intellectual ability group (below 9

points on the APM), high intellectual ability group (above 27 points), and the middle or average intellectual ability group (scores between 9 and 27). Of the 71 students, only 37 were in the low ability group and only 35 were in the high ability group. Yakmaci-Guzel and Akarsu then randomly selected 33 students who scored at or very near the 50th percentile to be in the middle group.

To measure overexcitability, the researchers used the OEQ I (Yakmaci-Guzel & Akarsu, 2006). To measure motivation, leadership, and creativity, the researchers had teachers complete an observational checklist based on Renzulli's motivation construct and Marland's definition of creativity and leadership. Creativity, leadership, and motivation scores were then placed into three stanines, high, middle, and low. However, the nature of the groups' scores was not discussed. After the OEQ I data was evaluated, the researchers performed a one-way ANOVA and a series of t-tests to determine if how the variables were related. Group membership according to intelligence, motivation and leadership were the independent variables, and the five OE subscales were the dependent variables.

The researchers found that high intellectual ability students scored significantly higher than low intellectual ability students in MOE (f=55.902, p< .005) and TOE (f=510.735, p<.001). The high motivation group (n=36) also scored significantly higher than its low counterpart (n=23) in MOE (f=54.485, p<.05) and TOE (f=54.559, p<.05). Again, the high leadership group significantly outscored the low leadership group in TOE (t=2.262, p<.026) and in MOE (t=2.141, p<.038). The n's for leadership groups were not reported. The high creativity group (n=22) had significantly higher POE (f=54.551, p<.05), SOE (f=54.021, p<.05), MOE (f=55.155, p<.01), TOE (f=58.357, p<.001) and EOE (f=53.983, p<.05) overexcitability scores than the low

creativity group (n=22). The researchers concluded that students who were better leaders, more motivated, and intellectually gifted were more likely to be overexcitable.

Tieso (2007a)

Tieso (2007a) conducted a study investigating the OE differences between groups based on gender, age, and giftedness. To do this, Tieso compared the OEQ II scores of males and females, gifted and non-gifted, and gifted elementary and gifted middle school students. The total number of participants was 480, which segmented into the following subgroups: 263 females and 217 males; 249 elementary school students and 231 middle school students; and 184 typical students and 296 gifted students. All students were drawn from five East coast school districts, which used matrices to identify its gifted students. These matrices included "a minimum score on standardized tests of achievement, ability, or creativity represents the baseline for placement in GT services with no delineation among students based on identification by ability or achievement scores (i.e., highly gifted, talent pool, etc.)" (para. 8). All of the students completed the OEQ II, and the data was collected and analyzed using ANOVA and MANOVA procedures with the five OEs as dependent variables and the various group memberships as the independent variables.

The means for all females and males indicated some significant gender differences. Females had higher SOE (f=16.87; $p < .011$) and EOE (f=41.66; $p < .011$) scores than males (Tieso, 2007a). There were also significant differences between the gifted and non-gifted groups. The gifted group significantly outscored the non-gifted group on MOE (f=7.00; $p < .01$) and TOE (f= 7.46; $p < .01$). Within the gifted sample, there was also significant variance. Overall, the gifted elementary students had a higher OE mean scores than the middle school students. The MOE (f=20.06; $p < .011$) and SOE (f=23.78; $p < .011$) differences were significant. Such

significant differences were not evident between typical elementary and typical middle school students, and gender differences were less significant for the gifted groups. Tieso concluded that gender and age are related to OE.

Falk, Yakmaci-Guzel, Chang, Danz, and Cavez-Eakle (2008)

In a book chapter, Falk, Yakmaci-Guzel, Chang, Danz, and Cavez-Eakle (2008) presented four studies of OE scores and giftedness. Each study compared gifted person's OEQ II scores with non-gifted person's scores. Studies were conducted in Spain, Taiwan, Turkey, and Mexico. None of the studies are available in English. For the purposes of this literature, each study will be reviewed individually. The Mexico study is excluded, primarily because its variables are not limited to OE and giftedness. While the study's participants, artists and scientists, are certainly gifted, they are not gifted in the sense of the other participants in this literature review who are identified as gifted through standardized tests, achievement scores, and other academic or intellectual criteria. This is particularly true of the study's artist participants who are not differentiated from the scientists in the sample or in the findings. Again, these artists and scientists are probably gifted, but the artists may not meet the definition of giftedness for this literature review.

Sanz's study in Spain had a sample size of 102 gifted students who were an average age of 11.05 and 102 non-gifted students who were an average age of 11.70 (Falk et al., 2008). The study found that the gifted group scored significantly higher on MOE (t=2.188, $p < .05$) and TOE (t=4.533, $p < .001$) than the non-gifted group.

In the study in Taiwan, Chang had a sample of students of all ages, with a non-gifted group of 2,046 and a gifted and talented group of 951 (Falk et al., 2008). In reporting the results, Falk et al. noted that Chang had created three groups, gifted, talented, and non-gifted. The sizes

and operationalizations of these groups were unreported. Each group completed an instrument called the Me Scale. The Me Scale was "developed according to Dabrowski's theory" (Faulk et al., 2008, p. 191). This included a pilot study in which 120 fifth, eight, and eleventh graders completed 91 items. From this pilot, 75 items were preserved and sent to "nine experts who were familiar with Dabrowski's theory, gifted education, statistics, or methodology" (p. 191). These experts evaluated the items, preserving 66 items. These items were used in a second pilot to 220 fifth, eight, and eleventh graders. After this second pilot, 6 additional items were deleted. The final version of the Me Scale contained 60 items, 12 items for each of the five OE subscales. Using the Me Scale, the authors found that the gifted group significantly outscored the non-gifted and talented group on TOE (f=14.44, $p < .05$). The gifted and talented group significantly outscored the non-gifted control group on SOE (f=63.91, $p < .001$), TOE (f=208.90, $p < .001$), MOE (f=117.34, $p < .01$), and EOE (f=18.74, $p < .001$).

Yakmaci-Guzel's study in Turkey had 500 tenth-graders with an average age of 16.8 (Falk et al., 2008). The sample was divided into below average, average and above average groups based on scores on the Raven Advanced Progressive Matrices Test and the Turkish norms for their grade level. The above average group significantly outscored the other two groups on TOE (f=9.699, $p < .001$). Based on these results, Falk et al. (2008) concluded that gifted persons were significantly overexcitable.

Siu (2010)

Siu (2010) studied the relationship between the five OEs, gender, nationality, and giftedness. The study was conducted in Hong Kong with 446 primary and secondary students (221 were males, 225 were females; 217 were gifted and 229 were not gifted.) The gifted children came from two sources: a gifted center at a local university identified using a number of

assessments, including standardized tests on intellectual abilities (n=196) and gifted participants identified in schools using individual psychological reports (n= 21). Siu also used the Test of Nonverbal Intelligence-III (TONI-III) (Brown, Sherbenou, & Johnsen, 1997) to ensure all gifted participants were gifted, Siu removed several participants from the study due to their TONI-III scores, but did not discuss any threshold for such screening purposes. All of the remaining participants took the OEQ II.

Using a univariate analyses, Siu found that the females significantly outscored the males in SOE (f=8.613, $p < .05$) and EOE (f= 11.337, $p < .05$). The SOE (.019) and EOE (.025) effect sizes (partial η^2) were small (2010). The gifted group significantly outscored the non-gifted group: POE (f=14.272, $p < .01$), SOE (f=30.902, $p < .01$), MOE (f=5.321, $p < .01$), TOE (f= 60.654, $p < .01$), and EOE (f= 16.973, $p < .01$). Siu also calculated the effect sizes (partial η^2) for each OE: POE (.031), SOE (.065), MOE (.012), EOE (.037), and TOE (.120). A two-way ANOVA with giftedness and gender as independent variables demonstrated that they did not have a significant interaction effect on any OE subscale. Siu (2010) compared these results to those found in an earlier study in the United States (Tieso, 2007a).

Harrison and Haneghan (2011)

Harrison and Haneghan (2011) looked at giftedness and its relationship with the five OEs. The researchers also measured how the OEs were related to fear of uncertainty, death, and insomnia. They believed these constructs to be indicative of psychoneuroses, symptoms of positive disintegration. To do this, the authors operationalized insomnia as having sleeping troubles and fear of the unknown as "having anxiety when faced with universal questions that have no known answer" (p. 679). They developed Likert scales to measure these variables. They piloted the scales prior to the study. To measure fear of death, Harrison and Haneghan used the

Death Anxiety Questionnaire, a 15-item questionnaire that measures anxieties about death (Conte, Bakur-Weiner, & Plutchik, 1982). The authors used the OEQ II to measure overexcitability (Harrison & Haneghan, 2011).

Harrison and Haneghan conducted an ANOVA comparing gifted groups' OE scores to the non-gifted groups' OE scores (2011). The five OEs were the dependent variables, group membership (school year, giftedness) were the independent variables. They administered the OEQ II to 73 gifted and 143 typical middle and high school students. The gifted group was identified as intellectually or creatively gifted using achievement test, IQ test, and/or creativity test scores. The authors did not provide specific score thresholds or descriptive about the participants' scores.

The authors found that the gifted group was more overexcitable than the non-gifted group (Harrison & Haneghan, 2011). These differences were most pronounced in MOE (f=9.230, p <.001; no differentiated scores for high or middle school students), and SOE (f=9.694, p <.005), TOE (f=16.918, $p < .001$ for middle school students; f=4.170, $p < .001$ for high school students). Using Pearson's r, the researchers also found that OEs and giftedness correlated with scores on the Likert scales measuring insomnia and fear of the unknown. This relationship was strongest with MOE and TOE. However, none of these correlations exceeded .53.

Wirthwein and Rost (2011)

In Germany, Wirthwein and Rost (2011) attempted to use OEQ II scores to differentiate between 96 intellectually gifted adults (mean age of 31.4), and 91 non-gifted adults (mean age of 31.4). They also used the OEQ II to attempt to differentiate between 123 high achievers (mean age of 31.4), and 97 average achievers (mean age of 30.5). The gifted adults' had been identified

when they were children for a longitudinal study. They were identified using "a combination of the three intelligence tests, weighted according to their *g* saturation" (para 7).

During the longitudinal study, Wirthwein and Rost reported that the gifted sample had IQ's of 136 in the third grade and 136 in the ninth grade (2011). The non-gifted adults were also identified in the longitudinal study and had an average IQ score of 102 at the third grade testing point and an average IQ of 103 at the ninth grade testing point. The high and average achieving groups were not identified until the ninth grade. There, the high achievers had an IQ mean of 117, while the average achievers averaged 102. The researchers defined achievement as a high grade point average (GPA) while in school, though they did not specify the exact GPA. (Their figure seemed to indicate that in the 13^{th} grade, the mean high achiever group average GPA was 1.4 and the average achiever group mean was 2.8). Perhaps this was because they recognized that their audience comprised many non-German readers who might be unfamiliar with the country's GPA system.

Using two MANOVA's and follow up univariate ANOVA's, the researchers compared the gifted and non-gifted OE scores and the two achieving groups' OE scores (Wirthwein, & Rost, 2011). Wirthwein and Rost also used discriminate analysis to determine how and if the individual OE scores predicted group membership. The researchers found that the gifted group significantly outscored the non-gifted group on TOE ($p<.01$, $d=.42$), but not on any other OE subscale. The high achievers outscored the average achievers on TOE ($p < .01$; $d=.56$) and SOE ($p=.02$; $d= .32$). The discriminate analysis only found a significant discriminate function for the achievement sample, with TOE being the most discriminating.

CHAPTER 3: METHODOLOGY

This chapter outlines the evaluation procedures that were undertaken. As noted earlier, systematic reviews have two general steps, identification and evaluation (Boaz, Ashby, & Young, 2002). The methodology for the collection procedures was described earlier, in Chapter 2, and the PRISMA flowchart used earlier (see Appendix B or C) culminates with the evaluation phase of systematic reviews. This chapter outlines the second phase of this proposed systematic review, the evaluation methods.

As PRISMA's flowchart noted, evaluations of the sample can be quantitative and/or qualitative (Moher, Liberati, Tetzlaff, Altman, The PRISMA Group, 2009). Quantitative evaluations could include a variety of meta-analytic techniques, while qualitative analysis could be used to describe trends across the studies such as common methodological strengths and weaknesses. This chapter outlines the combination of quantitative and qualitative methods, and a mixed-methods approach, used to answer the research questions proposed in Chapter One. The individually proposed procedures, as well as their limitations, are detailed below. Also, the history, rationale, and strategy for a mixed methods approach are presented.

Mixed Methods Procedures

History

Like systematic reviews, the mixed method approach is a relatively novel approach to collecting and analyzing data (Creswell, 2009). There were certainly people aggregating and evaluating qualitative and quantitative data for some time; however, in the modern academic tradition, mixed method approaches seem to have begun with Campbell and Fiske who argued that using a variety of techniques or measures was an appropriate methodological practice, and could even strengthen a study's validity (1959). They noted that "validation is typically

convergent, a confirmation by independent measurement procedures" (p. 81). In other words, Campbell and Fiske argued that researchers could strengthen their studies' validity by using multiple approaches to demonstrate findings. Initially, this practice was referred to as the multitrait-multimethod approach (Campbell & Fiske, 1959) or the convergent methodology (Jick, 1979). Another common term for it was triangulation, defined as "the combination of methodologies in the study of the same phenomenon" (Denzin, 1978, p. 291). These methodologies combined are quantitative and qualitative, and so data analyses of various kinds are used to answer research question/s. Currently, mixed methods is the term commonly used to signify the use of the quantitative and qualitative traditions, and it has become increasingly popular as researchers have outlined a number of different kinds of mixed method approaches (Creswell, 2009).

Concurrent Triangulation Strategy

There are a variety of mixed method approaches (Creswell, 2009). For instance, some approaches weigh quantitative or qualitative data unequally, some approaches concurrently or sequentially collect data, and some approaches are designed to provide a more thorough, expansive understanding of a phenomenon. This systematic review will use a mixed methods approach called concurrent triangulation strategy, a strategy that concurrently collects quantitative and qualitative data and then concurrently analyzes said data. Theoretically, the use of both quantitative and qualitative methods to answer research questions will provide added validity to the study.

Methods for Answering Individual Research Questions

For the purposes of this systematic review, quantitative and qualitative procedures were used to answer the five research questions and their sub-questions. Some questions will employ

only quantitative means while others will employ a combination of qualitative and quantitative means. Below, the methods to solve each question are presented. At the end of this chapter, a figure summarizes each research question, how it will be answered, and how the answer will be presented in the findings.

Research Question 1: What are the various characteristics of these comparative studies?

a. Where were the studies conducted?
b. How many comparative studies have been conducted?
c. How did researchers operationalize giftedness?
d. What instrument did researchers use?
e. What was the sizes of the gifted and non-gifted samples?
f. What were the significant scores?
g. What were the *p* values?

To answer this first research question and its sub-questions, descriptive material from the comparative studies was collected and presented on a series of tables. A description of the data was provided in an effort to provide a narrative answer to each question.

Research Question 2: How many of the conducted studies found significant differences for each individual OE?

Vote counting procedure. In order to answer the second research question, a vote counting was conducted. Vote counting is a simple and common meta-analytic technique (Glass, McGaw, & Smith, 1981). Light and Smith (1971) described the procedure:

> All studies which have data on a dependent variable and a specific independent variable of interest are examined. Three possible outcomes are defined. The relationship between the independent and dependent variable is either significantly positive, significantly negative, or there is no significant relationship in either direction. The number of studies falling into each of these three categories is then simply tallied. If a plurality of studies falls into any one of these three categories, with fewer falling into the other two, the modal category is declared the winner (p. 443).

For the comparative studies, each of the five OEs underwent a vote counting procedure. There were three categories that received votes: Gifted sample significantly outscored non-gifted sample; no significant difference found between two samples; and non-gifted sample

significantly outscored gifted sample. The votes were tallied for each of the five OEs. Results were displayed on a table. After the votes were tallied, percentages were calculated. These demonstrated the percentage of studies finding that gifted and non-gifted groups significantly outscored each other and studies finding no significant differences. As suggested by Light and Smith (1971), the plurality of tallies demonstrated the winner.

Multiple comparisons in one study. One study used one or more gifted group and compared its OE levels to one non-gifted group (Piechowski & Colangelo, 1984). Both of these comparisons were counted in the vote counting procedure.

Limitations to vote-counting. Vote counting has limitations. Light and Smith (1971) observed that the method disregards individual study's qualities, such as sample size, degree of significant findings, and methodological soundness. In other words, while each study received one vote, some studies may have deserved more or less than one vote as their quality and findings varied.

This is an important limitation to be mindful of. However, as Glass, McGaw, and Smith (1981), Light and Smith (1971), and Rosenthal (1978) all noted, when the number of studies is large, vote counting can provide a simple, robust meta-analytic procedure. There may not be that many sampled comparative studies, but there are more than 5, the suggested minimum (Glass, McGaw, & Smith, 1981). To help demonstrate each individual study's significance, though, every study, its finding, the significance scores, and *p* values were reported on a separate table/s. Also, a tally chart of *p* values was provided. All of this information was provided in an effort to answer the first research question, but it can help provide more information about the quality of the studies. Also, in order to answer the fourth research question, the studies' methodological soundness was reviewed, which provided additional information about the studies' quality.

Despite these efforts to mitigate vote counting's limitations, it is still important to note that vote counting is inherently not a statistically powerful procedure (Rosenthal, 1978).

Research Question 3: Are some scholars' critiques of the comparative studies accurate?

a. Do the comparative studies have small sample sizes (Piirto, 2010)?

To answer this research question, the sample sizes of all of the studies were collected and presented on a table. Piirto appeared to suggest that at least 80 participants were needed in the gifted and non-gifted samples (2010). Some texts have noted that at least 30 participants are necessary for parametric statistical analyses (Hinkle, Wiersma, & Jurs, 2003). Rather than establish a threshold or ranking system for qualifying the size of the studies' samples, the sample sizes were instead collected and reported on a table. This was done for every study's gifted and non-gifted sample, in an effort to answer part of research question one. A description of the table was provided, and general, emergent trends were reported and discussed.

One reason for avoiding labeling the studies' sample sizes was because it is unclear if the five OEs are normally distributed in the population (Mendaglio, 2002; Tillier, 2009a). Also, the OEQ I and II are not normed instruments. If traits or anything else may or may not be normally distributed, then qualifying a sample size as "small" might be inaccurate. Additionally, providing the studies' sample sizes and describing any emerging themes will provide both an exact report of the data and an interpretation that would have been offered by any contrived ordinal ranking system for measuring sample sizes.

b. Do the studies have mostly trivial and small effect sizes (Pyrt, 2008)?

To answer this question, the studies' effect sizes were collected. When studies did not provide their effect sizes, these were calculated for each OE. If studies fail to report adequate information for such calculations, this was reported as well. All effect sizes were presented on a

series of tables, including a table presenting the found and calculated effect sizes, and a table categorizing the effect sizes according to Cohen's recommendations of trivial, small, medium, and large (1988). Effect sizes reported as Cohen's *d* and partial η^2 were collected and categorized according to Cohen's recommendations. In calculating effect sizes the following formula was used (Greek symbols were avoided where possible so that different word processors and cloud computing systems would all be able to depict the formulae):

Cohen's d = (Mean $_{\text{gifted}}$ – Mean $_{\text{average ability}}$) / Standard Deviation $_{\text{pooled}}$

Also, an online effect size calculator was used to insure calculations are accurate (Becker, 2000).

Some studies that did not report effect sizes presented the means in different groups such as gifted girls and boys (Tieso, 2007a) or gifted middle school students and high school students (Harrison & Haneghan, 2011). Also, some studies have more than one non-gifted group (Bouchet & Falk, 2001; Wirthwein & Rost, 2011). In order to calculate the correct harmonic, weighted mean combining these groups into gifted and non-gifted groups, the following formula was used:

Harmonic Weighted Mean = n_1 Mean $_1$ + n_2 Mean $_2$ / n_1 + n_2

In addition to calculating individual study's effect sizes, a composite effect sizes for the studies using the OEQ II was calculated. This was done in an effort to report effect sizes for a larger sample size and to serve as a form of meta-analysis. Only those studies using the OEQ II will be used because only one study used the ElemenOE (Bouchard, 2004) and the Me Scale (Chang as cited by Falk et al., 2008). Additionally, researchers using the OEQ I collected qualitative data that was collected and evaluated by different researchers and no general, standardized inter-rater reliability exists.

In order to calculate these effect sizes, the studies using the OEQ II had their OE mean scores, variances, standard deviations, and sample sizes collected. Using the variance or standard deviation, the sum of squares was calculated for each of the five OEs for each study. This was done by multiplying the denominator (the degrees of freedom) by the product of the fraction (the variance). The equations below demonstrate this algebra.

Variance (s^2) = SS / n - 1 (degrees of freedom)

(s^2) (n - 1) = SS

This process was repeated for each study's gifted and non-gifted OE mean. With each study's sum of squares calculated for each OE, the variances were then pooled for each of the five OEs. This was done using the pooled variance formula. The formula is presented below.

Pooled Variance (s^2_p) = (n_1 - 1) s^2_1 + (n_2 - 1) s^2_2 + …(n_k - 1) s^2_k / n_1 + n_2 +… n_k-K

Additionally, the square root of the formula's result was taken as to obtain the pooled standard deviation. This was done to obtain the pooled standard deviation for the gifted and non-gifted for each of the five OEs.

In order to obtain the weighted, harmonic mean each study's sample size and OE means were entered into the formula discussed earlier.

Harmonic Weighted Mean = n_1 Mean $_1$ + n_2 Mean $_2$ / n_1 + n_2

Harmonic means were obtained for the gifted and non-gifted for each of the five OEs. All calculations were performed by entering the formulae into Microsoft Excel and then entering the harmonic, weighted means and the pooled standard deviations into an effect size calculator (Becker, 2000).

Rounding. The calculated effect sizes were rounded to the hundredth decimal point. When the thousandth decimal point is five or greater, the hundredth point was rounded up. When the thousandth decimal is four or lower, the hundredth point was not rounded up.

Missing data. If the necessary data to calculate effect size is missing or unreported, it will be noted as "data unreported" on the table where all effect sizes will be presented.

Limitation to Cohen's recommendations (1988). Cohen's recommended categorizations of trivial, small, medium, and large may not be applicable to the found effect sizes in OE between gifted and non-gifted samples (1988). This is because Cohen's recommendations are largely relative, and the interpretation of an effect size largely depends on the nature of the field and the study itself. This is something Cohen recognized:

> The terms 'small,' 'medium,' and 'large' are relative, not only to each other, but to the area of behavioral science or even more particularly to the specific content and research method being employed in any given investigation....In the face of this relativity, there is a certain risk inherent in offering conventional operational definitions for these terms for use in power analysis in as diverse a field of inquiry as behavioral science. This risk is nevertheless accepted in the belief that more is to be gained than lost by supplying a common conventional frame of reference which is recommended for use only when no better basis for estimating the ES index is available" (p. 25).

This relative nature of effect size makes it difficult to determine whether Cohen's recommendations (1988) are appropriate in interpreting effect sizes between gifted and non-gifted samples on the collected comparative studies.

In order to accommodate for this limitation of calculating effect sizes, not only were effect sizes ranked according to Cohen's recommendations (1988), but effect sizes were also converted into the percentage of distributional overlap that they represented. Effect sizes measure this in a standardized form, but in order to accurately depict the degree of OE score overlap between gifted and non-gifted samples, the standardized effect size was converted into a percentage score illustrating the amount of distribution overlap. To achieve these conversions,

Marzano Research Laboratory's effect size conversion tables will be used (n.d.). This information was presented in table form.

After this conversion, effect sizes calculated as Cohen's *d* were converted into the total, raw number of gifted participants included outside of the distributional overlap. This was done by multiplying the percentage (in its decimal form) with the total size of the gifted sample. The product of this multiplication produced the number of gifted participants whose OE scores can be found beyond the distributional overlaps of the gifted and non-gifted samples. Also, unlike other calculations in this methodology section, any decimal point caused the number to be rounded up. For example, 12.001 would be rounded to 13.00. This was done because it is impossible to have a tenth or hundredth of a person, and rounding to whole numbers helps simplify the calculations.

Limitation in composite effect size calculations. There were several limitations in combining the studies' OE score means and standard deviations are combined, the composite effect size. First, few of the studies reported the necessary data to be included in this calculation. Some studies that did find or did not find significant group difference were omitted from the calculation because of this (e.g., Bouchet & Falk, 2001; Sanz as cited by Falk et al., 2008). This created a kind of selection bias.

Also, by using the data from the studies using the OEQ II, these studies' findings will be repeatedly represented in the findings. In other words, these studies will have their individual effect sizes and other data demonstrated and then their data will be represented again in aggregate form. Some studies, due to the employed instrument or available data, will only have their findings represented individually and will be omitted from the aggregate. In order to accommodate for these limitations, these composite effect sizes were not be listed in the table

mapping the individual study's effect sizes. Instead, they were presented in a distinct section, in which the studies included in this meta-analysis were explicitly listed.

c. Is TOE the only OE on which gifted individuals consistently, significantly outscored non-gifted individuals (Piirto, 2010; Pyrt, 2008)?

To answer this research question, the vote-counting procedure's findings were used. The findings for TOE were compared to the other OEs, as was the calculated percentages for each OE. A narrative answer was provided.

Research Question 4: How methodologically rigorous were the comparative studies?

Evaluating the methodological rigor of a body of literature is a core element of systematic reviews (Boaz, Ashby, & Young, 2002). To do this, a thematic analysis was conducted. To help guide this process, Creswell's threats to internal and external validity were used (2009). Trends across studies regarding their methodologies' robustness to Creswell's threats were reported. Other emergent themes or commonalities across the studies' methodologies were also found and reported. Below, Creswell's threats to internal and external validity are described.

Internal validity. To help evaluate the comparative studies for their methodological rigor, Creswell's threats to internal validity were used. Creswell defined threats to internal validity as "experimental procedures, treatments, or experiences of the participants that threaten the researcher's ability to draw correct inferences from the data about the population in an experiment" (2009, p. 230). Creswell listed a total of ten potential threats to internal validity. Of those threats, one was applicable to comparative studies, while the rest are more appropriate in treatment settings. This threat is selection bias, something Creswell defined as when "participants can be selected who have certain characteristics that predispose them to have certain outcomes" (p. 163). All studies had their gifted samples reviewed for selection biases to determine the degree of selection bias (if any) in these gifted samples.

In order to check for selection biases, each study had its operationalization or definition of giftedness and samples compared to the psychometric, academic conception of giftedness defined in Chapter One. To do this, operationalizations were drawn from the studies and recorded on a table. In the event that some number of members of the gifted sample possesses some other trait significantly, their number (*n*) was recorded as well as the trait. Such significant differences in traits from the non-gifted population could confound findings in the OE comparison/s. In the event that giftedness is not defined or operationalized, the method the researcher/s used to identify its gifted sample served as the study's operationalization.

These recorded operationalizations and descriptions of the samples were compared to the academic conception of giftedness as defined in Chapter One. This is the kind of giftedness that has had its relationship to OE currently disputed in the literature and affirmed by text and Internet sources. Themes regarding how studies' operationalizations and samples were similar to and different from the academic notion of giftedness were recorded. These were reported as general trends across all of the collected comparative studies. Any other found emergent themes regarding the studies' internal validity were also reported.

External validity. The studies finding that the gifted sample significantly outscored the non-gifted sample also had their external validity evaluated. Creswell defined threats to external validity as "when experimenters draw incorrect inferences from the sample data to other persons, other settings, and past or future situations" (2009, p. 162). Creswell listed three threats to external validity. As with Creswell's threats to internal validity, some of his threats to external validity were not applicable to comparative study designs. This included the interaction of a studies' setting and treatment and the interaction of the subjects' history and treatment. Again, the collected studies did feature treatment/s, but only a single testing occurrence. A kind of

setting-testing threat, where the setting somehow significantly influenced the samples' OE scores, is possible, but would be very difficult to accurately gauge.

The sampled studies were evaluated with Creswell's selection threat: "Because of the narrow characteristics of participants in the experiment, the researcher cannot generalize to individuals who do not have the characteristics of participants" (2009, p. 165). To check for this threat, each study was reviewed. The operationalization of giftedness, gifted samples, and the participants' age and culture were recorded. General trends or themes across studies were reported, and individual threats to external validity were presented. Also, found emergent themes in regards to the studies' external validity were also reported. Below, specific methodological procedures for each of these checks on external validity were discussed.

Operationalization of giftedness and gifted samples**.** As with internal validity, the manner in which studies operationalized giftedness and the individuals that they collected for their samples influences the studies' external validity. Studies with samples diverging from the concept of giftedness as academic talent may have had a limitation regarding their external validities (but only for the academically gifted population). Studies that do not diverge from this concept of giftedness could have their findings more robustly generalized to the gifted population.

To evaluate the studies' external validity, the earlier comparisons between each study's samples and operationalizations and the conception of giftedness as academic, cognitive ability were used. These comparisons helped demonstrate the studies' external validity. General, emergent trends were reported, as were individual incidences of potential violations of external validity.

Culture. The variable of cultural origin was selected because there is some evidence that individuals from different cultures vary in their OEQ II scores (Piirto, Montgomery, & May, 2008). Piirto, Montgomery, and May (2008) compared 568 American and Korean gifted high school students' OEQ II scores. The authors found that Korean students had less of a gender difference in EOE, SOE, and MOE; that Korean students had greater POE than American students; and that American and Korean students scored similarly on TOE. The authors suggested that Korean society's encouragement of stoicism in male and female children caused the OE gender gap to be meager, but were uncertain about the cause of the significant difference in POE and felt that it warranted more cross cultural investigations.

This study does not prove that international gifted persons' OEQ II scores are incomparable to North American gifted persons' OEQ II scores. However, Piirto, Montgomery, and May's findings do suggest that cultural differences might enhance or even create significant OE differences between gifted and non-gifted populations (2008). Similarly, the study's findings suggested that cultural differences could diminish or even erase significant OE differences. Different cultures' influence on OEQ II scores, including countries where some of the collected comparative studies were conducted (Germany, Hong Kong, and Turkey), is still largely unknown. And because of this, drawing conclusions about North American gifted persons' OE levels might have unexpected limitations.

To check for this potential threat to external validity, studies' gifted samples' cultural origins were recorded. This included recording the country where the subjects live and supposedly go to school or work. This was done for every gifted sample, and general, emergent trends were discussed.

Age. The variable of age was selected because it may be the case that gifted children at different age groups are more likely to be overexcitable than other age groups. Tieso (2007a) showed that the younger gifted elementary school students generally had significantly higher OEs than their middle school counterparts. It may have been the case that the sampled, younger gifted cohort was just more overexcitable. However, it may have also been the case that gifted persons' OE scores can vary significantly over time due to maturation (e.g., puberty) and other circumstances. Other cross sectional studies also showed significant differences between gifted age groups (Piechowski & Colangelo, 1984), and Piechowski has asserted that OEs might be more easily seen in children (1997).

In addition to these arguments, cross sectional comparisons are inherently problematic. Different age cohorts and generations can be exposed to different environments. This might impact how OEs manifest on instruments. And while it is true that Dabrowski (1972) argued that individuals' OE levels never changed during their lifetime, this is a theoretical assumption made that has not yet been empirically, longitudinally tested. Because of all of this, generalizing about all gifted persons' OE levels from age specific studies might be imprudent. To check for external validity regarding age, the studies' gifted samples' age means, age ranges, year in school, and any other age related information was collected. General trends that emerged were discussed.

Research Question 5: Is the gifted population more overexcitable than the non-gifted population?

To answer this question, the evidence from the other four questions was used. In Chapter 5, the discussion, the data is used to discuss each individual OE and whether or not the gifted population is more overexcitable than the non-gifted population. Evidence was synthesized, presented, and answers were provided.

Limitations

Internal and External Validities

One inherent limitation in evaluating the collected studies operationalizations of giftedness and samples is that giftedness itself is such a theoretically debated topic (Sternberg & Davidson, 2005). Limiting giftedness to academic, cognitive abilities and then evaluating the studies' against this standard would be a failure to encapsulate the diversity of the giftedness construct. In other words, such an evaluating for internal and external validity would only be evaluating the studies against a standard representing only a small portion of the nature of giftedness or gifted population, indicative of a kind of construct underrepresentation.

This is all true. Yet, this standard, the notion that giftedness is academic or cognitive exceptionality, is the one whose relationship to the five OEs is disputed. There is no debate within the literature about the excitability levels of gifted athletes, artists, or other exceptional persons. Additionally, the listed websites and texts in Chapter One are largely stating that highly intelligent persons are overexcitable. The standard used to evaluate the internal and external validity of the studies' operationalizations and samples is theoretically narrow because it accurately represents the kind of giftedness described by scholars studying the five OEs and their relationship to giftedness.

Limitations Regarding External Validity

Checking for external validity using samples' ages and cultural backgrounds has limitations. For both age and cultural backgrounds, there is not a large body of evidence confirming that these variables significantly impact samples' OE scores (May, Montgomery, & Piirto, 2008; Piechowski & Colangelo, 1984; Tieso, 2007a). Some studies have shown this, but

not many. And, the author did not evaluate the quality of one of those studies (May, Montgomery, & Piirto, 2008).

These are important limitations to note, and in order to accommodate for them, general trends about these variables are only reported. No ordinal rank or other kind of ranking will be assigned demarcating the merit of any studies' external validity. Instead, these variables will only be reported on in the findings. Their potential severity or innocuousness will be discussed in the discussion.

Researcher Bias

The researcher-as-instrument paradigm is a *sine qua non* feature of qualitative research. To help limit this problem, Creswell suggested that researchers report any biases that they held before and during the study (2009). A report of the researcher's biases is presented below:

> Initially, I regarded the relationship between giftedness and overexcitable to be definitive. In other words, I thought gifted individuals, that is high IQ persons and other individuals who took part or should have taken part in some form of gifted education, were overexcitable in some way. I thought that most gifted individuals would on average be overexcitable in all five OEs. I thought that males would have higher POE than females and that females would have higher MOE than males. I came to these beliefs after conducting a literature review on OE research earlier in my graduate student experience.
>
> However, it is important to note that I never dogmatically held any of these opinions. And, as I began reviewing the comparative literature, my opinion of the relationship between giftedness and OE changed. I started becoming more doubtful and even disbelieving. This increasing doubt may influence the manner in which I conduct and/or report the study.

General Limitations

One limitation regarding all of these procedures for answering the research questions is that they are piecemeal. In other words, rather than evaluating the body of literature's finding *in toto*, such as combining all of the studies' data and then conducting a series of tests for significant differences, this methodology collected and/or evaluated each studies' sample size,

effect size, internal validity, external validity, and so on. This kind of evaluation may find a series of imperfections, errors and/or problems with individual studies, but if one were to combine the studies' findings and data, these individual errors or imperfections would be demonstrated as only isolated incidences. So, instead of analyzing individual studies, a series meta-analyses using the data might provide a more rigorous, large-sample-sized experiment.

Such a traditional meta-analytic approach would possibly provide additional valuable information about the relationship between giftedness and the five OEs. And in some measure this kind of analysis was done in calculating the composite effect size scores. However, such an approach has a number of its own difficulties as well. First, it is unclear if the OEQ II collects data sufficient for parametric analyses. As noted in Chapter One, Mendaglio has observed that the OEQ II collects Likert scale type data, which is ordinal (2012). As detailed earlier, using procedures like ANOVA and MANOVA on ordinal data is problematic and other procedures would be more appropriate. Additionally, many of the studies do not report sufficient data for meta-analytic purposes.

Also making traditional meta-analytic procedures problematic is that as noted earlier, these research methodologies only consider the quality of the data and methodological procedures after quantitative procedures have been completed (Glass, McGaw, & Smith, 1981). Consequently, in the quantitative procedures all data is equal, regardless of its quality. Such equal admission would fail to recognize the signals of questionable procedures and methodologies amidst the general noise of data.

Summary

In an effort to summarize and illustrate how each research question was addressed, Table 3.1 is presented below. In it, the research question, the procedure used to answer it, and the manner in which the findings will be reported are listed.

Table 3.1 Summary of research questions and methodologies

Research Question	Procedure	How reported
Research Question 1: What are the various features of these studies? When were the studies conducted? Where were the studies conducted? How many comparative studies have been conducted? How did researchers operationalized giftedness? What instrument did researchers use? How large were the gifted and non-gifted samples? What were the significant scores? What were the p values?	Acquire data from studies	Table and narrative
Research Question 2: How many of the conducted studies found significant differences for each individual OE?	Vote counting procedure	Tables and narrative
Research Question 3: Are some scholars' critiques of the comparative studies accurate?	n/a	Narrative

(Table 3.1 continued)

Research Question	Procedure	How reported
Do the comparative studies have small sample sizes (Piirto, 2010)?	Presentation of comparative studies' sample sizes for both gifted and non-gifted groups	Table and narrative
Do the studies have mostly trivial and small effect sizes (Pyrt, 2008)?	Collect and/or calculate effect sizes from studies; present findings according to Cohen's recommendations, but also calculate percentage of distributional overlap represented by effect size	Table and narrative; present effect sizes and percentage of distribution overlap
Research Question 4: How methodologically rigorous were the comparative studies?	n/a	n/a
Internal validity	Evaluate studies' operationalization of giftedness and samples for selection bias	Report themes related to Creswell's threat to internal validity (2009). Report any other emergent themes.
External validity	Evaluate studies' gifted samples' demographic characteristics including age and cultural background and studies' operationalization and samples to see if findings could be generalized to gifted population	Creswell's threat to external validity will be used to evaluate the studies (2009). This will be done for age, culture, operationalization and any other emergent themes.
Research Question 5: Is the gifted population more overexcitable than the non-gifted population?	Synthesis data from other questions and provide narrative to answer questions	Narrative, table

CHAPTER 4: RESULTS

This chapter provides answers to research questions 1, 2, 3, and 4. Research Question 5 is answered in Chapter 5.

Research Question 1: What are the Various Characteristics of these Comparative Studies?

a. Where were the Studies Conducted?

In Table 4.1 below, the studies and their locations are listed. The country is provided for every study, and if researchers provided more specific information, such as region or city, this is provided in parentheses. In the event that more specific information was provided about only part of a study's sample, this is noted as well.

Table 4.1 Location of studies

Study	Location
Piechowski & Colangelo (1984)	United States (gifted adolescents were from Iowa)
Gallagher (1985)	United States
Ackerman (1993, 1997)	Canada
Domroese as cited by Ackerman (1998)	United States (large Midwestern city)
Breard (1994)	United States (South Carolina)
Miller, Silverman, & Falk (1994)	United States (1/3rd of the subjects were from Colorado)
Bouchet & Falk (2001)	United States (Midwest)
Bouchard (2004)	United States (Houston, Texas)
Yakmaci-Guzel & Akarsu (2006)	Turkey (Istanbul)
Tieso (2007a)	United States (east coast)
Chang as cited by Falk et al. (2008)	China (Hong Kong)
Sanz as cited by Falk et al. (2008)	Spain
Yakmaci-Guzel as cited by Falk et al. (2008)	Turkey (Istanbul)
Siu (2010)	China (Hong Kong)
Harrison & Haneghan (2011)	United States
Wirthwein & Rost (2011)	Germany

Of the sampled comparative studies, 9 were conducted in the United States of America. 7 were conducted outside of the United States. Of these international studies, 6 were conducted outside of North America.

b. How Many Comparative Studies have been Conducted?

A total of 14 studies were sampled. However, Falk et al. was a book chapter featured three distinct studies (2008). In total, then, there were 16 total studies. Within these 16 studies, there were 17 total and distinct comparisons between gifted and non-gifted samples. This was because Piechowski and Colangelo's study featured two distinct comparisons (1984).

c. How did Researchers Operationalize Giftedness?

Table 4.2 below details how each study operationalized giftedness and findings. When possible, exact test scores tests, and elements of matrices are listed. Four studies provided a clear psychometric or test score threshold (Ackerman, 1993; 1997; Breard, 1994; Domroese as cited by Ackerman 1998; Yakmaci-Guzel & Akarsu, 2006). Though, one such study made it clear that exceptions to the threshold were permitted, so presumably members of that gifted sample scored below the threshold (Ackerman, 1993; 1997). Many of the studies used a number of assessments or methods for identifying gifted students (Bouchard, 2004; Gallagher, 1985; Harrison & Haneghan, 2011; Piechowski & Colangelo, 1984; Siu, 2010; Tieso, 2007a; Wirthwein & Rost, 2011). Two studies provided unclear information for the nature of the operationalization. Bouchet and Falk operationalized giftedness according to how high schools identified gifted students (2001). However, because their subjects came from many different high schools, there was no effort to clearly describe each high school or school district's operationalization of giftedness. Chang as cited by Falk also provided no information regarding the operationalization of the gifted subjects (2008).

Table 4.2 Operationalizations of giftedness

Study	Giftedness Operationalization	Finding
Piechowski & Colangelo (1984)	Gifted adults (Silverman & Ellsworth, 1981) were identified based on their scoring in the 98th percentile of standardized tests, membership in a school's gifted program, or distinguishing themselves in the arts -49 gifted adolescents identified as gifted based on a combination of test scores, grades, and teacher nominations (Colangelo, Piechowski, & Kelly as cited by Colangelo & Piechowski, 1984)	Gifted adults and adolescents significantly outscored non-gifted sample on TOE and EOE; adolescents also outscored non-gifted sample on MOE
Gallagher (1985)	The gifted sample was identified using behavioral checklist, academic record, above average CAT, and high score on Otis Lennon Test of Mental Ability	Gifted sample's EOE, TOE, and MOE scores were significantly higher than control
Ackerman (1993, 1997)	The gifted sample was identified using achievement test scores, recommendations, grades, and an IQ of at least 120 (exceptions were made to IQ threshold)	The gifted sample's POE, TOE, and EOE scores were significantly higher than the non-gifted sample
Breard (1994)	The gifted sample was identified using a 100 point scale system, 90 points of which based on achievement and aptitude tests and 10 points on individual school district discretion	The gifted sample's POE and EOE scores were able to significantly discriminate between gifted and non-gifted samples
Miller, Silverman, & Falk (1994)	The gifted sample was identified using Mensa membership or through acquaintance with the researchers. -15 of the participants were Mensa members who had an IQ at or above the 98th percentile. -19 of the participants had at least a 1200 on the SAT or the GRE -4 of the participants had an IQ of at least 130.	The gifted group had significantly higher TOE and EOE than the non-gifted sample
Domroese as cited by Ackerman (1998)	The gifted sample was identified using performance on the Ravens Progressive Matrix, the cognitive Abilities Test, and the Iowa Test of Basic Skills. Gifted group threshold scores were established at or above the 90th percentile	No significant differences found

(Table 4.2 continued)

Study	Giftedness Operationalization	Finding
Bouchet & Falk (2001)	The gifted sample was identified using membership in a gifted education program during high school	Gifted sample had significantly higher TOE and EOE scores
Bouchard (2004)	The gifted sample was identified using evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields	Gifted group had significantly higher TOE
Yakmaci-Guzel & Akarsu (2006)	The high intellectual ability group was identified using Ravens Progressive Matrix and the score threshold of 27	High intellectual group significantly outscored the low group on TOE and MOE
Tieso (2007a)	The gifted sample was identified using a matrix that included a minimum score on standardized tests of achievement, ability, or creativity	Gifted group significantly outscored non-gifted group on TOE and MOE
Chang as cited by Falk et al. (2008)	Unknown	Gifted group significantly outscored the non-gifted group on TOE
Sanz as cited by Falk et al. (2008)	The gifted sample was identified using IQ scores	Gifted group significantly outscored non-gifted group on TOE and MOE
Yakmaci-Guzel as cited by Falk et al. (2008)	The gifted sample was identified using performance on the Raven Advanced Progressive Matrices Test and comparisons to the Turkish norms for their grade level	Gifted group significantly outscored the non-gifted group on TOE
Siu (2010)	The gifted sample was identified using a number of assessments including standardized tests on intellectual abilities and psychological profiles.	The gifted group significantly outscored the non-gifted group on all OEs
Harrison & Haneghan (2011)	The gifted sample was identified as creatively and/or intellectually gifted using achievement, IQ, and/or creativity test scores	Gifted group significantly outscored the non-gifted group on TOE, SOE, and MOE
Wirthwein & Rost (2011)	The gifted sample was identified using IQ scores on three different tests; achievement groups were operationalized using GPA	Gifted group significantly outscored non-gifted group on TOE; high achievers significantly outscored low achievers on TOE

d. What Instrument did Researchers use?

Of the sampled comparative studies, six used the OEQ I in written form, one used the OEQ I in interview form, seven used the OEQ II, 1 used the ElemenOE, and one used the Me Scale. Before the OEQ II's development in 1999 (Falk & Lind, 1999), every comparative study used the OEQ I. After, the OEQ II's development, only one comparative study has used the OEQ I (Yakmaci-Guzel & Akarsu, 2006). Two comparative studies have used non-OEQ instruments, namely the ElemenOE Scale and the Me Scale. When combining the nature of the instruments, seven of the studies used open-ended, qualitative instruments (the OEQ I), eight of the studies used forced choice, Likert scale questionnaires (the OEQ II and Me Scale), and one study used an observational checklist (the ElemenOE). Table 4.3, below, summarizes these findings.

Table 4.3 Instrument used

Study	OE instrument
Piechowski & Colangelo (1984)	OEQ I
Gallagher (1985)	OEQ I in interview form
Ackerman (1993, 1997)	OEQ I
Domroese as cited by Ackerman (1998)	OEQ I
Breard (1994)	OEQ I
Miller, Silverman, & Falk (1994)	OEQ I
Bouchet & Falk (2001)	OEQ II
Bouchard (2004)	ElemenOE
Yakmaci-Guzel & Akarsu (2006)	OEQ I
Tieso (2007a)	OEQ II
Chang as cited by Falk et al. (2008)	Me Scale
Pardo de Santayana Sanz as cited by Falk et al. (2008)	OEQ II
Yakmaci-Guzel as cited by Falk et al. (2008)	OEQ II
Siu (2010)	OEQ II
Harrison and Haneghan (2011)	OEQ II
Wirthwein and Rost (2011)	OEQ II

e. What were the Sizes of the Gifted and Non-gifted Samples?

Table 4.4 below lists the sample sizes for each study's gifted and non-gifted samples. Some researchers used alternative terms such as "average ability graduate students" (Piechowski & Colangelo, 1984) or "high ability group" (Yakmaci-Guzel as cited by Falk et al., 2008; Yakmaci-Guzel & Akarsu, 2006). These terms are represented in the table above too. Additionally, some studies used samples from other comparative studies. This is also noted in the table above.

Some studies had more than two samples (Bouchet & Falk, 2001; Piechowski & Colangelo, 1984; Wirthwein & Rost, 2011; Yakmaci-Guzel & Akarsu, 2006). These groups' individual sample sizes are listed. Though, as the literature review noted, some of these studies combined their non-gifted groups in their comparisons (Bouchet & Falk, 2001; Piechowski & Colangelo, 1984), while other researchers used the different groups to function as separate control groups with which they made distinct, separate comparisons (Wirthwein & Rost, 2011; Yakmaci-Guzel & Akarsu, 2006). The methodology and findings for these studies' comparisons are available in detail in Chapter 2.

Two of the studies featured undifferentiated groups (Yakmaci-Guzel as cited by Falk et al., 2008; Chang as cited by Falk et al., 2008). In Yakmaci-Guzel as cited by Falk et al., there are a total of 500 participants, however it is unclear what the sample sizes are for the three distinct groups. In Chang as cited by Falk et al., there was a gifted and talented group, gifted group, and non-gifted group. However, the sample sizes for the gifted and talented and non-gifted groups were the only sample sizes provided. The largest sample of gifted individuals was 296 (Tieso, 2007a) and the largest sample of non-gifted individuals was 2,046 (Chang as cited by Falk et al.). Below, the studies' sample sizes are presented according to the studies' instruments. First, there

is a table of OEQ I studies, then a table of OEQ II studies, and finally a table of non-OEQ instruments. Table 4.4 details all of these findings.

Table 4.4 Sample sizes

Study	Gifted and non-gifted sample sizes
Piechowski & Colangelo (1984)	-28 gifted adults from Silverman & Ellsworth (1981) -49 gifted adolescents from Colangelo, Piechowski, & Kelly (1982) -42 average ability graduate students from Lysy & Piechowski (1983)
Gallagher (1985)	-12 gifted -12 non-gifted
Ackerman (1993, 1997)	-42 gifted -37 non-gifted
Domroese as cited by Ackerman (1998)	-25 gifted -30 non-gifted -27 near-gifted
Breard (1994)	-39 gifted -30 near gifted -48 non-gifted
Miller, Silverman, & Falk (1994)	-42 gifted adults -41 graduate students from Lysy and Piechowski (1981)
Bouchet & Falk (2001)	-140 gifted -129 advanced placement -281standard programs
Bouchard (2004)	-96 gifted -75 non-gifted
Yakmaci-Guzel & Akarsu (2006)	-35 high ability group -37 low ability group -33 medium ability group
Tieso (2007a)	-296 gifted students -184 non-gifted students
Chang as cited by Falk et al. (2008)	-951 gifted and talented -2,046 non-gifted
Sanz as cited by Falk et al. (2008)	-102 gifted -102 non-gifted
Yakmaci-Guzel as cited by Falk et al. (2008)	-500 total participants divided into three groups based on Raven Progressive Matrices scores: below and above average and average groups *n*'s of groups was unreported

(Table 4.4 continued)

Study	Gifted and non-gifted sample sizes
Siu (2010)	-217 gifted -229 non-gifted
Harrison & Haneghan (2011)	-73 gifted -143 non-gifted
Wirthwein & Rost (2011)	-96 gifted -91 non-gifted -123 high achievers -97 average achievers

Sample Sizes from OEQ I Studies.

Table 4.5 below details only those studies using the OEQ I study. These studies were also presented earlier in narrative and table form.

Table 4.5 OEQ I Studies' sample sizes

OEQ I Study	Sample sizes
Piechowski & Colangelo (1984)	-28 gifted adults from Silverman & Ellsworth (1981) -49 gifted adolescents from Colangelo, Piechowski, & Kelly (1982) -42 average ability graduate students from Lysy & Piechowski (1983)
Gallagher (1985)	-12 gifted students -12 non-gifted students
Ackerman (1993, 1997)	-42 gifted -37 non-gifted
Domroese as cited by Ackerman (1998)	-25 gifted -30 non-gifted -27 near-gifted
Breard (1994)	-39 gifted -30 near gifted -48 non-gifted

(Table 4.5 continued)

OEQ I Study	Sample sizes
Miller, Silverman, & Falk (1994)	-42 gifted adults -41 graduate students from Lysy and Piechowski (1981)
Yakmaci-Guzel & Akarsu (2006)	-37 low ability group -33 middle ability group -35 high ability group

Various sample sizes were obtained for the seven comparative OEQ I studies. The total number of gifted individuals sampled was 278. The total number of non-gifted individuals sampled was 342. The largest sample size for the gifted group was 77, the combined samples of Piechowski and Colangelo (1984). The largest sample size for the non-gifted group was 78 (Breard, 1994). The smallest sample size for the gifted and non-gifted group was 12 (Gallagher, 1985).

Three studies compared two samples, one gifted sample and one non-gifted sample (Ackerman, 1993, 1997; Gallagher, 1985; Miller, Silverman, & Falk, 1994). Four studies used three samples in their comparisons. Piechowski and Colangelo used two gifted samples to make multiple comparisons with one non-gifted sample (1984). Domroese (as cited by Ackerman, 1998), Breard (1994), and Yakmaci-Guzel and Akarsu (2006) combined two non-gifted samples and then compared this combined sample to one gifted sample. These various non-gifted samples included groups labeled as “near gifted” (Breard; Domroese as cited by Ackerman), “low mental ability” (Yakmaci-Guzel & Akarusu), and “average mental ability group” or “non-gifted groups” (Breard; Domroese as cited by Ackerman).

Sample Sizes from OEQ II Studies.

Table 4.6 is presented below. It lists only those studies using the OEQ II instrument. These studies were also presented earlier.

Table 4.6 OEQ II Studies' sample sizes

Study	Sample sizes
Bouchet & Falk (2001)	-281 non-gifted -140 gifted -129 advanced placement
Tieso (2007a)	-184 non-gifted students -296 gifted students
Sanz as cited by Falk et al. (2008)	-102 gifted -102 non-gifted
Yakmaci-Guzel as cited by Falk et al. (2008)	-500 total participants divided into three groups based on Raven Progressive Matrices scores: below and above average and average groups *n'*s of groups was unreported
Siu (2010)	-229 non-gifted -217 gifted
Harrison & Haneghan (2011)	-143 non-gifted -73 gifted
Wirthwein & Rost (2011)	-91 non-gifted -96 gifted -97 average achievers -123 high achievers

The comparative studies using the OEQ II had various sample sizes. The largest sample size was 296 gifted individuals (Tieso, 2007a) and 410 non-gifted individuals (Bouchet & Falk, 2001). The smallest sample size for gifted individuals was 73 (Harrison & Haneghan, 2011) and 91 non-gifted individuals (Wirthwein & Rost, 2011). Generally speaking, the OEQ II studies' sample sizes were larger than the OEQ I sample sizes.

f. What were the Significant Scores?

The table below lists each study and its significant scores. Significant scores and *p* levels are provided in the table below. In the event that *f, t*, or other scores demonstrating significant differences were not provided by the original study, then only *p* level is provided. Significant difference scores are reported with the same number of digits as reported by the studies authors. No rounding was performed. In the event that studies made comparisons between multiple groups and reported multiple significant differences, this was also noted (Chang as citedy by Falk, 2008; Piechowski & Colangelo, 1984; Wirthwein & Rost, 2011). Some studies only calculated a discriminant function (Ackerman, 1993, 1997; Breard, 1994). These functions are listed in Table 4.7 below as well.

Table 4.7 Significant scores

Study	Significant differences and *p* values
Piechowski & Colangelo (1984)	Gifted adults vs. typical adults: TOE: $p < .0000$ EOE: $p < .01$ Gifted adolescents vs. typical adults: TOE: $p < .015$ MOE: $p < .033$ EOE: $p < .0002$
Gallagher (1985)	TOE: $p < .002$ EOE: $p < .02$ MOE: $p < .02$
Ackerman (1993, 1997)	d = .80z (POE) + .44z (TOE) + .35z (EOE) $\chi 2$= 25.73, p < .001
Domroese as cited by Ackerman (1998)	Data unavailable
Breard (1994)	d=48269z (TOE) + .75271z (EOE) λ: .93 d= .92161z (TOE) - .71818z (EOE) λ: .91

(Table 4.7 continued)

Study	Significant differences and *p* values
Miller, Silverman, & Falk (1994)	EOE: f=7.51, $p < .01$ TOE: f=11.14, $p < .01$
Bouchet & Falk (2001)	EOE: f=6.92, $p < .00$ TOE: f=10.38, $p < .00$
Bouchard (2004)	TOE: t=22.83, $p < .000$
Yakmaci-Guzel & Akarsu (2006)	MOE: f=55.902, $p < .005$ TOE: f=510.735, $p < .001$
Tieso (2007a)	MOE: f=7.00, $p < .01$ TOE: f=7.46, $p < .01$
Chang as cited by Falk et al. (2008)	Gifted group vs. non-gifted + talented group: TOE: f=14.44, $p < .05$ Gifted and talented vs. non-gifted: MOE: f=117.34, $p < .01$ EOE: f=18.74, $p < .001$ SOE: f=63.91, $p < .001$ TOE: f=208.90, $p < .001$
Sanz as cited by Falk et al. (2008)	TOE: t=4.533, $p < .001$ MOE: t=2.188, $p < .05$
Yakmaci-Guzel as cited by Falk et al. (2008)	TOE: f=9.699, $p < .001$
Siu (2010)	POE: f=14.272, $p < .01$ SOE: f=30.902, $p < .01$ MOE: f=5.321, $p < .01$ TOE: f=60.654, $p < .01$ EOE: f=16.973, $p < .01$
Harrison & Haneghan (2011)	MOE: f=9.230, $p < .001$ SOE: f=9.694, $p < .005$ TOE: f=16.918, $p < .001$
Wirthwein & Rost (2011)	Gifted vs. non gifted: TOE: $p < .01$ High achievers vs. average achievers: TOE: $p < .01$

Table 4.8 below lists those studies where the non-gifted, control sample significantly outscored the gifted group. The available significant score data is also listed.

Table 4.8 Significant scores for non-gifted samples

Study	Significance scores and *p* values
Piechowski and Colangelo (1984)	Gifted adolescents vs. non-gifted adults: SOE: Exact significant score or level of significance was unreported
Bouchard (2004)	POE: t=6.43, $p < .012$
Sanz as cited by Falk (2008)	POE: t=3.182, $p < .005$
Wirthwein and Rost (2011)	POE: d= .22 EOE: d= .21

g. What were the *p* Values?

Table 4.9 below tallies the *p* levels for the comparative studies. Each "X" represents a *p* score for the individual OE at the given level.

Table 4.9 Significance level tally marks

Significant level (p)	SOE[c]	POE[ac]	EOE[abc]	MOE[c]	TOE[abc]
.05				X	X
.033				X	
.02			X	X	
.015					X
.01	X	X	X X X	X X	X X X X
.00			X		X
.005	X			X	
.002					X
.001				X	X X X X

(Table 4.9 continued)

Significant level (p)	SOE[c]	POE[ac]	EOE[abc]	MOE[c]	TOE[abc]
.000					X X
.0002			X		

Note[a]. Ackerman (1993, 1997) and Breard (1994) findings are not included. Ackerman's study did find significant differences in EOE, TOE, and POE, however the only level of significance reported was for the discriminant function. Similarly, Breard found significant differences in TOE and EOE, but also reported findings as a function.

Note[b]. Piechowski and Colangelo (1984) reported two gifted, non-gifted comparisons. Consequently, their study registers two "X" marks under the TOE and EOE columns.

Note[c]. Only the comparison between the gifted and non-gifted groups in Chang as cited by Falk et al. (2008) were included in the table above. This was because the other comparison, between the gifted and talented group and the non-gifted group, was not a comparison between only a gifted and non-gifted sample.

Research Question 2: How Many of the Conducted Studies found Significant Differences for each Individual OE?

Below, the results of the vote counting procedure are presented in Table 4.11. The total number of comparisons considered for the vote counting procedure was 17. Colangelo and Piechowski had two distinct comparisons, and both of their results were included in the table (1984). The numbers in the table reflect votes, or instances where a study found a significant difference or no significant difference. The vote counting procedure's findings are also discussed underneath Table 4.10, presented below.

Table 4.10 Vote Counting

	POE	SOE	EOE	MOE	TOE
Gifted sample significantly outscored non-gifted sample	2	2	8	7	16
No significant difference found	12	14	8	10	1

(Table 4.10 continued)

	POE	SOE	EOE	MOE	TOE
Non-gifted sample significantly outscored gifted sample	3	1	1	0	0

POE

For POE, the category of "No significant difference found " received a majority of the votes (12). In second place was the "Non-gifted sample significantly outscored gifted sample" category (3 votes), and in third place was the "Gifted sample significantly outscored non-gifted sample" (2 votes).

SOE

For SOE, the category of "No significant difference found " received a majority of the votes (14). In second place was the "Gifted sample significantly outscored non-gifted sample" category (2 votes), and in third place was the "non-gifted sample significantly outscored gifted sample" (1 vote).

EOE

For EOE, there was a tie for a plurality of votes. The tie was between the categories of "No significant difference found " and of "Gifted sample significantly outscored non-gifted sample". Both categories received 8 votes. The category of "Non-gifted sample significantly outscored gifted sample" received 1 vote.

MOE

For MOE, the category "No significant difference found " won a majority of the votes (10). In second place the category of "Gifted sample significantly outscored non-gifted sample" received 7 votes, and in third place the category of "Non-gifted sample significantly outscored gifted sample" received no votes.

TOE

For TOE, the category "Gifted sample significantly outscored non-gifted sample" received a majority of the votes (16). The category "No significant difference found" received 1 vote and the category "Non-gifted sample significantly outscored gifted sample" received no votes. Below, in Table 4.11, the raw vote counting numbers are converted into percentages.

Table 4.11 Percentages of votes

	POE	SOE	EOE	MOE	TOE
Gifted sample significantly outscored non-gifted sample	11.76%	11.76%	47.06%	41.18%	94.12%
No significant difference found	70.59%	82.35%	47.06%	58.82%	5.88%
Non-gifted sample significantly outscored gifted sample	17.65%	5.88%	5.88%	0.00%	0.00%

Research Question 3: Are Some Scholars' Critiques of the Comparative Studies Accurate?

a. Do the Comparative Studies have Small Sample Sizes (Piirto, 2010)?

In reviewing the sample sizes of the comparative studies (see table above), it is apparent that there is a wide range of sample sizes. Generally, the studies that used the OEQ I had smaller sample sizes than those studies that used the OEQ II. Piirto contended that it was difficult to find comparative studies where both the gifted and non-gifted samples had more than 80 participants (2010). Five such studies were found during the course of the systematic review: Bouchet and Falk (2001), Tieso (2007a), Sanz as cited by Falk (2008), Siu (2011), and Wirthwein and Rost (2011). All of these studies used the OEQ II as an instrument.

Those studies using the OEQ I as an instrument have smaller samples. Three of the studies using the OEQ I have samples of gifted individuals that are less than 40 (Breard, 1994; Domroese as cited by Ackerman, 1998; Gallagher, 1985). 4 of the studies have samples greater than 40 (Ackerman, 1993, 1997; Miller, Silverman, & Falk, 1994; Piechowski & Colangelo, 1984; Yakmaci-Guzel & Akarsu, 2006). Considering the "smallness" of these sample sizes is difficult. Clearly the OEQ I studies' samples are smaller than the OEQ II studies' sample sizes. This naturally leads to a comparative, relative smallness. Yet, it is difficult to establish any absolute description of the comparative studies' sample sizes.

With that stated, though, it is clear that Piirto's critique was not entirely accurate (2010). This may be partly because several of the studies with the largest sample sizes (Siu, 2011; Wirthwein & Rost, 2011) were published in the same year of Piirto's critique (2011). It is possible that Piirto had yet to see these new studies. Regardless, five total studies with sample sizes larger than 80 in each of the compared groups is what currently exists in the giftedness-OE literature.

b. Do the Studies have Mostly Trivial and Small Effect Sizes (Pyrt, 2008)?

Below, a table displays the findings and effect sizes for each study. Some effect sizes are presented as Cohen's *d* while others are presented as partial η^2. Effect sizes (Cohen's *d*) were calculated in the event that researchers did not provide an effect size. In the event that studies did not provide an effect size or sufficient data for calculation, this is noted on Table 4.12 as "data unreported".

Table 4.12 Effect sizes

Study	Finding	Effect sizes
Piechowski & Colangelo (1984)	Gifted significantly outscored non-gifted on TOE, MOE, and EOE	Data unreported
Gallagher (1985)	Gifted sample's EOE, TOE, and MOE scores were significantly higher than non-gifted sample	Data unreported
Ackerman (1993, 1997)	POE, EOE, and TOE were able to significantly discriminate between gifted and non-gifted groups	Data unreported
Domroese (1994) as cited by Ackerman (1998)	No significant differences found	Data unreported
Breard (1994)	TOE and EOE scores were able to correctly place 3 samples classify 40.9% of the sample	Data unreported
Miller, Piechowski, & Falk (1994)	Gifted sample's EOE and TOE scores were significantly higher than non-gifted sample	Data unreported

(Table 4.12 continued)

Study	Finding	Effect
Bouchet & Falk (2001)	Gifted sample had significantly higher TOE and EOE scores than non-gifted sample	Gifted vs. standard group: TOE: *d*=.55[a] Gifted vs. AP group: TOE: *d*= .28[a] Gifted vs. AP + Standard group: TOE *d*= .47[a] Gifted vs. standard group: EOE: *d*=.27[a] Gifted vs. AP group: EOE: *d*=.20[a] Gifted vs. AP + Standard group: EOE: *d*=.24[a]
Bouchard (2004)	Gifted sample's TOE scores were significantly higher than control	TOE: *d*=.74[b]
Yakmaci-Guzel & Akarsu (2006)	High intellectual group significantly outscored the low group on TOE and MOE	High intellectual group vs. low intellectual group: MOE: *d*=.63[a] High intellectual group vs. medium + low intellectual group: MOE: *d*=.64[a] High intellectual group vs. low intellectual group: TOE: *d*= .92[a] High intellectual group vs. low and medium intellectual group: *d*=.90[a]

(Table 4.12 continued)

Study	Finding	Effect sizes
Tieso (2007a)	Gifted sample's MOE and TOE were significantly higher than control	TOE: *d*=.11[a] MOE: *d*=.36[a]
Chang (2001) as cited by Falk et al. (2008)	Gifted group significantly outscored talented and non-gifted group on TOE and gifted and talented combined group significantly outscored non-gifted group on TOE, SOE, EOE, and MOE	Data unreported
Sanz as cited by Falk et al. (2008)	Gifted sample's TOE and MOE scores were significantly higher than nongifted sample	Data unreported
Yakmaci-Guzel (2002, 2003) as cited by Falk et al. (2008)	Above average group significantly outscored average and below average group on TOE	Data unreported
Siu (2010)	The gifted group significantly outscored the non-gifted group on all five OEs	POE: partial η^2=.031 SOE: partial η^2=.065 MOE: partial η^2=.012 EOE: partial η^2=.037 TOE: partial η^2=.120
Harrison & Haneghan (2011)	Gifted group significantly outscored non gifted-group on TOE, MOE, and SOE	MOE: partial η^2=.08 TOE: partial η^2=.07 SOE: partial η^2=.011

(Table 4.12 continued)

Study	Finding	Effect sizes
Wirthwein & Rost (2011)	Gifted group significantly outscored non-gifted group on TOE; high achievers significantly outscored low achievers on TOE	Gifted vs. non gifted: TOE: *d*=.42; partial η^2= .04 High achievers vs. average achievers: TOE *d*=.56; partial η^2=.08 Gifted vs. non-gifted, low, and high achievers: TOE: *d*=.30[a] Gifted vs. high achievers TOE: *d*=.00[a]

Note[a]: These effect sizes were calculated using data found in the studies.
Note[b:] These effect sizes were taken from Pyrt's calculations (2008).

Table 4.12 above provides the effect size findings. The table below categorizes these effect sizes' sizes according to Cohen's recommendations (1988). Those effect sizes calculated as Cohen's *d* are presented first, and then those effect sizes calculated as partial η^2 are presented. In Table 4.13 below, tallies are also made with an "X". Also, the exact effect size is included in parentheses next to its appropriate tally mark.

Table 4.13 Tallies for Cohen's *d*

	Trivial: < .20	Small: .20-.50	Medium: .50-.80	Large: >.80
POE				
SOE				
EOE[a]		X (.24)		
MOE[a]		X (.36)	X (.64)	

(Table 4.13 continued)

	Trivial: < .20	Small: .20-.50	Medium: .50-.80	Large: >.80
TOE[a]	X (.11)	X (.30) X (.47)	X (.74)	X (.90)

Note[a]. Several studies produced multiple comparisons, but have only one comparison represented here. This includes Yakmaci-Guzel and Akarsu (2006), Wirthwein and Rost (2011), and Bouchet & Falk (2001). These studies included three groups, a gifted group, a medium or above average ability group, and an average or below average ability group. In each case, the medium/above average group was combined with the below average/average group, then a comparison with the gifted group was made. Pyrt's used the same method in his calculations of effect sizes (2008).

Below, a partial η^2 table is presented, Table 4.14. The sizes small, medium, and large are in accordance with Cohen's recommendations (1988).

Table 4.14 Tallies for partial h^2

	Small: .01	.035	Medium: .06	.10	Large: .14
POE		X (.031)			
SOE	X (.011)		X (.065)		
EOE		X (.037)			
MOE	X (.012)			X (.080)	
TOE[a]			X (.070)		X (.120)

Note[a]: The partial η^2 calculated by Wirthwein and Rost is not included on the table above (2011). This is because that effect size was included as Cohen's d in the table above. To include the effect size on both tables would be reporting two effect sizes for one mean difference.

Table 4.15 below aggregates both Cohen's *d* and partial η^2 according to Cohen's recommendations (1988).

Table 4.15 Aggregated effect size tallies

	Trivial	Small	Medium	Large
POE		X		
SOE		X	X	
EOE		XX		
MOE		XX	XX	
TOE	X	XX	XX	XX

It is important to reiterate that many of the studies failed to provide sufficient data to calculate effect sizes for some or all of their OEs. Consequently, what is portrayed is not a

complete depiction of the comparative literature's effect sizes. However, considering this sample, it is clear that many of the effect sizes are trivial or small. Of the 17 available effect sizes, 10 were either trivial or small, 5 were medium, and 2 were large. So, using Cohen's recommendations (1988), skeptical critiques that many of the found effect sizes were trivial or small was accurate (Pyrt, 2008).

However, as noted earlier, effect sizes are inherently relative to the nature of the group difference or effect (Cohen, 1988). In order to provide a more accurate understanding of the significance of these effect sizes, the Cohen's *d* are converted into percentage of distributional overlap on Table 4.16 below.

Table 4.16 Effect size converted in percentages

Study	Effect size (Cohen's *d*)	OE Type	Percentage of non-gifted sample's scores at or below gifted OE mean	Percentage of gifted sample's score distribution that does not overlap with non-gifted sample score distribution
Bouchet and Falk (2001)	.47	TOE	68%	18%
Bouchet and Falk (2001)	.24	EOE	59%	9%
Bouchard (2004)	.74	TOE	77%	27%
Yakmaci-Guzel and Akarsu (2006)	.90	TOE	82%	32%
Yakmaci-Guzel and Akarsu (2006)	.64	MOE	74%	24%
Tieso (2007a)	.11	TOE	54%	4%
Tieso (2007a)	.36	MOE	64%	14%
Wirthwein and Rost (2011)	.30	TOE	62%	12%

Above, Table 4.16 helps demonstrate a more precise portrayal of the effect sizes. Below, another table, Table 4.17 converts these percentages into raw numbers of gifted participants from the studies.

Table 4.17 Percentages converted to raw numbers

Study	OE Type	Percentage of gifted sample's score distribution that does not overlap with non-gifted sample score distribution	Number of gifted participants in non-overlap part of OE score distribution
Bouchet & Falk (2001)	TOE	18%	26
Bouchet & Falk (2001)	EOE	9%	13
Bouchard (2004)	TOE	27%	26
Yakmaci-Guzel & Akarsu (2006)	TOE	32%	14
Yakmaci-Guzel & Akarsu (2006)	MOE	24%	10
Tieso (2007a)	TOE	4%	12
Tieso (2007a)	MOE	14%	42
Wirthwein & Rost (2011)	TOE	12%	12

These conversions of effect sizes in Table 4.17 help to demonstrate a more accurate depiction of their absolute size rather than their size relative to Cohen's recommendations (1988). Again, many effect sizes could not be calculated due to missing or inadequate data. However, of the available effect sizes, it appears that only TOE effect sizes are consistently large. Those effect sizes account for two of the three largest partial η^2 and the three largest Cohen's *d* effect sizes. Relative to the other four OEs, then, TOE score differences between

gifted and non-gifted groups produced the largest effect. Whether or not this effect is large in an absolute sense is still difficult to determine.

Composite Effect Size

Several studies employed the OEQ II and provided enough data for a composite effect size to be calculated. These were: Bouchet and Falk (2001), Tieso (2007a), Siu (2010), Harrison and Haneghan (2011), and Wirthwein and Rost (2011). Bouchet and Falk (2001) only reported enough data for the composite EOE and TOE calculations. All of the other researchers reported enough data to calculate the effect size for all five of the OEs. The total sample size of gifted subjects was 822. For the POE, SOE, and MOE calculations, though, the sample size was 682 due to the absence of Bouchet and Falk's data. The total sample size of non-gifted subjects was 1279. Again, for the POE, SOE, and MOE calculations, Bouchet and Falk's samples were excluded and the sample size of non-gifted participants was smaller, 867. Tables 4.18 and 4.19 below list the calculated pooled standard deviations and harmonic, weighted means for each of the five OEs.

Table 4.18 Harmonic, weighted OE means

	POE	SOE	MOE	EOE	TOE
Gifted	3.30	3.19	2.91	3.36	3.57
Non-gifted	3.15	3.04	2.64	3.34	3.28

Table 4.19 Pooled standard deviation

	POE	SOE	MOE	EOE	TOE
Gifted	.74	.81	.74	.76	.78
Non-gifted	.69	.77	.76	.73	.72

Using these data, the composite effect sizes were calculated. These are presented on Table 4.20 below, according to Cohen's recommendations (1988).

Table 4.20 Composite effect sizes

	Trivial: < .20	Small: .20-.50	Medium: .50-.80	Large: >.80
POE	X (.19)			
SOE	X (.19)			
MOE		X (.35)		
EOE	X (.03)			
TOE		X (.38)		

c. Is TOE the only OE on which Gifted Individuals Consistently, Significantly Outscored Non-gifted Individuals (Piirto, 2010; Pyrt, 2008)?

Gifted individuals did consistently and significantly outscore non-gifted individuals on measures of TOE. However, it is unclear if TOE is the only OE upon which gifted individuals consistently and significantly outscored non-gifted individuals. In the vote counting procedure's results, it is clear that gifted samples did not consistently, significantly outscore non-gifted samples on POE and SOE measures. In fact, there are more instances of non-gifted samples significantly outscoring gifted samples on POE (3) than gifted samples significantly outscoring non-gifted samples (2). Additionally, there are six times more instances of no significant differences between the groups than there are instances where the gifted group significantly outscored the non-gifted group on POE.

For SOE, gifted samples significantly outscored the non-gifted sample two times, only one time more than the non-gifted sample significantly outscored the gifted sample. Additionally, the "no significant difference" category received fourteen votes. Therefore, there were seven times more occurrences of no significant difference than occurrences in which the gifted sample significantly outscoring the non-gifted sample on SOE.

For MOE and EOE, it is more difficult to assert whether or not the gifted samples have consistently significantly outscored the non-gifted samples. For MOE, there were six occurrences in which gifted samples significantly outscored non-gifted samples. There were nine occurrences of no significant group differences between the samples and zero occurrences of non-gifted samples significantly outscoring gifted groups. Similarly, there were eight occurrences in which gifted samples significantly outscored non-gifted samples on EOE and eight occurrences in which no significant difference was found. There was one instance where a non-gifted group significantly outscored a gifted group on EOE.

For both of these OEs, it does not seem that gifted samples consistently, significantly outscored non-gifted groups. However, another researcher could have an opposing conclusion from this same data and argue that these results do demonstrate that gifted samples consistently significantly outscore non-gifted samples. This kind of interpretation depends upon the nature and definition of consistency. Such a definition or perspective is largely dependent on the researcher, at least in regards to results from comparative studies on giftedness and OE. Regardless of how one might interpret the findings from the vote counts for EOE and MOE, it is clear that gifted samples have significantly, consistently outscored non-gifted samples on TOE. Only one study found that a gifted sample did not significantly outscore the non-gifted sample on a TOE measure.

Research Question 4: How Methodologically Rigorous were the Comparative Studies?

To check for methodological rigor, the studies internal and external validities were reviewed. Below, themes regarding the studies internal validity are presented. Afterwards, themes regarding the studies external validity are presented.

Internal Validity

Selection Bias

In order to check for selection bias, each study's operationalization of giftedness was collected on Table 4.21 below.

Table 4.21 Study's operationalizations of giftedness

Study	Giftedness Operationalization
Piechowski and Colangelo (1984)	Gifted adults (Silverman & Ellsworth, 1981) were identified based on their scoring in the 98th percentile of standardized tests, membership in a school's gifted program, or distinguishing themselves in the arts The 49 gifted adolescents identified as gifted based on a combination of test scores, grades, and teacher nominations (Colangelo, Piechowski, & Kelly as cited by Colangelo & Piechowski, 1984)
Gallagher (1985)	The gifted sample was identified using behavioral checklist, academic record, above average CAT, and high score on Otis Lennon Test of Mental Ability
Ackerman (1993, 1997)	The gifted sample was identified using achievement test scores, recommendation/s, grades, and an IQ of at least 120 (exceptions were made to IQ threshold)
Breard (1994)	The gifted sample was identified using a 100 point scale system, 90 points of which based on achievement and aptitude tests and 10 points on individual school district discretion
Miller, Silverman, & Falk (1994)	The gifted sample was identified using Mensa membership or through acquaintance with the researchers. -15 of the participants were Mensa members who had an IQ at or above the 98th percentile. -19 of the participants had at least a 1200 on the SAT or the GRE -4 of the participants had an IQ of at least 130.
Domroese as cited by Ackerman (1998)	The gifted sample was identified using performance on the Ravens Progressive Matrix, the cognitive Abilities Test, and the Iowa Test of Basic Skills. Gifted group threshold scores were established at or above the 90th percentile
Bouchet & Falk (2001)	The gifted sample was identified using membership in a gifted education program during high school
Bouchard (2004)	The gifted sample was identified using evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields

(Table 4.21 continued)

Study	Giftedness Operationalization
Yakmaci-Guzel & Akarsu (2006)	The high intellectual ability group was identified using Ravens Progressive Matrix and the score threshold of 27
Tieso (2007a)	The gifted sample was identified using a matrix that included a minimum score on standardized tests of achievement, ability, or creativity
Chang as cited by Falk et al. (2008)	Unknown
Sanz as cited by Falk et al. (2008)	The gifted sample was identified using IQ scores
Yakmaci-Guzel as cited by Falk et al. (2008)	The gifted sample was identified using performance on the Raven Advanced Progressive Matrices Test and comparisons to the Turkish norms for their grade level
Siu (2010)	The gifted sample was identified using a number of assessments including standardized tests on intellectual abilities and psychological profiles.
Harrison & Haneghan (2011)	The gifted sample was identified as creatively and/or intellectually gifted using achievement, IQ, and/or creativity test scores
Wirthwein and Rost (2011)	The gifted sample was identified using IQ scores on three different tests; achievement groups were operationalized using GPA

As the table above illustrates, psychometric, intellectual, academic giftedness is operationalized in a number of ways. Some of the studies operationalized academic giftedness as a high psychometric test score (e.g. Breard, 1994; Yakmaci-Guzel & Akarsu, 2006), while others use a number of criteria including such tests, recommendations (e.g. Ackerman, 1993, 1997), behavioral checklists (Gallagher, 1985), and creativity measures (Harrison & Haneghan, 2011). Several trends regarding these operationalizations are provided below. These trends robustness in regards to threats to selection or selection bias are also discussed below.

Psychometric tests. Many of the studies in the comparative literature either entirely or partially used psychometric or standardized tests in operationlizing giftedness. Some studies listed an exact scoring threshold that gifted participants had to meet (Ackerman, 1993, 1997; Breard, 1994; Miller, Silverman, & Falk, 1994; Piechowski & Colangelo, 1984; Yakmaci-Guzel, 2006) while others did not mention a specific threshold, but stated that a high level of test performance was necessary (Domroese as cited by Ackerman, 1998; Gallagher, 1985; Harrison & Haneghan, 2011; Sanz as cited by Falk et al., 2008). Of all of the operationalizations, though, only three failed to explicitly mention a standardized or psychometric test of some kind (Bouchard, 2004; Bouchet & Falk, 2001; Chang as cited by Falk et al., 2008). Of these three, one did not provide any operationalization information (Chang as cited by Falk et al.). This frequent use of psychometric tests in operationalizing and identifying gifted samples demonstrates a strong alignment between the comparative studies' samples and the academic conception of giftedness.

Membership in school programs. Several studies had adult participants who were no longer in school or college (Miller, Silverman, & Falk, 1994; Piechowski & Colangelo, 1984; Wirthwein & Rost, 2011). The remaining studies sampled elementary, middle, high school, or undergraduate gifted students who were either participating in or had participated in their school's gifted program. It is also important to note that of the three studies with adult subjects, one sampled adults who had been in gifted school programs as children (Piechowski & Colangelo), one sampled adults who were members of MENSA, a group that necessitates that members meet a standardized score threshold (Miller, Silverman, & Falk), and one used data from a longitudinal study in which the adult gifted sample had been identified in childhood as

gifted (Wirthwein & Rost). Combined, the comparative studies' samples demonstrated a strong alignment with the academic, intellectual notion of giftedness.

Use of matrices in operationalization/identification. A number of studies used multiple criteria or matrices in operationalizing giftedness. This was done because school districts from which the samples were drawn used matrices to identify gifted students. All of the matrices included standardized test scores, but also used other criteria to identify gifted individuals. It is unclear how the test scores were weighted in comparison to the other criteria. However, a number of studies' operationalizations used the word "or", implying that gifted individuals are either identified through psychometric testing or through one of the other listed qualities or means. Several studies used matrices in this manner, noting that gifted individuals could have been identified by exceptional test scores or by demonstrating an exceptional ability in one of the following areas: leadership, artistic ability, or creativity (Bouchard, 2004); creative ability (Harrison & Haneghan, 2011); distinguished artistic achievement (Piechowski & Colangelo, 1984); a particular psychological profile (Siu, 2010); and creativity (Tieso, 2007a). Gallagher's gifted sample was also identified with a matrix, but it stipulated that gifted students have high-test scores and perform well on a behavioral checklist (1985).

These matrices create some uncertainty around the nature of these studies' samples. The use of the word "or" implies that gifted students, such as those sampled, could be exceptional due to their intellectual, academic abilities or exceptional due to some other kind of gift. This theme demonstrates some potential selection bias present in the comparative literature as not all of the subjects may have been identified according to their intellectual, academic giftedness. Or, these other characteristics were not controlled or accounted for in the studies' statistical comparisons. Yet, because standardized tests are easy to administer and interpret, it may be the

case that the matrices and their various criteria are largely superficial. The matrices could simply be used to provide the patina of diversity to parties concerned about the biases and limitations of psychometric testing. Consequently, most gifted students in these studies would still have been identified using the intellectual, academic conception of giftedness. It is unclear to determine this for certain, though, and it is best to consider the possibility that the collected samples are potentially diverse.

Creativity and artistic ability. Closely related to the matrices theme is the theme of creativity and artistic ability. A number of studies' included or potentially included artistically gifted or creatively gifted persons (Bouchard, 2004; Harrison & Haneghan, 2011; Piechowski & Colangelo, 1984; Tieso, 2007a). These studies operationalizations included: distinguished artistic performance (Piechowski & Colangelo), high scores on creativity instruments (Harrison & Haneghan; Tieso), and a high level of artistic ability or achievement (Bouchard). As was the case with the matrices theme, it is unclear how many or if any participants were identified using these criteria. However, creative giftedness does not align well the intellectual, psychometric conception of giftedness and could bias samples' OE scores. As noted earlier in this dissertation, creativity and artistic ability are widely understood to be positively related to the OEs (Piechowski, 2006), consequently the inclusion of such gifted persons could constitute as selection bias.

Inter-rater reliability. One emergent theme related to the studies' internal validity was their scoring of the OEQ I. Two studies, Piechowski and Colangelo (1984) and Miller, Silverman, and Falk (1994), have potential inter-rater reliability concerns. Piechowski and Colangelo (1984) sampled its 119 participants' OEQ I scores from 3 different studies with potentially 9 different OEQ I scorers. It is unclear which author scored the OEQ I in the studies,

however there were at least 28 completed OEQ I's (Silverman & Ellsworth, 1981) that Piechowski and Colangelo did not help evaluate. No inter-rater reliability was established in the study. Miller, Silverman, and Falk (1994) did rate all of their gifted participants' OEQ I scores, however they rated none of their control, non-gifted sample scores, which were 41 graduate students drawn from Lysy and Piechowski (1981). Consequently, Miller, Silverman, and Falk's study might have the same kind of inter-rater reliability limitation (1994).

Conclusions

For the most part, the studies as a whole are largely free from serious selection bias concerns. Most of the sampled participants were or had been members of a school district's gifted program. And while this raised a variety of potential selection biases evidenced by the vague use of matrices and the inclusion of creative/artistic persons in samples, it is difficult to acquire more valid samples of the intellectual, academic gifted population. When collecting samples from a small minority whose theoretical definition varies across states and countries, some allowances seem reasonable.

Yet, it is noteworthy that a number of artistically, creatively gifted persons may have been included in four studies' samples (Bouchard, 2004; Harrison & Haneghan, 2011; Piechowski & Colangelo, 1984; Tieso, 2007a). Also, the failure to establish inter-rater reliabilities in two studies (Miller, Silverman, & Falk, 1994; Piechoski & Colangelo, 1984) is problematic. These themes represent some concern that should be considered when evaluating the body of litearture's internal validity and findings.

External Validity

Themes concerning threats and strengths related to external validity are presented below. The included themes related to several general topics including operationalizations, age, countries of origin, sample sizes, and findings.

Operationalizations

The table listing the studies' operationalizations illustrates a number of trends regarding the studies' external validity. These trends are closely related to those trends regarding the internal validity trends. This was expected as studies' internal validity is inherently related to their external validity.

Psychometric Tests and Membership in School Programs. Many of the studies sampled their participants from schools where gifted students were identified using psychometric tests. These studies' samples are similar to the academic, intellectual conception of giftedness. Consequently, this theme shows that these studies demonstrate robust external validity.

Use of Matrices. Some of the studies used matrices and included artistically talented or otherwise creative persons in their samples (Bouchard, 2004; Gallagher, 1985; Harrison & Haneghan, 2011; Piechowski & Colangelo, 1984; Siu, 2010; Tieso, 2007a). These studies illustrated a problematic theme for the comparative studies' external validity. The studies used different, though similar matrices, possibly causing different studies' samples to be significantly different. For instance, Piechowski and Colangelo's (1984) potentially sampled some artistically talented adults, while other studies' adult samples included only intellectually gifted adults (Wirthwein & Rost, 2011). Consequently, it might be problematic to generalize the findings from studies that used matrices and studies that included artistic or creative persons.

Age. Below, a table presents the age information for each study in the systematic review. Not every study provided a mean age. Some studies provided an age range and/or the year of school of the participants (e.g. 1st grade). If available, mean age of the sample(s) is provided. However, if mean age was unavailable, age range and/or year in school is provided. These data were the only other descriptive data provided about the samples' ages. All age related data is provided in the "Age information" column. Emergent themes drawn from these data are described on Table 4.22 below.

Table 4.22 Age information for samples

Study	Gifted and non-gifted sample sizes	Age information
Piechowski and Colangelo (1984)	28 gifted adults from Silverman & Ellsworth (1981)	Mean age: 36.4 years
	49 gifted adolescents from Colangelo, Piechowski, & Kelly (1982)	Mean age: 14.8 years
	42 average ability graduate students from Lysy & Piechowski (1983)	Mean age: 29 years
Gallagher (1985)	-12 gifted -12 non-gifted	All sixth graders; either 11 or 12 years old
Ackerman (1993, 1997)	-42 gifted -37 non-gifted	All high school students Age range: 14-18
Breard (1994)	-39 gifted -30 near gifted -48 non-gifted	All fourth and fifth grade students
Miller, Silverman, and Falk (1994)	41 gifted adults	Mean age: 37
	42 average ability graduate students from Lysy and Piechowski (1981)	Mean age: 29

(Table 4.22 continued)

Study	Gifted and non-gifted sample sizes	Age information
Domroese as cited by Ackerman (1998)	-25 gifted -30 non-gifted -27 near-gifted	All fifth grade students
Bouchet & Falk (2001)	-140 gifted -129 advanced placement -281standard programs	All college undergraduates Mean age: 22.32
Bouchard (2004)	-96 gifted -75 non-gifted	All elementary school students
Yakmaci-Guzel and Akarsu (2006)	-35 high ability group -37 low ability group -33 middle ability group	All high school students Age range: 15.5 and 19.5
Tieso (2007a)	-296 gifted students -184 non-gifted students	All elementary and middle school students Age range: 7-15
Chang as cited by Falk et al. (2008)	-951 gifted and talented -2,046 non-gifted	Students of all school ages
Sanz as cited by Falk et al. (2008)	-102 gifted -102 non-gifted	Mean age: 11.05 years
Yakmaci-Guzel as cited by Falk et al. (2008)	-500 total participants divided into three groups based on Raven Progressive Matrices scores: below and above average and average groups *n*'s of groups was unreported	Mean age: 16.80
Siu (2010)	-217 gifted -229 non-gifted	Students of various school ages
Harrison and Haneghan (2011)	-73 gifted -143 non-gifted	All middle and high school students

(Table 4.22 continued)

Study	Gifted and non-gifted sample sizes	Age information
Wirthwein and Rost (2011)	-96 gifted -91 non-gifted	Mean age: 31.4
	-123 high achievers -97 average achievers	Mean age: 30.5

School-aged samples. Many of the gifted and non-gifted samples are of school age, elementary, middle, high, or collegiate. Of all of the samples, 13 were of school age. Eight samples included elementary and/or middle school students, six samples included high school students, and 1 sample included college undergraduates. Three samples included exclusively adults. Omitting Wirthwein and Rost's achiever group samples (as they are not gifted), these three samples had mean ages of 36.4 (Piechowski & Colangelo, 1984), 37 (Miller, Silverman, & Falk, 1994), and 31.4 (Wirthwein & Rost, 2011). This high number of studies with school-aged sample demonstrates robust external validity in regards to those populations. For other populations, such as middle-aged and elderly gifted populations, it is unclear how externally valid these studies are.

Underrepresentation or absence of certain age populations. Another theme evident in the age data is that some groups are underrepresented or omitted from the comparative literature. Undergraduate college students (ages 18-22) are present in one study, and there are three studies featuring comparisons between gifted and non-gifted adults (Miller, Silverman, & Falk, 1994; Piechowski & Colangelo, 1984; Wirthwein & Rost, 2011). There are no studies comparing gifted and non-gifted individuals with an average age of 40 or greater. Consequently, there are no comparisons between the middle-aged or elderly gifted and non-gifted population. These

underrepresented and absent populations reflect a weakness in the comparative literature's external validity.

Country of origin. Table 4.23 below was used to answer on a sub-research question discussed earlier in Chapter 4. It is used here to help demonstrate the themes in regards to countries of origins.

Table 4.23 Country of origin

Study	Location
Piechowski and Colangelo (1984)	United States 49 gifted adolescents from Iowa (Colangelo & Piechowski, 1984)
Gallagher (1985)	United States
Ackerman (1993, 1997)	Canada
Domroese as cited by Ackerman (1998)	United States (large Midwestern city)
Breard (1994)	United States (South Carolina)
Miller, Silverman, and Falk (1994)	United States (1/3rd of the subjects from Colorado)
Bouchet & Falk (2001)	United States (Midwest)
Bouchard (2004)	United States (Houston, Texas)
Yakmaci-Guzel and Fusun Akarsu (2006)	Turkey (Istanbul)
Tieso (2007a)	United States (east coast)
Chang as cited by Falk et al. (2008)	China (Hong Kong)
Sanz as cited by Falk et al. (2008)	Spain
Yakmaci-Guzel as cited by Falk et al. (2008)	Turkey (Istanbul)
Siu (2010)	China (Hong Kong)
Harrison and Haneghan (2011)	United States
Wirthwein and Rost (2011)	Germany

Studies conducted in the United States**.** Many of the studies were conducted in the United States. Nine studies collected their samples from the United States.

Vagueness of sample area. While some studies indicated where in the United States the sample was from, several studies were unclear (Bouchet & Falk, 2001; Harrison & Haneghan, 2011; Tieso, 2007a). Consequently, it is difficult to determine if any comparative study has ever been conducted in certain states or regions of the country.

Studies conducted outside of the United States. Seven studies were conducted outside of the United States. Two of these were conducted in Europe (Sanz as cited by Falk et al., 2008; Wirthwein & Rost, 2011), four were conducted in Asia (Chang as citdy by Falk et al., 2008; Siu, 2010; Yakmaci-Guzel, as cited by Falk et al., 2006; Yakmaci-Guzel & Akarusu, 2006), and one was conducted in Canada (Ackerman, 1993, 1997). It is difficult to determine how representative different countries' samples are of the intellectual, academic notion of giftedness established in American school districts.

Urban nature of sample sites for international studies. Of the international studies, four were conducted in urban areas (Chang as cited by Falk et al., 2008; Siu, 2010; Yakmaci-Guzel, as cited by Falk et al., 2006; Yakmaci-Guzel & Akarusu, 2006). Researchers who conducted the two studies conducted in Turkey (Yakmaci-Guzel & Akarusu; Yakmaci-Guzel as cited by Falk et al.) collected samples in Istanbul. Researchers who conducted the two studies in China (Chang as cited by Falk et al.; Siu) collected samples in Hong Kong. Istanbul and Hong Kong are both large cities, unlike other parts of Turkey and China. This makes the samples collected potentially unrepresentative of those countries' general populations.

Unknown nature of other countries populations and minorities. The researcher is largely ignorant of Chinese (Chang as cited by Falk et al., 2008; Siu, 2010), German (Wirthwein & Rost, 2011), and Spanish (Sanz as cited by Falk et al., 2008) culture. Consequently, it cannot be determined if it is the case that these countries have certain minority patterns that should have been reported or could have altered the studies' external validity in any way.

Recency of international studies. International comparative studies have been conducted more recently than studies in the United States. Of those studies conducted in the United States, two were conducted in the 1980s, four in the 1990s, three in the 2000s, and one since 2010. Of

those studies conducted outside of the United States, none were conducted in the 1980s, one was conducted in the 1990s, four were conducted in the 2000s, and two were conducted since 2010. It is unclear if this recency has any impact on the studies' external validity. However, it is a definite theme that the international comparative studies have all been conducted more recently than the American comparative studies.

Sample Sizes

An emergent theme regarding the studies' external validity was their sample sizes. As noted earlier, those studies using the OEQ I studies had much smaller sample sizes than those studies using the OEQ II. This theme might indicate that those studies using the OEQ II would have a stronger external validity. This would assume that other elements of the OEQ I and II studies were held constant, though.

Consistency/Inconsistency of Findings

Another emergent theme from the comparative literature's findings is that some OEs consistently and significantly demonstrates differences between the gifted and non-gifted samples. Significant differences between gifted and non-gifted groups are found more inconsistently for other OEs. This finding was noted in the vote counting procedure, where TOE was shown to most consistently discriminate between gifted and non-gifted groups, and EOE and MOE being a somewhat inconsistent discriminator. POE and SOE consistently found no significant difference between gifted and non-gifted groups. The consistency of differences between TOE, POE, and SOE scores strengthens the comparative literature's general external validity. The inconsistency of the differences between EOE and MOE scores somewhat weakens the literature's external validity.

Conclusion

The answers to the first four research questions were provided in this chapter. Each answer attempted to provide unbiased descriptions, data, and calculations. For the first research question, a variety of demographic information was retrieved and presented in the table and narrative form. To answer the second research question, a vote counting procedure was conducted, and information was collected and/or calculated and presented in chart and narrative form to answer the third research question. For Research Question 4, the studies' various qualities were reviewed to determine themes regarding internal and external validity. In the next chapter, all of these data and findings are synthesized in an effort to answer research question 5 for each of the individual OEs.

CHAPTER 5: DISCUSSION

In this chapter, the findings from Chapter 4 are used to answer the fifth research question: Is the gifted population more overexcitable than the non-gifted population? Each of the five overexcitabilities (OEs) is considered individually. Afterwards, a general discussion about the comparative literature, its findings, the consequences of this dissertation's findings, and avenues for future research are presented.

Evidence for the Individual Overexcitabilities (OEs)

Psychomotor Overexcitability (POE)

The evidence provided in Chapter 4 demonstrated that it is unclear if gifted individuals have significantly higher POE than non-gifted individuals. The vote counting procedure demonstrated that two studies found that gifted samples significantly outscored non-gifted individuals (Ackerman, 1993; 1997; Siu, 2010). However, the review of the studies' sample sizes, effect sizes, and internal and external validity demonstrated that these two studies had limitations. Ackerman's study had a small sample size (42) and was conducted outside of the United States (in Canada). Siu's study had a much larger sample size and used the OEQ II, however it was also conducted outside of the United States (in Hong Kong) (2010). Siu regarded the effect size for POE (partial η^2=.031) as small.

The vote counting procedure also found three studies in which non-gifted samples significantly outscored gifted samples. These included Bouchard (2004), Wirthwein and Rost (2011), and Sanz (as cited by Falk, 2008). The review of the literature's internal and external validity also demonstrated that these studies had potential limitations. Bouchard's study used the ElemenOE, an instrument the researcher designed, piloted, and employed alone. The instrument has never been reused or re-piloted by an independent researcher in a comparative study.

Authors of the other studies both used the OEQ II and had large sample sizes, but were conducted in Europe. As noted in Chapter 4, it is unclear how generalizable results in other countries are to the United States' intellectually gifted population.

When the POE means of gifted and non-gifted samples from multiple studies (Harrison & Haneghan, 2011; Siu, 2010; Tieso, 2007a; Wirthwein & Rost, 2011) were combined, the composite effect size of .19 was found. This effect size was small according to Cohen's recommendations (1988). However, only Siu found significant POE differences, so it is noteworthy that the combination of other studies' data (Harrison & Haneghan; Tieso; Wirthwein & Rost) produced a sizeable effect. The combination of such studies' null findings with Siu's findings could have produced a much smaller effect size or even a negative effect size (demonstrating that the non-gifted population outscored the gifted population). However, it is also important to note that Bouchet and Falk's data, as well as many other studies (e.g., Sanz as cited by Falk et al., 2008), was not included in the analysis. This demonstrates that the composite effect size calculation suffers from a significant selection bias.

And this large number of studies reporting no significant group difference is arguably the most important data point regarding findings related to POE. Combined, there are only five studies that have found significant differences between the two groups. There are eleven studies, twelve comparisons that found no significant differences. Additionally, there has never been a study in the United States that has shown that gifted individuals have significantly higher POE than non-gifted individuals, and no study has ever shown any difference in gifted and non-gifted adult POE levels. Considering this disparity in numbers and the concerns regarding the studies' sample sizes, findings, and internal and external validity, the most prudent conclusion is that there is insufficient evidence to conclude that gifted individuals have significantly higher POE

than non-gifted individuals. Below, Table 5.1 lists those studies finding that the gifted sample had significant higher POE than the non-gifted sample. The studies' limitations are also listed.

Table 5.1 POE Limitations

Study	POE finding	Limitation/s
Ackerman (1993, 1997)	POE discriminated the most between gifted and non-gifted samples	-Small sample size -Conducted outside of United States (Canada)
Siu (2010)	A gifted sample significantly outscored a non-gifted sample on POE	-Conducted outside of United States (Hong Kong) -Effect size was small partial η^2=.031

Sensual Overexcitability (SOE)

As was the case with POE, the evidence provided in Chapter 4 demonstrated that it is unclear if gifted individuals have significantly higher SOE than non-gifted individuals. The vote counting procedure found two studies in which gifted samples significantly outscored the non-gifted samples (Harrision & Haneghan, 2011; Siu, 2010). The review of the literature's external and internal validities found that these studies were mostly robust. As noted earlier, Siu's study was conducted outside of the United States. Harrison and Haneghan's study had a large sample size, was conducted in the United States, and used the OEQ II. The studies, though, had small (Harrison & Haneghan) or medium (Siu) effect sizes.

The vote counting procedure also found one study in which the non-gifted sample significantly outscored the gifted sample (Piechowski & Colangelo, 1984). The review of the literature's internal validity demonstrated that this study had a cross-sectional comparison limitation. A non-gifted, adult sample significantly outscored an adolescent, gifted sample. This cross-sectional comparison is exacerbated because the study's instrument, the OEQ I, has been shown to favor individuals who can write more proficiently (Ackerman, 1993). It could have

been that the non-gifted adult sample, composed of graduate students, was simply more apt at responding than a group of younger individuals.

The composite effect size calculation found a small effect size of .19 (Cohen, 1988). As was the case with the POE composite effect size, this finding entails significant selection bias. This is because every comparative study that has ever found that the gifted sample significantly outscored the non-gifted sample on SOE measures was included in the calculation (Harrison & Haneghan, 2011; Siu, 2010). Only two (Tieso, 2007a; Wirthwein & Rost, 2011) of the 14 studies finding no significant differences between the two samples were included in the calculation.

Considering this disparity, that there are seven studies finding null results for every one study finding significant results, as well as the studies' small effect sizes (Harrison & Haneghan, 2011; Siu, 2010), and limitations concerning external validity (Siu, 2010), the most prudent conclusion is that there is insufficient evidence to conclude that gifted individuals have significantly higher SOE than non-gifted individuals. As was done earlier, the studies finding that the gifted sample significantly outscored the non-gifted sample are presented on Table 5.2.

Table 5.2 SOE Limitations

Study	SOE finding	Limitation/s
Siu (2010)	A gifted sample significantly outscored a non-gifted sample on SOE	-Conducted outside of United States (Hong Kong) -Effect size was medium: partial η^2=.065
Harrison & Haneghan (2011)	A gifted sample significantly outscored a non-gifted sample on MOE	-Effect size was small: partial η^2=.011

Imaginational (MOE)

The evidence provided in Chapter 4 demonstrated that it is unclear if gifted individuals have significantly higher MOE than non-gifted individuals. The vote counting procedure found that seven studies found that gifted samples significantly outscored the non-gifted samples. 10 studies found no significant difference between the gifted and non-gifted groups, and no study found that the non-gifted sample significantly outscored the gifted sample. As a larger number of studies found that the gifted samples significantly outscored the non-gifted sample, a variety of themes concerning these studies' strengths and limitations emerged. The strengths are discussed below, and then the limitations.

Strengths

Operationalization strength. Most of the studies that found the gifted sample significantly outscoring the non-gifted sample operationalized giftedness as performance on a standardized test or membership in a school's gifted program (Gallagher, 1985; Harrison & Haneghan, 2011; Sanz as cited by Falk et al., 2008; Siu, 2010; Tieso, 2007a; Yakmaci-Guzel & Akarsu, 2006). Piechowski and Colangelo's (1984) gifted sample may have included some creative artists and Gallagher (1985) and Harrison and Haneghan's (2011) samples may have included some creatively gifted persons. However, it was unclear if such persons were actually included in the samples and if so how many such persons were included. This sampling of academic, psychometrically gifted populations demonstrates strengths regarding these studies' internal and external validities.

Sample size strength. Four of the studies that found that the gifted sample significantly outscored the non-gifted sample had fairly large sample sizes. Sample sizes of gifted participants

included: 73 (Harrison & Haneghan, 2011); 102 (Sanz as cited by Falk et al., 2008); 217 (Siu, 2010); and 296 (Tieso, 2007a).

Consistency in the literature strength. No study has ever found a non-gifted sample to significantly outscore a gifted sample.

Recency strength. Several studies in recent years have found gifted samples to significantly outscore non-gifted samples on MOE. These include Yakmaci-Guzel and Akarsu (2006), Tieso (2007a), Sanz as cited by Falk et al. (2008), Siu (2010), and Harrison and Haneghan (2011). The emphasis on recency of studies is important because more recent literature may use more rigorous, more recent statistical instruments and analysis. For instance, some of the older studies do not report effect sizes or even variance so that a reader could calculate an effect size (e.g. Gallagher, 1985). Additionally, recent findings might be subjugated to new reviewers and consumers who might find errors or limitations which prior reviewers may have missed. Such reviewers might be less enamored with the idea that gifted persons are inherently overexcitable.

Limitations

Methodological limitations. Piechowski and Colangelo found that their sample of gifted adults significantly outscored their sample of non-gifted adults (1984). However, Piechowski and Colangelo did not help evaluate 28 of the completed OEQ I's (Silverman & Ellsworth, 1981). These were the OEQ I's completed by the gifted adults (Silverman & Ellsworth, 1981) who had significantly higher MOE than the non-gifted adults. Piechowski and Colangelo only evaluated the non-gifted adult's OEQ I's (1984). Consequently, the non-gifted and gifted sample had two different sets of raters and no inter-rater reliability was established.

Sample size limitations. Of the seven MOE studies that found that the gifted sample significantly outscored the non-gifted sample, three of the studies had fairly small sample sizes: 12 (Gallagher, 1986), 28 (Piechowski and Colangelo, 1984), 35 (Yakmaci-Guzel & Akarsu, 2006). However, as discussed in Chapter 3, it is unclear if these samples should be regarded as small considering the ambiguous nature of the OE construct.

Finding limitations. The results for Harrison and Haneghan (2011) and Siu (2010) demonstrated that the gifted sample significantly outscored the non-gifted sample on MOE. However, these score differences' effect sizes were not especially large (respectively, partial η^2 = .08; partial η^2 =012). Yakmaci-Guzel and Akarsu (2006) calculated a medium effect size (*d* = .64) according to Cohen's recommendations (1988). Using Tieso's data, a medium effect size was also calculated, *d*=.36 (2007a). Other studies (e.g. Gallagher, 1985) either did not report their effect size(s) or variance(s).

The composite effect size was .35, medium according to Cohen's recommendations (1988). However, as was the case with the composite POE and SOE effect sizes, there was a considerable selection bias. Of the four studies included in the calculation (Harrison & Haneghan, 2011; Tieso, 2007a; Siu, 2010), only one (Wirthwein & Rost, 2011) reported null results. Other studies reported null results did not report sufficient data to be included in the calculation (e.g., Bouchet & Falk, 2001).

Cultural limitations. Some of the most recent and significant studies findings that gifted individuals significantly outscored non-gifted individuals on MOE have been conducted in countries foreign to the United States. This includes Turkey (Yakmaci-Guzel & Akarsu, 2006), Hong Kong (Siu, 2010), and Spain (Sanz, as cited by Falk et al., 2008). These findings may suffer limitations regarding the studies' external validity.

Conclusion

It is important to note that despite these limitations, the studies finding that the gifted sample had higher MOE levels did have a number of strengths. Some of the studies had very large sample sizes (Tieso, 2007; Siu, 2010), a variety of age groups were sampled, and several recent studies were conducted in the United States (Harrison & Haneghan, 2011; Tieso, 2007a). However, there are still only seven studies showing that gifted individuals are significantly more overexcitable than non-gifted individuals. There are 9 studies, 10 comparisons showing that there are no significant differences between gifted and non-gifted samples. This inconsistency in the findings and some of the limitations described above make it prudent to conclude that there is insufficient evidence that gifted individuals have significantly higher MOE than non-gifted individuals. There is, though, more evidence to consider gifted individuals as having high MOE than there is evidence to consider gifted individuals as having high SOE or POE. Below, Table 5.3 collects and presents the limitations mentioned above.

Table 5.3 MOE Limitations

Study	MOE finding	Limitation/s
Piechowski & Colangelo (1984)	A gifted adult sample significantly outscored a non-gifted adult sample on MOE	The gifted adults and non-gifted adult samples' OEQ I scores were drawn from different studies and different OEQ I raters, and the inter-rater reliability between these studies is not established The sample sizes were small: 70 (28 gifted adults from Silverman & Ellsworth (1981) and 42 average ability graduate students from Lysy & Piechowski, (1983)
Gallagher (1985)	The gifted sample significantly outscored the non-gifted on MOE	The sample sizes were small: 24 (12 gifted, 12 non-gifted)

(Table 5.3 continued)

Study	MOE finding	Limitation/s
Yakmaci-Guzel & Akarsu (2006)	A gifted sample significantly outscored a non-gifted sample on MOE	The study was conducted outside of the United States The sample sizes were small: 114 (37 in low intellectual ability group; 33 in the middle group, and 35 in the high group)
Tieso (2007a)	A gifted sample significantly outscored a non-gifted sample on MOE	Effect size was medium d=.36
Siu (2010)	A gifted sample significantly outscored a non-gifted sample on MOE	The study was conducted outside of the United States The effect size was small: partial η^2=.012
Harrison & Haneghan (2011)	A gifted sample significantly outscored a non-gifted sample on MOE	The effect size was medium: partial η^2=.08

Emotional Overexcitability (EOE)

The evidence provided in Chapter 4 demonstrated that it is unclear if gifted individuals have significantly higher EOE than non-gifted individuals. The vote counting procedure showed that seven studies (eight comparisons) found that a gifted sample significantly outscored a non-gifted sample. Piechowski and Colangelo's study was counted twice as it included two distinct comparisons (1984). Eight studies found no significant difference between the gifted and non-gifted groups, and one study found that the non-gifted sample significantly outscored the gifted sample. As in the MOE section, a larger number of studies found that the gifted samples significantly outscored the non-gifted sample, and so a variety of themes concerning these studies' strengths and limitations emerged. These are presented below.

Strengths

Operationalization strengths. Most of the studies that found the gifted sample significantly outscoring the non-gifted sample operationalized giftedness as performance on a standardized test or membership in a school's gifted program (Ackerman, 1993, 1997; Bouchet & Falk, 2001; Breard, 1994; Gallagher, 1985; Miller, Silverman, & Falk, 1994; Siu, 2010). As noted earlier, Piechowski and Colangelo (1984) and Gallagher's (1985) samples may have included some creatively gifted persons, though this was unclear. Most of the researchers' samples aligned with the psychometric, academic operationalization of giftedness, strengthening these studies' internal and external validities.

Cultural strengths. Siu's (2010) study was conducted outside of the United States, as was Ackerman's (1993, 1997). However, Ackerman's study was conducted in Canada, a North American, British-colonized country that is reasonably similar to the United States. Also, the five other studies finding significant group differences in EOE scores were conducted in the United States.

Age strengths. Studies finding significant differences in EOE scores have sampled populations across the lifespan. This has included comparing gifted and non-gifted adults (Miler, Silverman, & Falk, 1994; Piechowski & Colangelo, 1984), elementary and middle school-aged children (Breard, 1994; Gallagher, 1985), high school-aged adolescents (Ackerman, 1993, 1997), and college undergraduates (Bouchet & Falk, 2001). These findings across the life span demonstrate a degree of cross sectional validity that gifted individuals have higher EOE than non-gifted individuals.

Limitations

Methodological limitations. One methodological limitation discussed earlier pertained to Piechowski and Colangelo (1984) and Miller, Silverman, and Falk (1994). In the comparison of gifted adults and non-gifted adults, inter-rater reliability was not established, though Piechowski and Colangelo did rate both the gifted adolescents and non-gifted, adult samples' OEQ I scores. Miller, Silverman, and Falk did rate all of their gifted participants' OEQ I scores, however they rated none of their non-gifted sample's scores. These were 41 graduate students drawn from Lysy and Piechowski (1981). Consequently, one of the comparisions in Piechowski and Colangelo and the comparison made by Miller, Silverman, and Falk's have questionable inter-rater reliability.

Sampling limitations. Closely related to the methodological limitations are sampling limitations. Of the eight comparisons that found gifted samples significantly outscoring non-gifted samples, the sample sizes were: 12 (Gallagher, 1986), 39 (Breard, 1994), 42 (Miller, Silverman, & Falk, 1994), 42 (Ackerman, 1993, 1997), 28 gifted adults (Piechowski & Colangelo, 1984), 48 gifted adolescents (Piechowski & Colangelo, 1984), 140 (Bouchet & Falk, 2001), and 217 (Siu, 2010). Two samples are listed for Piechowski and Colangelo as two of their comparisons were counted in the vote counting procedure (1984). Two studies featured over 100 gifted participants measured gifted individuals as significantly outscoring non-gifted, control groups.

Findings limitations. While these eight comparisions found that gifted individuals significantly outscored non-gifted groups, these findings also had limitations. Breard's two discriminant functions had high Wilke's lamdas, .93 and .91 (1994). Additionally, the function, which relied on EOE and TOE variables, was only able to accurately categorize 40.9% of the

study's 117 participants as gifted, near-gifted, or non-gifted. Ackerman's (1993, 1997) discriminating function also relied on EOE scores, however EOE was far less discriminating than POE and TOE scores. Reported and calculated effect sizes were between small and medium (Bouchet & Falk, 2001; Siu, 2010). The calculated composite effect size was small, *d*=.03, though this only included some studies from the systematic review (Bouchet & Falk, 2001; Harrison & Haneghan, 2011; Tieso, 2007a; Siu, 2010; Wirthwein & Rost, 2011).

Few studies limitation. Total, there are only seven studies that have demonstrated that gifted individuals significantly outscored non-gifted individuals on EOE. Significant differences between the groups have been shown eight times, twice in Piechowski and Colangelo (1984). An equal number of comparisons and one additional study showed no significant difference.

Recency limitation. No study in North America has shown significant EOE score differences since 2001 (Bouchet & Falk, 2001). And Bouchet and Falk's study used college-aged students. Consequently, no study has demonstrated a significant EOE difference between North American K-12 gifted and non-gifted students since 1997 (Ackerman). And, that Ackerman study (1997) used the same participants from her 1993 study. Consequently, no study demonstrating significant EOE difference between K-12 gifted and non-gifted students since Breard's unpublished master's thesis (1994). In North America, the OEQ II has never found significant EOE score differences between gifted K-12 children and non-gifted K-12 children.

Conclusion

As was the case with MOE, there are only seven studies that have demonstrated that gifted individuals are significantly more overexcitable than non-gifted individuals. There are eight studies showing that there are no significant differences between gifted and non-gifted samples. This inconsistency in the findings and some of the limitations described above make it

prudent to conclude that there is insufficient evidence to demonstrate that gifted individuals have significantly higher EOE than non-gifted individuals. Again, though, there is more evidence demonstrating that gifted individuals have significantly high EOE than there is evidence demonstrating that they have significantly high POE or SOE. Table 5.4 catalogues the limitations for each study.

Table 5.4 EOE Limitations

Study	Finding for EOE	Limitation/s
Piechowski & Colangelo (1984)	A gifted adult and adolescent group significantly outscored non-gifted comparison groups on EOE	Gifted adult and non-gifted adult samples' OEQ I had different raters and inter-rater reliability was unestablished Comparisons between gifted adolescents and non-gifted adults were cross-sectional Small sample sizes: 119 (28 gifted adults from Silverman & Ellsworth (1981); 49 gifted adolescents from Colangelo, Piechowski, & Kelly, (1982); 42 non-gifted graduate students from Lysy & Piechowski (1983)
Gallagher (1985)	The gifted sample significantly outscored the non-gifted sample on EOE	The sample sizes were small: 24 (12 gifted, 12 non-gifted)
Ackerman (1993, 1997)	EOE scores helped to discriminate between gifted and typical samples	EOE was less discriminating than POE and TOE The sample sizes were small: 79 (42 gifted, 37 non-gifted)
Breard (1994)	EOE scores helped to correctly discriminate between gifted and non-gifted groups	Wilke's lambda (λ) was a large value, measured at .93 and .91 for of Breard's functions The functions only accurately predicted 40.9% of the samples' group memberships The sample sizes were small: 117 (39 gifted, 30 near gifted, and 48 non-gifted)

(Table 5.4 continued)

Study	Finding for EOE	Limitation/s
Miller, Silverman, and Falk (1994)	The gifted sample significantly outscored the non-gifted sample on EOE	The gifted and non-gifted samples' OEQ I scores were rated by different raters and the inter-rater reliability was not established The sample sizes were small: 42 gifted adults and 41 graduate students from Lysy and Piechowski (1981)
Bouchet & Falk (2001)	The gifted sample significantly outscored the non-gifted sample on EOE	The effect sizes were small: *d*=.27 gifted vs. standard group *d*=.20 gifted vs. AP samples *d*=.24 gifted vs. AP + Standard group
Siu (2010)	The gifted sample significantly outscored the non-gifted sample on EOE.	Conducted outside of United States (Hong Kong) The effect size was medium: partial η^2=.037

Intellectual Overexcitability (TOE)

The vote counting procedure found 16 comparisons in which gifted samples significantly outscored non-gifted samples. These 16 comparisons were found in 15 studies. Piechowski and Colangelo's study was again counted twice (1984). One instance of no significant difference was found and no instances were found in which the non-gifted sample significantly outscored the gifted sample. The review of sample sizes, calculations of effect sizes, and themes regarding the studies' internal and external validities found that those studies demonstrating significant TOE differences had a number of limitations. However, these studies also demonstrated strengths and robustness in a variety of ways. Again, these strengths and limitations are listed below.

Strengths

Operationalization strengths. Most of the studies that found that the gifted sample significantly outscored the non-gifted sample operationalized giftedness as performance on a standardized test or membership in a school's gifted program (Ackerman, 1993, 1997; Bouchet

& Falk, 2001; Bouchard, 2004; Breard, 1994; Chang as cited by Falk et al., 2008; Gallagher, 1985; Harrison & Haneghan, 2011; Miller, Silverman, & Falk, 1994; Sanz as cited by Falk, 2008; Siu, 2010; Tieso, 2007a; Wirthwein & Rost, 2011; Yakmaci-Guzel & Akarusu, 2006; Yakmaci-Guzel as cited by Falk, 2008). As noted earlier, Piechowski and Colangelo (1984), Gallagher (1985), Harrison and Haneghan's (2011) samples may have included some creatively gifted persons, though this was unclear. Most of the researchers' samples aligned with the psychometric, academic operationalization of giftedness, strengthening these studies' internal and external validity.

Sample size strength. The TOE comparative studies that found significant differences between gifted and non-gifted groups had the following sample sizes: 12 (Gallagher, 1986), 37 (Yakmaci-Guzel & Akarsu, 2006); 28 (Piechowski & Colangelo's (1984); 39 (Breard, 1994); 42 (Ackerman, 1993, 1997); 41 (Miller, Silverman, & Falk, 1994); 49 (Piechowski & Colangelo, 1984); 73 (Harrison and Haneghan, 2011); 96 (Bouchard, 2004); 296 (Tieso, 2007a); 140 (Bouchet & Falk, 2001); 217 (Siu, 2010); 96 (Wirthwein & Rost, 2011); 102 (Pardo as cited by Falk et al., 2008); 500 (undifferentiated) (Yakmaci-Guzel as cited by Falk et al., 2008), and 951 (undifferentiated) (Chang as cited by Falk et al., 2008). As before, these are only the number of gifted subjects. Three studies reported over 100 subjects, however two other studies had sample sizes of 96. Additionally, two other studies had sample sizes in the 70's. Six studies total had sample sizes above 70.

It is also possible that Yakmaci-Guzel's (2006) study and the Chang's study (as cited by Falk et al., 2008) both had large gifted sample sizes. However, as noted above, these studies' either failed to succinctly operationalize their various gifted samples, list the number of gifted

participants, or Falk et al. (2008) failed to report this information. Consequently, it is unclear how many members of their sample sizes are actually gifted.

Findings strength. Some of these studies' findings have limitations, however many of the findings were fairly robust. The studies that calculated discriminant analyses, Breard (1994) and Ackerman (1993, 1997), were discussed in the EOE section above. For the other comparative studies that found a significant difference, the effect sizes (Cohen's *d*) were as follows: .11 (Tieso, 2007), .42 (Wirthwein & Rost, 2011), .47 (Bouchet & Falk, 2001), .74 (Bouchard, 2004), and .92 (Yakmaci-Guzel, 2006). Other effect sizes (partial η^2) included: .07 (Harrison & Haneghan, 2011) and .120 (Siu, 2010). The calculated composite effect size was .38, using data from (Bouchet & Falk, 2001; Harrison & Haneghan, 2011; Tieso, 2007a; Siu, 2010; Wirthwein & Rost, 2011).

These tables, adapted from those presented earlier in Chapter 4, help illustrate these effect sizes' magnitude. The first table, Table 5.5, is for Cohen's *d* (1988), the second, Table 5.6, is for partial η^2. The tables are based on Cohen's recommendations for effect size interpretation.

Table 5.5 TOE Cohen's *d*

	Trivial: < .20	Small: .20-.50	Medium: .50-.80	Large: >.80
TOE	X (.11)	X (.42) X (.47)	X (.74)	X (.92)

Table 5.6 TOE partial η^2

	Small: .01	.035	Medium: .06	.10	Large: .14
TOE			X (.070)		X (.120)

So, of all the effect sizes, four are at least medium and three are small or trivial. These effect sizes are larger and more numerous than those for MOE, EOE, POE, and SOE.

Consistency in literature strength. There are more studies (15 total) that show significant TOE score differences than studies that show significant score differences in EOE or

MOE. In fact, there are as many studies showing significant difference in TOE (15) as there are studies showing significant differences in EOE and MOE combined (14). However, there does appear to be a potential repeat finding within these 15 studies. This is that of Yakmaci-Guzel (as cited by Falk et al, 2008) and Yakmaci-Guzel and Akarsu (2006).

It is possible that these two studies report the same finding. They have the same sample classification system (below average mental ability, average mental ability, and above average mental ability), use the same method to identify members for their sample groups (Ravens Progressive Matrix scores), were conducted in the same country and regions of that country (Istanbul, Turkey), and produced the same findings (significant TOE difference between gifted and non-gifted groups). However, the studies did use different instruments. Yakmaci-Guzel (as cited by Falk et al, 2008) used the OEQ II and Yakmaci-Guzel and Akarsu (2006) used the OEQ I. But, the different instrument could have been used on the same samples, and because Falk et al. (2008) failed to report the size of Yakmaci-Guzel's sample, it is very difficult to even guess about potential sample overlap. On the whole, it should be assumed that these two studies are different and produced unique results. This is because there is not enough evidence to conclusively prove otherwise. Regardless of this potential double count, there is a relatively large body of literature demonstrating that gifted samples score significantly higher on TOE than non-gifted samples.

Recency strength. In addition to the studies demonstrating significant differences, many recent investigations have shown that gifted sample significantly outperformed non-gifted samples on TOE. This has included three studies published after 2010 (Harrison & Haneghan, 2011; Siu, 2010; Wirthwein & Rost, 2011) and seven studies published during the 2000s (Bouchard, 2004; Bouchet & Falk, 2001; Chang as cited by Falk et al., 2008; Sanz as cited by

Falk et al., 2008; Tieso, 2007a; Yakmaci-Guzel & Akarusu, 2006; Yakmaci-Guzel as cited by Falk et al., 2008).

Limitations.

Methodological limitations. Piechowski and Colangelo (1984) and Miller, Silverman, and Falk's (1994) studies suffer from the same limitations discussed earlier. This is that the authors either did not rate the control group's OEQ I scores (Miller, Silverman, & Falk, 1994) or that they did not rate one of the gifted groups' OEQ I scores (Piechowski & Colangelo, 1984) and failed to establish inter-rater reliability.

Chang and Yakmaci-Guzel (as cited by Falk et al., 2008) reported large sample sizes. However, Falk et al. (2008) did not report the sample sizes of the gifted and non-gifted groups. Instead, both studies only reported the total sample size, so it is unclear how many gifted individuals were actually sampled.

Instrument limitation. Bouchard's study used the ElemenOE (2004). The instrument was designed, piloted, and implemented by Bouchard. Its validity and reliability information is reported in her study that illustrated that the instrument is reliable and valid. However, it is important to note that the instrument has only ever been used once in the comparative literature. Additionally, unlike the forced choice instruments, the OEQ I, II, and Me Scale, the ElemenOE is an observational checklist. Checklists are not inherently bad instruments, but the ElemenOE is different from other methods of measuring OEs and, more importantly, the instrument has not been tested or used in a comparative study by any researcher other than its designer.

Cultural limitations. Some of the studies' findings that gifted individuals significantly outscore non-gifted individuals on TOE were conducted in countries foreign to the United States. This included Turkey (Yakmaci-Guzel & Akarsu, 2006; Yakmaci-Guzel as cited by Falk et al.,

2008), China (Chang as cited by Falk et al., 2008; Siu, 2010), and Germany (Wirthwein & Rost, 2011). As noted above, these studies' findings are certainly important and valid. However, it is also important to understand that culture may have a significant impact on individuals' OEQ II scores. There were four North American studies finding significant TOE score differences in the 2000s decade (Bouchard, 2004; Bouchet & Falk, 2001; Harrison & Haneghan, 2011; Tieso, 2007a).

Conclusion

It appears that there is enough evidence to conclude that gifted individuals have a higher degree of TOE than non-gifted individuals. A number of studies have found this. These studies demonstrate a number of limitations, but also demonstrate many strengths. Table 5.7 below lists these studies and their limitations.

Table 5.7 TOE Limitations

Study	TOE finding	Limitations
Piechowski & Colangelo (1984)	A gifted adult and adolescent group significantly outscored a non-gifted sample on TOE	The gifted adult and non-gifted adult samples' OEQ I were rated by different raters and inter-rater reliability was unestablished The comparisons between the gifted adolescents and non-gifted adults are cross-sectional in nature The sample sizes were small: 119 (28 gifted adults from Silverman & Ellsworth (1981); 49 gifted adolescents from Colangelo, Piechowski, & Kelly, (1982), and 42 non-gifted adults from Lysy & Piechowski (1983)

(Table 5.7 continued)

Study	TOE finding	Limitations
Gallagher (1985)	The gifted sample significantly outscored the non-gifted sample on TOE	The sample sizes were small: 24 (12 gifted, 12 non-gifted)
Ackerman (1993, 1997)	TOE scores helped to discriminate between gifted and typical samples	TOE was far less discriminating than POE The sample sizes were small: 79 (42 gifted, 37 non-gifted)
Breard (1994)	TOE scores helped to correctly discriminate between gifted and non-gifted groups	Wilke's lambda was a large value, measured at .93 and .91 for both of Breard's functions The functions only accurately predicted 40.9% of the samples' group memberships The sample sizes were small: 117 (39 gifted, 30 near gifted, and 48 non-gifted)
Miller, Silverman, and Falk (1994)	The gifted sample significantly outscored a non-gifted sample on TOE	The gifted and non-gifted samples' OEQ I scores were rated by different raters and the inter-rater reliability was not established The sample sizes were small: 42 gifted adults and 41 graduate students from Lysy and Piechowski (1981)
Bouchet & Falk (2001)	The gifted sample significantly outscored the non-gifted sample on TOE	The effect sizes were medium: *d*=.55 b/t G/t and standard group *d*= .28 gifted vs. AP group *d*= .47 gifted vs. AP + Standard group

(Table 5.7 continued)

Study	TOE finding	Limitations
Bouchard (2004)	The gifted sample significantly outscored a non-gifted sample on TOE	The instrument, ElemenOE, has only been used in one study
Yakmaci-Guzel & Akarsu (2006)	The gifted sample significantly outscored a non-gifted sample on TOE	The study was conducted outside of the United States (Turkey) The sample sizes were small: 105 (37 in low intellectual ability group; 33 in the middle group, and 35 in the high)
Tieso (2007a)	The gifted sample significantly outscored a non-gifted sample on TOE	The effect size was small: *d*=.11
Chang as cited by Falk et al. (2008)	The gifted sample significantly outscored a non-gifted sample on TOE	The sample size was unreported The study was conducted outside of the United States (Hong Kong)
Sanz as cited by Falk et al. (2008)	The gifted sample significantly outscored a non-gifted sample on TOE	The study was conducted outside of the United States (Spain)
Yakmaci-Guzel as cited by Falk et al. (2008)	The gifted sample significantly outscored a non-gifted sample on TOE	Results may be duplicated in Yakmaci-Guzel & Akarsu (2006) Sample sizes for the gifted, average, and below average groups are unreported The study was conducted outside of the United States (Turkey)
Siu (2010)	A gifted sample significantly outscored a non-gifted sample on TOE	The study was conducted outside of the United States (Hong Kong)

(Table 5.7 continued)

Study	TOE finding	Limitations
Harrison and Haneghan (2011)	A gifted sample significantly outscored a non-gifted sample on TOE	The effect size was medium: partial η^2= .07; 7
Wirthwein and Rost (2011)	The gifted sample significantly outscored a non-gifted sample on TOE	The effect size was small to medium: *d*=.42 The gifted group only significantly outscored the non-gifted group; it did not significantly outscore the non-gifted, high-achieving group

Conclusions about the Different OE Scores

When considering all of the evidence above, it is clear that giftedness is related to the five OEs in varying degrees. Based on the surveyed comparative studies, there is little to no evidence that the gifted population has significantly higher SOE or POE than the non-gifted population. Similarly, there is significant evidence that the gifted population has significantly higher TOE than the non-gifted population. It is less clear what kind of relationship exists between EOE and MOE and giftedness.

As noted above, some studies clearly showed that gifted samples significantly outscored non-gifted samples on MOE and EOE measures. However, many of these studies had a variety of limitations. Some might consider these limitations minor, yet several studies have failed to find any significant difference. Still, some researchers could claim that very rarely have non-gifted individuals significantly outscored gifted individuals on EOE or MOE. The evidence seems capable of supporting either the skeptic or proponent position.

One example of this opacity is the international nature of some of the studies (e.g., Siu, 2010). As noted in Chapter 3, there is evidence that sampling in non-American countries may limit such studies' external validity. Yet, a scholar more favorable towards the relationship

between giftedness and OE might observe that such studies provide a kind of cross-cultural, construct validity to the giftedness-OE relationship. This kind of interpretation would not necessarily be right or wrong, and could be a defensible interpretation of the data. Many of the comparative studies' limitations and strengths observed in this dissertation may be similarly subjective.

While there is evidence to support the proponents' arguments, it is best to conclude that the body of comparative studies does not show that gifted individuals have significantly higher EOE or MOE than non-gifted individuals. This conclusion seems most apt considering that several of the few studies finding significant differences are considerably flawed in a variety of ways. These include concerns about the instruments' validity, small sample sizes, samples drawn from other countries and from particular parts of other countries, relatively few studies finding significant differences, and small effect sizes. This litany provides a number of reasons to avoid committing to the proposition that gifted individuals have significantly high MOE or EOE.

Still, though, it is important to note that this conclusion does not mean that the intellectually gifted individuals are not more overexcitable than non-gifted individuals. The gifted population may have significantly more EOE, MOE, POE, and SOE than the non-gifted population. Or, a segment of the gifted population may have a significant degree of OE. It just appears that the current body of literature fails to reliably and significantly demonstrate such a proposition. Counter, more convincing evidence may eventually be found which would lead to the conclusion that gifted persons are more overexcitable.

Thought Experiment

One simple method to demonstrate why the null hypothesis (that gifted individuals do not have significantly high MOE or EOE) is preferable to the alternative hypothesis is a thought

experiment. If seven or eight studies existed that demonstrated gifted individuals were more unimaginative and cruel than the general population, it is unlikely that many researchers would believe the studies. This is of course entirely hypothetical, yet it is hard to believe that researchers would accept the conclusions of such a small body of literature. This would be especially true if some of those studies demonstrated that gifted persons possessed severe character flaws, similar to being cruel and unimaginative. And yet, the only difference between this hypothetical thought experiment and the reality concerning MOE and EOE is that MOE and EOE are desirable characteristics; cruelty and being unimaginative are not.

Consequences

These conclusions about the relationship between giftedness and the five OEs imply a number of consequences for practitioners, researchers, and others. These consequences are discussed according to TOE and then the other five OEs.

TOE

To consider the consequences that gifted individuals have been found as having more TOE than non-gifted individuals, it is important to revisit the construct's definition. Here is the definition provided in Chapter One, derived from Piechowski (1979):

> *Intellectual overexcitability (TOE):* Individuals with high TOE have exceptional interest in theories and explanations, curiosity, analysis, and the desire to know regardless of the benefits of knowledge. Additionally, such individuals often ask a great deal of questions, are quick thinkers and observers, and offer unexpected, novel opinions about conventional society. When a lack of stimulating learning material is present, boredom can result for high TOE individuals. TOE is distinct from intelligence.

Considering this definition, the finding that gifted individuals have higher TOE means that gifted individuals are curious, enjoy theories and explanations, intrinsically enjoy learning, question often, offer unconventional perspectives, and can become bored without appropriate mental stimulation.

It is certainly important for individuals interacting with gifted students or adults to understand that gifted individuals may demonstrate these traits. By understanding gifted person's behaviors as manifestations of TOE, parents and others can plan better and more appropriate educational stimulation for children. Additionally, constant questioning and second-guessing can be understood as genuine manifestations of curiosity rather than mere annoyances. Gifted adults, understanding that they might have an intrinsic enjoyment of some learning, could perhaps learn how to more leisurely study some topics.

However, it is unclear what the relationship between giftedness and TOE actually demonstrates. Gifted individuals have often been called curious, eager to make explanations and theories, and/or unconventional (Clark, 2013). Additionally, boredom with schoolwork has been cited as an explanation for underachievement amongst gifted students (Whitmore, 1986). And none of these descriptions of gifted individuals has cited TOE as a feature of giftedness or way of explaining of these characteristics. All of these traits—creativity, curiosity, unconventionality, and eagerness to explain—could just commonly co-occur with giftedness. TOE may just be the term used to describe the nature of this trait co-occurrence rather than an actual characteristic or variable itself. A kind of item analysis or factor modeling of the TOE items on the OEQ II could help provide some more data regarding this conundrum. For now, though, the consequences of the giftedness-TOE relationship do not appear overly significant, considering that this relationship has already been described in a variety of ways in the literature.

SOE, POE, MOE, and EOE

As noted earlier, there is little evidence demonstrating that gifted individuals have significantly higher SOE and POE than non-gifted individuals. There is also not much evidence demonstrating that gifted individuals have significant higher MOE and EOE. Because of this

absence of evidence, researchers and practitioners should reconsider the dominant narrative that gifted persons are more overexcitable than non-gifted persons. This entails reconsidering certain counseling techniques, parenting/classroom management strategies, and the nature of giftedness itself. Educational resources, including the surveyed textbooks and websites, should also reconsider their message and issue more reserved, balanced new editions.

This reconsidering is important as such methods may be harming children in unknown or unperceived ways. At the very least, having an empirically unfounded theory about how gifted individuals react to stimuli is unwise. Unknown and unforeseen negative consequences could arise from such a position. Additionally, authoritative institutions such as Duke and SENG could mislead gifted persons by informing them via websites that giftedness is related to overexcitability. At the very least, textbooks, counselors, and resources should more fully portray the controversy regarding the OEs. This would include depicting the skeptics' arguments as well as the current mainstream proponent arguments.

For researchers, the lack of a found relationship between giftedness and these four OEs offers an opportunity. New studies can and should be conducted, and new instruments should be designed to determine if significant population differences do exist. Longitudinal studies should also be conducted in an effort to see how OE levels may change across time.

Explaining Belief in the Giftedness-OE Relationship

Assuming that the conclusions reached in this chapter are true, it is worth considering why so many resources, textbooks, practitioners, and researchers have stated that gifted individuals are overexcitable. It is worth considering why these opinions rather than the skeptics' beliefs have seemingly been given such credence and attention. Such consideration might offer

some insight in how the gifted education field reaches some degree of dogmatic, text-book belief about a topic despite a lack of considerable empirical evidence.

Below, a number of hypotheses are offered in an effort to explain why many believe that gifted individuals are overexcitable. It is important to note that these hypotheses are largely conjecture made in an attempt to explain the current state of belief in the giftedness-OE relationship.

Unawareness

A simple and reasonable explanation for the acceptance of the giftedness-OE relationship is that many or most are ignorant of the comparative literature's limitations. A lack of awareness might cause individuals to trust respected resources, such as textbooks and websites, and assume that scholars specializing in the OEs would know best. There is only so much time, and researchers, practitioners, and others are limited in what assumptions they can test. This explanation, though, fails to account for why textbooks and other respected resources began portraying gifted individuals as overexcitable.

Other Sources of Data

Regardless of the comparative studies' flaws or evidence, it is possible that many scholars believe that gifted individuals are overexcitable because of other kinds of studies or data. As noted in Chapter One, a limitation of this dissertation is that only comparative studies were considered for the systematic review. Consequently, case studies, phenomenologies, non-comparative descriptive studies, and other kinds of research on the giftedness-OE relationship are entirely omitted from this systematic review. Some of this data may be very or entirely convincing to some researchers. Additionally, personal experiences and anecdotal evidence derived from teaching, parenting, or some other source may convince many persons.

Halo Effect

Another potential explanation relies on hypothesizing about the psychology of researchers and practitioners. Essentially, it is possible that these groups' affinity for gifted persons, particularly gifted children, caused them to be more likely to view gifted persons' behaviors through a positive lens. The OEs provide such a positive lens for many potentially confusing and even irritating behaviors. Such a lens might have also been more palatable to parents when explaining their hyperactive or otherwise difficult child. This explanation implies that a certain halo effect is at work, distorting adults' perceptions of their own or others' gifted children.

Incentives

There are a variety of incentives that might cause individuals to believe that gifted individuals are overexcitable. As noted earlier, there is an incentive to publish findings rather than null results. Consequently, some studies may exist that have found that gifted and non-gifted individuals did not differ significantly on any or few of the five OEs. These studies may have never been published, causing the literature to become more saturated with studies that demonstrated that gifted individuals significantly outscored non-gifted individuals on one or more of the five OEs.

Another incentive is for practitioners, particularly those in the mental health field, to embrace the notion that gifted individuals have a different kind of neurology that warrants a special kind of therapy. This special kind of therapy provides an occupational specialty for many individuals involved with gifted persons. Additionally, if gifted individuals are unique so that they require unique mental counseling, this implies that they might warrant other services and

treatments. This could help practitioners and parents make arguments for increased funding or attention to gifted children in schools.

Researcher Gullibility

One way of interpreting the belief in the giftedness-OE relationship is that the entire field of gifted education is or has been overly gullible in accepting sub-adequately designed studies' findings. So, while little convincing evidence of the giftedness-OE relationship exists, little evidence is enough evidence. One data point that offers credence to this theory is the initial fervent acceptance of the relationship as presented by Piechowski (1979). Piechowski offered no comparative data, and his book chapter was largely descriptive in nature. Yet, it was willingly believed and received (Tolan, 2009). It is possible that such willingness or gullibility continues today, and is for some reason an attribute of the gifted education research community. It is also very possible that the giftedness-OE relationship was accepted, despite the lack of evidence, for a number of other reasons, some of which are discussed in this section.

Nature of Giftedness

Another explanation for the belief in the giftedness-OE relationship is that the five OEs are aspects of giftedness, not co-occurring traits. The OEs, then, would be similar to exceptional intelligence or some other aspect of giftedness. If this is the case, the OEs are *sine quo non* aspect of giftedness, an *a priori* fact to be dealt rather than an *a posteriori* relationship to be investigated.

Consequently, the comparative studies would not be demonstrating significant or insignificant differences between the gifted and non-gifted samples. Rather, the studies would be demonstrating that not all of the members in the gifted group are gifted or perhaps not very gifted. In other words, only those individuals who significantly outscored their non-gifted

counterparts on the OEs would be gifted. Those individuals labeled as "gifted" in the study but not demonstrating significantly high OEs would not be gifted. This would be so because the five OEs (or perhaps fewer) are inherently part of giftedness, and if individuals do not demonstrate the OEs at significant levels, then they are not gifted, regardless of their intelligence.

This is a logically sound, possible explanation of the comparative literature. It may seem unlikely, yet it is very possible that there is a subpopulation of gifted individuals or a certain kind of giftedness that is especially overexcitable. Yet, this kind of interpretation of giftedness reflects a larger problem and opportunity in gifted education. This is that there is little consensus about the nature of giftedness within gifted education (Sternberg & Davidson, 2005).

This theoretical agnosticism is helpful in that without orthodoxy, many theories about giftedness can be proffered without fear of intellectual castigation. Ideally, with many scholars contemplating giftedness, many different conceptions of giftedness would emerge. These, then, would or even are competing in an intellectual marketplace for credence, respect, and influence on policy makers and practitioners. With this kind of market-based system, gifted education could provide an increasing number of theories, some of which might prove exceptionally true (or at least believable) and/or useful. With a rigid, unchanging orthodoxy, a market monopoly, such innovation would not occur.

Yet, this kind of theoretical fluidity also has its problems, one of which is illustrated by the giftedness-OE relationship. This is that giftedness could potentially have its definition or conception expanded in order to include or exclude certain theoretical components. This kind of exclusion or inclusion could be done in order to insure that gifted persons are regarded as creative or to demonstrate that athletes and musicians are gifted too. However, this kind of

theoretical malleability could conceivably be used to exclude certain groups, such as African Americans, from gifted programs.

Therefore, in the event that empirical evidence does not show gifted samples as significantly overexcitable, the conception of giftedness can simply be changed so that eventually some kind of giftedness is significantly correlated, linked-to, or inherently intertwined with the OEs. In other words, the proponents and skeptics could always both be correct, they would just differ on the term giftedness rather than on the nature of the giftedness-OE relationship. The proponents would be arguing that giftedness is a suite of characteristics including intellectually ability and neurological overexcitability. The skeptics would be arguing that the intellectually gifted population as a whole is not significantly overexcitable. This difference in regards to the nature of giftedness may actually be occurring in the comparative literature now.

Conclusion

These hypothetical explanations for why so many believe that gifted individuals are significantly overexcitable are largely if not entirely conjecture. Additionally, many of them are not mutually exclusive, and so could be co-occurring in some kind of symbiotic or other relationship. Also, none of these explanations may have any pretense in reality. Yet, it is worth attempting to explain seemingly confusing researcher behavior, and while these hypotheses are conjecture, they at least offer researchers with an opportunity for introspection and more cognizant research.

Directions for Future Research

There are several new research directions that could be used to investigate the OE differences between gifted and non-gifted samples. These suggestions are discussed individually below.

New Comparative Methods

One direction for future research is continuing the investigation of OE differences, but with new means. This might include comparing the fMRI scans of gifted and non-gifted groups when exposed to certain stimuli, using alternative instruments to the OEQ II, or developing an entirely new instrument for comparative purposes. In Chang and Kuo's literature review (2013), they reported one study that observed MRI brain scans of gifted individuals (Kuo et al., 2012). The researchers found that brain volume and the volume of certain areas of the brain correlated with OE scores. No control group was used, but such a study could be repeated with a gifted and non-gifted sample. Additionally, an fMRI scan could be used rather than an MRI scan. This would allow researchers to provide both groups with stimuli and then observe the difference between the samples' brains' responses. In addition to using medical technology to determine the difference between gifted and non-gifted samples' OE levels, researchers could use neurological examinations. The author is unaware of the exact nature of neurological exams that Dabrowski conducted (1972), however if similar exams could be constructed or implemented with the help of medical professionals, researchers could employ them to determine any significant group differences.

While the use of medical technology and professionals could provide novel and important findings, both methods would probably be resource-demanding and potentially unrealistic options for researchers. Instead, perhaps, researchers should consider using the ElemenOE or

another instrument to measure the OEs. As noted earlier, the OEQ II's viability has been questioned on several grounds (Warne, 2011). Researchers might consider evaluating and implementing the ElemenOE when studying younger participants and perhaps even developing a new kind of behavioral checklist for evaluating older participants. However, if researchers were eager to continue using the OEQ II, the evaluation of its data should be properly conducted. Instead of using parametric statistical procedures, researchers should use non-parametric procedures that would more appropriately measure the instrument's ordinal data. A more ambitious direction for future research, though, would be the development of an entirely new instrument to measure the five OEs.

Different Populations

Another possibility for future research would be to measure the OEs of different and new populations. Researchers have measured the OE scores of samples from different countries (Wirthwein & Rost, 2011), of artists (Piechowski & Colangelo, 1984), and of gifted children (Bouchard, 2004) and adults (Miller, Silverman, & Falk, 1994). Yet, researchers should consider collecting a large sample size of artists or elderly gifted persons, as no such large-scale studies exists. Additionally, the measurement of exceptional athletes' OE scores might provide some interesting data.

A more interesting project, and a certainly more unrealistic one, would be to measure and compare the OE scores of the proponents and skeptics. The results would be hopelessly futile, as both samples would enter the process with a variety of biases. Yet, the experiment could be interpreted to demonstrate that the two groups' OE scores are part of their innate interpretation of the relationship between giftedness and OE. In other words, if the proponents have high OEs and think themselves gifted, they might be universalizing their own experiences. The skeptics, also

considering themselves gifted but low in OE, but are committing a similar universalizing fallacy. It is highly unlikely that a researcher would ever conduct such a project, as its results would be open to a great deal of warranted criticism due to the nature of the samples' *a priori* viewpoints and understanding of the instruments. Yet, it would be interesting to potentially identify an underlying cause of bias in how the giftedness-OE relationship is understood.

Limitation of Correlational Studies

One direction that researchers should pursue less is the correlation of OE scores with demographic variables such as race (Breard, 1994), nationality (Siu, 2010), gender (Tieso, 2007a), and sexuality (Treat, 2006). These studies are not inherently worthless, but they are or should be far less important to gifted education researchers. Additionally, these studies are very simple, as they generally perform a simple correlation or test for significant difference. Researchers interested in gifted individuals and the OEs should consider more novel research problems and designs rather than continuing such correlational studies.

Conclusion

This systematic review has shown that, at the very least, the relationship between giftedness and the five OEs is far more complicated and uncertain than is commonly believed. There is little to no evidence to believe that gifted individuals have significantly higher POE or SOE than non-gifted individuals. There is some evidence to believe that gifted individuals have significantly higher EOE and MOE than non-gifted individuals. However, much of this evidence is problematic and questionable due to small samples, small effect sizes, and a variety of limitations regarding the literature's internal and external validity. Additionally, there are not many studies that have replicated such findings. And while it appears that gifted individuals consistently and significantly outscore non-gifted individuals on TOE, it is unclear exactly how

important such findings are. Many scholars have already noted that gifted individuals demonstrate a high degree of characteristics similar to TOE. Generally, then, there is little evidence that gives credence to proponents' arguments about the giftedness-OE relationship.

Yet, despite all of the empirical tests that exist now and will exist in the future, the true relationship between giftedness and the five OEs will remain elusive. This is, in part, due to humans' innate inability to always unbiasedly and accurately understand data. Also, humans' loyalty to ideas and cliques, such as the skeptics and proponents, make accurate assessments of the giftedness-OE relationship difficult. Pride, group affinity, and other psychological phenomena are strong forces, regardless of the evidence. And for as long as the conception of giftedness is so fluid, it will be extremely difficult and perhaps even impossible to convincingly depict the nature of the giftedness-OE relationship to all audiences. So even while this dissertation has offered directions for future research regarding the giftedness-OE relationship, it might be more prudent for researchers to consider exploring topics that could more easily produce tangible help to gifted children and adults. Such help is one of the foremost purposes of gifted education, and it is a more noble work than merely participating in a debate about the overexcitability of gifted persons, a potentially irreconcilable, internecine academic struggle.

REFERENCES

Ackerman, C. M. (1993). *Investigating an alternate method of identifying gifted students*. (Unpublished master's thesis). University of Calgary, Calgary, Alberta, Canada.

Ackerman, C. M. (1997). Identifying gifted adolescents using personality characteristics: Dabrowski's overexcitabilities. *Roeper Review, 19*(4), 229-236.

Ackerman, C. M. (1998). *A secondary analysis of research using the Overexcitability Questionnaire*. (Unpublished doctoral dissertation). Texas A& M University, College Station, Texas.

Ackerman, C. M. (2001, January 28), OEQII [Online discussion group post]. Retrieved from http://groups.yahoo.com/group/dabrowskidiscussiongroup/message/421 on August 31, 2013.

Ackerman, C. M. (2009). The essential elements of Dabrowski's theory of positive disintegration and how they are connected. *Roeper Review*, 31(2), 81-95.

Amend, E. R. (2009). Dabrowski's Theory: Possibilities and implications of misdiagnosis, missed dianosis, and dual diagnosis in gifted individuals. In S. Daniels & M. M. Piechowski (Eds.), *Living With Intensity: Understanding the Sensitivity, Excitability and Emotional Development of Gifted Children, Adolescents and Adults* (pp. 83-104). Scottsdale, AZ: Great Potential Press.

Aronson, J. (1964). Introduction. In K. Dabrowski's *Positive Disintegration*. Boston: Little, Brown.

Battaglia, M. (2003). The man behind the theory: A biography and findings. In N. Duda, (Ed.), Positive Disintegration: The Theory of the future. 100th Dabrowski anniversary program on the man, the theory, the application and the future (pp. 3-12). Ft. Lauderdale, FL: Fidlar Doubleday. [The Proceedings from the Fifth International Conference on the Theory of Positive Disintegration, held in Ft. Lauderdale, FL., November 7 - 10, 2002].

Becker, L. A. (2000). *Effect size calculators.* Retrieved from http://www.uccs.edu/~lbecker/ on September 5, 2014.

Boaz, A., Ashby, D., & Young, K. (2002). *Systematic reviews: What have they got to offer evidence based policy and practice?* University of London: ESRC UK Centre for Evidence Based Policy and Practice.

Bouchard, L. (2004). An instrument for the measure of Dabrowskian overexcitabilities to identify gifted elementary students. *Gifted Child Quarterly*, *48*(4), 339-350.

Bouchet, N., & Falk, R. (2001). The relationship among giftedness, gender, and overexcitability. *Gifted Child Quarterly, 45*(4), 260-267.

Brown, L., Sherbenou, R.J., & Johnsen, S.K. (1997). T*est of nonverbal intelligences. Examiner manual* (3rd ed.). Austin, TX: Pro-Ed.

Campbell, D. T. & Fiske, D. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56,* 81-105.

Chang, H. J. (2001). *A research on the overexcitability traits of gifted and talented students in Taiwan*. (Unpublished master thesis). National Taiwan Normal University, Taipei.

Chang, H. J., & Kuo, C. (2013). Overexcitabilities: Empirical studies and application. *Learning and Individual Differences, 23*, 53-63.

Clark, B. (2013). *Growing up gifted*. Boston, MA: Pearson.

Cohen, J. (1988), *Statistical power analysis for the behavioral sciences* (2nd ed.), New Jersey: Lawrence Erlbaum Associates.

Colangelo, N. & Davis, G. (Eds.). (2002). *Handbook for gifted education 3rd ed.* Boston, MA: Pearson.

Colangelo, N. & Zaffrann, R. T. (Eds.). (1979). *New voices in counseling the gifted.* Dubuque, IA: Kendall/Hunt.

Conte, H. R., Bakur-Weiner, M., & Plutchik, R. (1982). Measuring death anxiety: Conceptual, psychometric, and factor-analytical aspects. *Journal of Personality and Social Psychology, 43*, 775-785.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches, 3rd ed.* Thousand Oaks, CA: Sage.

Cross, T. (2002). Foreword to M. Neihart, M. Reis, N. Robinson, & S. Moon (Eds.) *The social emotional development of gifted children: What do we know?* (pp. ix-x). Waco, TX: Prufrock Press.

Dabrowski, K. (1964). *Positive Disintegration.* Boston: Little, Brown.

Dabrowski, K. (1966). The Theory of Positive Disintegration. *International Journal of Psychiatry*,*2* (2), 229-244.

Dabrowski, K. (1972). *Psychoneurosis is not an illness.* London: Gryf Publications.

Dabrowski, K. (1973). *The dynamics of concepts*. London: Gryf Publications.

Dabrowski, K., Kawczak, A., & Piechowski, M. M. (1970). *Mental growth through positive disintegration*. London: Gryf Publications.

Dabrowski, K., & Piechowski, M. M. (1977). *Theory of levels of emotional development*, Vols. 1& 2, Oceanside, NY: Dabor Science.

Daniels, S. & Meckstroth, E. (2009). Nurturing the sensitivity, intensity, and development potential of young gifted children. In S. Daniels & M. M. Piechowski (Eds.), *Living With Intensity: Understanding the Sensitivity, Excitability and Emotional Development of Gifted Children, Adolescents and Adults* (pp. 33-56). Scottsdale, AZ: Great Potential Press.

Daniels, S., & Piechowski, M. M. (Eds.). (2009). *Living With intensity: Understanding the sensitivity, excitability and emotional development of gifted children, adolescents and adults.* Scottsdale, AZ: Great Potential Press.

Denzin, N. K. (1978). *The research act: A theoretical introduction to sociological methods*. New York: McGraw-Hill.

Domroese, C. (1993). *Investigating an alternate method for identifying gifted students*. Research Project, (Unpublished manuscript).

Evans, J. & Benefield, P. (2001). Systematic reviews of educational research: Does the medical model fit? *British Educational Research Journal, 27* (5)*,* 527-541.

Eysenick, H. J. (1981). *The intelligence controversy*. New York, NY: John Wiley & Sons, Inc.

Falk, R. F., Lind, S., Miller, N. B., Piechowski, M. M., & Silverman, L. K. (1999). *The Overexcitability Inventory for Parents*. Denver, CO: Institute for the Study of Advanced Development.

Falk, R. F., Manzanero, J., & Miller, N. (1997). Developmental potential in Venezuelan and American artists: A cross-cultural validity study. *Creativity Research Journal*, *10*(2-3), 201-206.

Falk, R. F. & Miller, N. B. (2009). Building firm foundations: Research and assessments. In S. Daniels & M. M. Piechowski (Eds.), *Living With Intensity: Understanding the Sensitivity, Excitability and Emotional Development of Gifted Children, Adolescents and Adults* (pp. 239-260). Scottsdale, AZ: Great Potential Press.

Falk, R. F., Yakmaci-Guzel, B., Chang, A., Sanz, R. P. & Chavez-Eakle, R. A., (2008). Measuring overexcitability: Replication across five countries. In S. Mendaglio (Ed.) *Dabrowski's theory of positive disintegration* (pp. 184-200).

Fancher, R. E. (1985). *The intelligence men: Makers of the IQ controversy*. NY: W.W. Norton & Company.

Gage, D. F., Morse P. A., & Piechowski, M. M. (1981). Measuring levels of emotional development. *Genetic Psychology Monographs*, *103*(1), 129-152.

Gagne, F. (2005). From gifts to talents: The DMGT as a developmental model. In R. Sternberg & J. Davidson (Eds.) *Conceptions of giftedness, 2nd ed.* (pp. 98-119). New York, NY: Cambridge University Press.

Gallagher, S. (1985) A comparison of the concept of overexcitabilities with measures of creativity and school achievement in sixth-grade students, *Roeper Review*, 8, 115–119.

Galton, F. (1978/1892). *Hereditary Genius.* London: Julian Friedmann Publishers.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Gatto-Walden, P. (2009). Living one's spirit song: Transcendent experiences in counseling gifted adults. In S. Daniels & M. M. Piechowski (Eds.), *Living With Intensity: Understanding the Sensitivity, Excitability and Emotional Development of Gifted Children, Adolescents and Adults* (pp. 203-224). Scottsdale, AZ: Great Potential Press.

Glass, G. V. (1976). Primary, secondary, and meta-analysis of research. *Educational Researcher, 5*, 3-8.

Glass, G. V., McGaw, B. & Smith, M.L. (1981). *Meta-analysis in social research*. Beverly Hills, CA: SAGE.

Gross, C., Rinn, A., & Jamieson, K. (2007). Gifted adolescents' overexcitabilities and self concepts: An analysis of gender and grade level. *Roeper Review*, *29*(4), 240-248.

Hafenstein, N., & Tucker, B. (1995). *Psychological intensities in young gifted children.* Paper presented at the Esther Katz Rosen Symposium, Lawrence, KS. (ERIC Document Reproduction Service No. ED 387975).

Harrison, G. E. & Haneghan, J. P. (2011). The gifted and the shadow of the night: Dabrowski's overexcitabilities and their correlation to insomnia, death anxiety, and fear of the unknown. *Journal for the Education of the Gifted, 34*(4), 669-697.

Hazell, C. G. (1989). Levels of emotional development with experienced levels of emptiness and existential concern. *Psychological Reports*, *64* (3, Pt 1), 835-838.

Heller, K. A., Monks, F. J., & Passow, A. H. (Eds.). (1993). *International handbook of research and development of giftedness and talent*. New York: Pergamon Press.

Hernstein, R. J. & Murray, C. (1994). *The bell curve.* New York: Free Press.

Hinkle, D. E. , Wiersma, W., & Jurs, S. G. (2003). *Applied statistics for the behavioral sciences* (5th ed.). Boston, MA: Houghton Mifflin Company.

Hollingworth, L. S. (1926). *Gifted children: Their nature and nurture.* New York, NY: Macmillan Company.

Intellectual Giftedness. (n.d.) In *Wikipedia*, Retrieved August 15, 2013, from http://en.wikipedia.org/wiki/Intellectual_giftedness#Characteristics_of_giftedness.

Jackson, P. S. & Moyle, V. F. (2009a). Inner awakening, outward journey: The intense gifted child in adolescence. In S. Daniels & M. M. Piechowski (Eds.), *Living With Intensity: Understanding the Sensitivity, Excitability and Emotional Development of Gifted Children, Adolescents and Adults* (pp. 57-72). Scottsdale, AZ: Great Potential Press.

Jackson, P. S. & Moyle, V. F. (2009b). Integrating the intense experience: Counseling and clinical applications. In S. Daniels & M. M. Piechowski (Eds.), *Living With Intensity: Understanding the Sensitivity, Excitability and Emotional Development of Gifted Children, Adolescents and Adults* (pp. 105-126). Scottsdale, AZ: Great Potential Press.

Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly, 24*, 602-611.

Khan, K. S., Kunz, R., Kleijnen, J., & Antes, G. (2003). Five steps to conducting a systematic review. *Journal of the Royal Society of Medicine, 96*(3), 118-121.

Kottmeyer, C. (1997-2012). *Dabrowski's overexcitabilities and Theory of Positive Disintegration*. Retrieved August 10, 2013, from http://www.hoagiesgifted.org/dabrowski.htm.

Kuo, C. C., Chang, H. J., Chang, Y. P., Chou, K. H., Lin, Y. H., Chen, H. C. & Lin, C. P. (2012). Psychological traits and train structures of mathematically/scientifically senior high school talented students. *Bulletin of Educational Psychology*, *43*(4), 805–832.

Lewis, R. B., Kitano, M. K., & Lynch, E. W. (1992). Psychological intensities in gifted adults. *Roeper Review*, *15*(1), 25–31.

Light, R. J. & Smith, P. V. (1971). Accumulating evidence: Procedures for resolving contradictions among different research studies. *Harvard Educational Review, 41*, 429-471.

Lind, S. (1999). Fostering adult giftedness. *CAG Communicator*, *30* (3), 10-12.

Lind, S. (n.d.a.). *Overexcitability and the gifted.* Retrieved August 11, 2013, from http://www.sengifted.org/archives/articles/overexcitability-and-the-gifted.

Lind, S. (n.d.b.). *Overexcitability and the highly gifted child.* Retrieved August 11, 2013, from http://www.davidsongifted.org/db/Articles_id_10102.aspx.

Lovecky, D. V. (2000). The quest for meaning: Counseling issues with gifted children and adolescents. In L. K. Silverman (Ed.) *Counseling the gifted & talented,* (pp.29-50). Denver, CO: Love Publishing.

Lysy, K. Z., & Piechowski M. M. (1983). Personal Growth: An empirical study using Jungian and Dabrowskian measures. *Genetic Psychology Monographs*, *108*, 267-320.

Marzano Research Laboratory (n.d.). Retrieved November 4, 2013 from http://www.marzanoresearch.com/media/documents/pdf/AppendixB_DTLGO.pdf.

Matthews, D. J., Subotnik, R. F., Horowtiz, F. D. (2009). A developmental perspective on giftedness and talent: Implications for research, policy, and practice. In F. Horowitz, R. Subotnik, & D. Matthews (Eds.) *The development of giftedness and talent across the life span*, (pp.209-225). Washington D.C.: American Psychological Association.

Mendaglio, S. (2002). Dabrowski's Theory of Positive Disintegration: Some implications for teachers of gifted students. *AGATE*. *15* (2), 14-22.

Mendaglio, S. (Ed.). (2008). *Dabrowski's theory of positive disintegration*. Scottsdale, AZ: Great Potential Press.

Mendaglio, S. (2012). Overexcitabilities and giftedness research: A call for a paradigm shift. *Journal for the Education of the Gifted*, *35* (3), 207-219.

Mendaglio, S. & Pyrt, M. C. (2003). Self-concept of gifted students: Assessment-based intervention. *Teaching Exceptional Children, 27* (3), 40-45.

Mendaglio, S., & Tillier, W. (1992). *Feeling bad can be good: Using Dabrowski's theory to reframe gifted children's adjustment difficulties.* Paper presented at the 6th Canadian SAGE Symposium, Canada (ERIC Document Reproduction Service No. ED 371548).

Mendaglio, S., & Tillier, W. (2006). Dabrowski's theory of positive disintegration and giftedness: Overexcitability research findings. *Journal for the Education of the Gifted*, *30,* 68-87.

Mika. E. (2006). Giftedness, ADHD, and overexcitabilities: the possibilities of misinformation. (Research Commentary Point-Counterpoint: Diagnosis of Giftedness and ADHD). *Roeper Review 28* (4), 237-242.

Miller, N. B., Falk, R. F. & Huang, Y. (2009). Gender identity and the overexcitability profiles of gifted college students. *Roeper Review*, 31(3), 161-169.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement*. PLoS Med 6(6).

Neihart, M., Reis, S. M., Robinson, N. M., & Moon, S. M. (Eds.). (2002). *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock Press.

Nixon, L. F. (2008). Personality disintegration and reintegration in mystical lives. In S. Mendaglio (Ed.). *Dabrowski's theory of positive disintegration* (pp. 203-226). Scottsdale, AZ: Great Potential Press, Inc.

O'Connor, K. J. (2002). The application of Dabrowski's theory to the gifted. In M. Neihart, S. M. Reis, N. M. Robinson, & S. M. Moon (Eds.), *The social and emotional development of gifted children: What do we know?* (pp. 51-60). Waco, TX: Prufrock Press.

Ogburn-Colangelo, M. K. (1979). Giftedness as multilevel potential: A clinical example. In N. Colangelo & R. T. Zaffrann (Eds.), *New voices in counseling the gifted*(pp. 165-187). Dubuque, IA: Kendall/Hunt.

Overexcitability. (n.d.). In *Wikipedia*, Retrieved August 15, 2013, from https://en.wikipedia.org/wiki/Overexcitability.

Pardo de Santayana Sanz, R. (2006). El alumno superdotado y sus problemas de aprendizaje: Validación del OEQ-II como prueba de diagnóstico (The gifted student and learning disabilities: Validation of the OEQ-II as a diagnosis test). Universidad Complutense de Madrid.

Petticrew, M. (2001). Systematic reviews from astronomy to zoology: Myths and misconceptions. *British Medical Journal, 322,* 98-101.

Piechowski, M. M. (1975). A theoretical and empirical approach to the study of development. *Genetic Psychology Monographs, 92*, 231-297.

Piechowski, M. M. (1979). Development potential. In N. Colangelo & R. T. Zaffrann (Eds.), *New voices in counseling the gifted* (pp. 25-27). Dubuque, IA: Kendall/Hunt.

Piechowski, M. M. (1986). The concept of developmental potential. *Roeper Review, 8*(3), 190-197.

Piechowski, M. M. (1991). Emotional development and emotional giftedness. In N. Colangelo & G. Davis (Eds.), *Handbook of Gifted Education* (pp. 285-306). Boston: Allyn and Bacon.

Piechowski, M. M. (1997). Emotional giftedness: The measure of intrapersonal intelligence. In N. Colangelo & G. Davis (Eds.) *Handbook of gifted education, 2nd ed.* (pp. 366-381). Needham Heights, MA: Allyn & Bacon.

Piechowski, M. M. (2006). *"Mellow out," They say. If I only could: Intensities and sensitivities of the young and bright.* Madison, WI: Yunasa Books.

Piechowski, M. M. (2008). Discovering Dabrowski's theory. In S. Mendaglio (Ed.) *Dabrowski's Theory of Positive Disintegration* (pp. 41-78). Scottsdale, AZ: Great Potential Press.

Piechowski, M. M. (2009a). Peace Pilgrim, exemplar of level V. *Roeper Review*, 31(2), 103-112.

Piechowski, M. M. (2009b). Piechowski's response to William Tillier's "Conceptual differences between PIechowski and Dabrowski" In J. Frank, H. Curties, & G. Finlay, (Eds.). *Imagining the way: Proceedings from the 19th Annual SAGE Conference* (pp. 70-74). (Unpublished manuscript). (Proceedings from the 19th Annual SAGE Conference. November 7-8, 2008, University of Calgary, Calgary AB).

Piirto, J. (2010). 21 years with the Dabrowski Theory: An autoethnography. *Advanced Development Journal,* 68-90. Retrieved from http://personal.ashland.edu/jpiirto/21%20years%20with%20Dabrowski.pdf on August 31, 2013.

Piirto, J., Montgomery, D., & May, J. (2008). A comparison of Dabrowski's overexcitabilities by gender for American and Korean high school gifted students. *High Ability Studies*, 19(2), 141-153.

PRISMA (n.d.a.). Retrieved on October 28, 2013 from http://www.prisma-statement.org/index.htm.

PRISMA (n.d.b.). Retrieved on October 28, 2013 from http://www.prisma-statement.org/history.htm.

PRISMA (n.d.c.). Retrieved on October 28, 2013 from http://www.prisma-statement.org/statement.htm.

Pyrt, M. C. (2008). The Dabrowskian lens: Implications for understanding gifted individuals. In S. Mendaglio (Ed.) *Dabrowski's Theory of Positive Disintegration* (pp. 175-182).

Renzulli, J. S. (1978). What makes giftedness? Reexamining a definition. *Phi Delta Kappan, 60,* 180-184, 261.

Robert, J. A. (1984). A study of typologies of personal growth. (Unpublished doctoral dissertation). Evanston, Illinois: Northwestern University.

Robinson, N. (2002). Introduction to M. Neihart, M. Reis, N. Robinson, & S. Moon (Eds.) *The social emotional development of gifted children: What do we know?* (pp. xi-xxiv). Waco, TX: Prufrock Press.

Robinson, N., Reis, S. M., Robinson, N. & Moon, S. (2002) In M. Neihart, M. Reis, N. Robinson, & S. Moon (Eds.), *The social emotional development of gifted children: What do we know?* (pp. 267-288). Waco, TX: Prufrock Press.

Robinson, N. M. (2005). In defense of a psychometric approach to the definition of academic giftedness: A conservative view from a die-hard liberal. In R. Sternberg & J. Davidson (Eds) *Conceptions of giftedness, 2nd ed.* (pp.280-294). New York, NY: Cambridge University Press.

Roeper, A. (1982). How gifted cope with their emotions. *Roeper Review, 5*(2), 21-24.

Roeper, A. (2009). The emperor has no clothes: Exquisite perception, stress, and the gifted child. In S. Daniels & M. M. Piechowski (Eds.), *Living With Intensity: Understanding the Sensitivity, Excitability and Emotional Development of Gifted Children, Adolescents and Adults* (pp. 73-82). Scottsdale, AZ: Great Potential Press.

Roeper, A., & Silverman, L. K. (2009). Giftedness and moral promise. In D. Ambrose & T. Cross (Eds.), *Morality, ethics and gifted minds* (pp. 251-264). New York: Springer.

Rosenthal, R. (1978). Combining results of independent studies. *Psychological Bulletin, 85*, 185-193.

Schiever, S. W. (1985). Creative personality characteristics and dimensions of mental functioning in gifted adolescents. *Roeper Review,* 7 (4), 223-226.

Silverman, L. K. (1991). Family counseling. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (pp. 307-320). Boston: Allyn and Bacon.

Silverman, L. K. (1993). Counseling needs and programs for the gifted. In K. Heller, F. Monks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 631-647). Oxford, England: Pergamon Press.

Silverman, L. K. (1994). The moral sensitivity of gifted children and the evolution of society. *Roeper Review*, *17*(2), 110-116.

Silverman, L. K. (2000a). The gifted individual. In L. K. Silverman (Ed.) *Counseling the gifted & talented,* (pp.3-28). Denver, CO: Love Publishing.

Silverman, L. K. (2000b). *Counseling the gifted and talented.* Denver, CO: Love.

Silverman, L. K. (2008). The theory of positive disintegration in the field of gifted education. In S. Mendaglio (Ed.) *Dabrowski's Theory of Positive Disintegration* (pp. 157-174). Scottsdale, AZ: Great Potential Press.

Siu, F. Y. (2010). Comparing overexcitabilities of gifted and non-gifted school children in Hong Kong: Does culture make a difference? *Asia Pacific Journal of Education*, 30(1), 71-83.

Sternberg, R. J. & Davidson, J. E. (Eds.) (2005). *Conceptions of giftedness 2nd ed.* Cambridge: Cambridge University Press.

Terman, L. M. (1926). *Genetic studies of genius*. Stanford, CA: Stanford University Press.

Terman, L. M., Oden, M. (1947). *Genetic studies of genius vol. 4: The gifted child grows up: Twenty-five years' follow-up of a superior group.* Stanford, CA: Stanford University Press.

Texas Association for the Gifted and Talented (2012). Retrieved September, 13, 2013 from http://txgifted.org/gifted-glossary/.

Tieso, C. (2007a). A new way to think about talent?. *Roeper Review*, *29* (4), 232-239.

Tieso, C. (2007b). Patterns of overexcitabilties in identified gifted students and their parents: A hierarchical model. *Gifted Child Quarterly*, *51*(1), 11-22.

Tillier, W. (2008d). Kazimierz Dabrowski: The Man. In S. Mendaglio (Ed.). *Dabrowski's Theory of Positive Disintegration* (pp. 3-11). Scottsdale AZ: Great Potential Press, Inc.

Tillier, W. (2009a). Dabrowski without the theory of positive disintegration just isn't Dabrowski. *Roeper Review, 31*(2), 123-126.

Tillier, W. (2009b). Conceptual differences between Piechowski and Dabrowski. In J. Frank, H. Curties, & G. Finlay, (Eds.). *Imagining the way: Proceedings from the 19th Annual SAGE Conference* (pp. 60 - 68). (Unpublished manuscript). (Proceedings from the 19th Annual SAGE Conference. November 7-8, 2008, University of Calgary, Calgary AB.).

Tillier, W. (2009c). Tillier's response to Piechowski. In J. Frank, H. Curties, & G. Finlay, (Eds.). *Imagining the way: Proceedings from the 19th Annual SAGE Conference* (pp. 75 - 77). (Unpublished manuscript). (Proceedings from the 19th Annual SAGE Conference. November 7-8, 2008, University of Calgary, Calgary AB.).

Tillier, W. (n.d.a.). *Central issues.* Retrieved August 22, 2013, from http://www.positivedisintegration.com/Synopses.htm.

Tillier, W. (n.d.b.). *A brief overview Dabrowski's Theory of Positive Disintegration and its relevance for the gifted.* Retrieved August 22, 2013, from http://positivedisintegration.com/gifted.htm.

Tillier, W. (n.d.c.). *A bibliography of Dabrowski materials*. Retrieved September 4, 2013 from http://www.positivedisintegration.com/DRIBiblio.htm#a-c.

Tolan, S. S. (2009). What we may be: What Dabrowski's work can do for gifted adults. In S. Daniels & M. M. Piechowski (Eds.), *Living With Intensity: Understanding the Sensitivity,*

Excitability and Emotional Development of Gifted Children, Adolescents and Adults (pp. 225-236). Scottsdale, AZ: Great Potential Press.

Treat, A. R. (2006). Gifted Gay, Lesbian, Bisexual, and Transgender annotated bibliography: A resource for educators of gifted secondary GLBT students. *Journal of Secondary Gifted Education*, 17(4), 230-243.

Warne, R. T. (2011). A reliability generalization of the Overexcitability Questionnaire–Two. *Journal of Advanced Academics*, *22*, 671-692.

Weed, M. (2005). "Meta interpretation": A method for the interpretive synthesis of qualitative research. *Forum: Qualitative Social Research Sozialforschung, 6*(1). Retrieved on October 31, 2013 from www.qualitative-research.net/index/php/fqs/article/view/508/1096#g31.

Whitmore, J. R. (1986). Understanding a lack of motivation to excel. *Gifted Child Quarterly, 30,* 60-69.

Wirthwein, L., Becker, C., & Loehr, E. (2011). Overexcitabilities in gifted and non-gifted adults: does sex matter? *High Ability Studies*, *22*, 145-153.

Wirthwein, L., & Rost, D. H. (2011). Focusing on overexcitabilities: Studies with intellectually gifted and academically talented adults. *Personality and Individual Differences*, 51, 337-342.

Wissler, C. D. (1901). The correlation of mental and physical tests. *The Psychological Review*, Monograph supplements.

Yakmaci-Guzel, B. (2002). Ustun yeteneklilerin belirlenmesinde yardimci yeni bir yaklasim: Dabrowskinin asiri dduyarlilik alanlari [A supplementary method in the identification of gifted individuals: Dabrowski's overexcitabilities]. Unpublished doctoral dissertation, University of Istanbul, Turkey.

Yakmaci-Guzel, B. & Akarsu, F. (2006). Comparing overexcitabilities of gifted and non-gifted 10th grade students in Turkey. *High Ability Studies*, *17*(1), 43-56.

APPENDIX A
DABROWSKI BIOGRAPHY

In his book chapter chronicling Dabrowski's life, Tillier noted that Dabrowski was a polymath, a "Renaissance man" who had "an astounding command of world cultures, the arts, philosophy, medicine, neurology, and of course psychiatry and psychology" (2008, p. 3). Accompanying this knowledge was impressive vita including an M.A., a Ph. D. in psychology, an M.D. post-graduate work at Harvard, and grants from the Polish National Culture Foundation and the Rockefeller Foundation. But Dabrowski was not simply an academic being. He led a tumultuous and at times heroic life that significantly influenced the development of his Theory of Positive Disintegration (TPD) and its components.

Dabrowski was born on September 1, 1902 in Lublin, Poland (Tillier, 2008). Tillier noted that during Dabrowski's young life he encountered tragedy often. When he was a teenager, the dead from a World War I battle littered one of his favorite playgrounds. One of his sisters died of a young age as well, and later, when Dabrowski was considering becoming a musician, a close friend of his committed suicide. The incident had a great effect on Dabrowski, convincing him to study medicine and psychology rather than music (Rankel, as cited by Tillier, 2008).

As a student, Dabrowski studied psychology, education (under the tutelage of Jean Piaget), medicine, and suicide at Geneva; psychoanalysis at Vienna, psychology and self-mutilation at Poznan; and public health at Harvard (Tillier, 2008). After this education, Dabrowski used funding from the Rockefeller Foundation to establish the Polish State Mental Hygiene Institute in Warsaw in 1935. There, Dabrowski began writing. His early work and publications included the topics of nervousness, self-mutilation, and excessive excitability. During this period, Dabrowski began studying anthroposophy (a kind of scientific spiritualism),

parapsychology (the study of the paranormal and its mental components), and Eastern religions and beliefs.

World War II violently interrupted this research and Dabrowski's work at the Institute (Tillier, 2008). In 1939 Russia and Germany invaded Poland, and ultimately Germany occupied the state during the early 1940s. Only 38 of the 400 Polish psychiatrists survived this occupation (Aronson, 1964). Dabrowski was one of the survivors, though the NAZI's imprisoned him for several months and sent his brother to a concentration camp (Tillier, 2008). After Dabrowski's wife negotiated his release from prison, he regained his position at the Institute of Mental Health in Warsaw. Much of Dabrowski's and the Institute's work, though, took place secretly, in Poland's forests. There, Dabrowski and others continued to treat patients, and even began providing sanctuary to orphans, priests, soldiers, the Polish resistance, and Jewish children (Battaglia, 2002). All of these and other happenings during the War caused Dabrowski to note that the violence and occupation provided a theatre upon which the lowest and highest aspects of human nature were on display (Tillier, 2008).

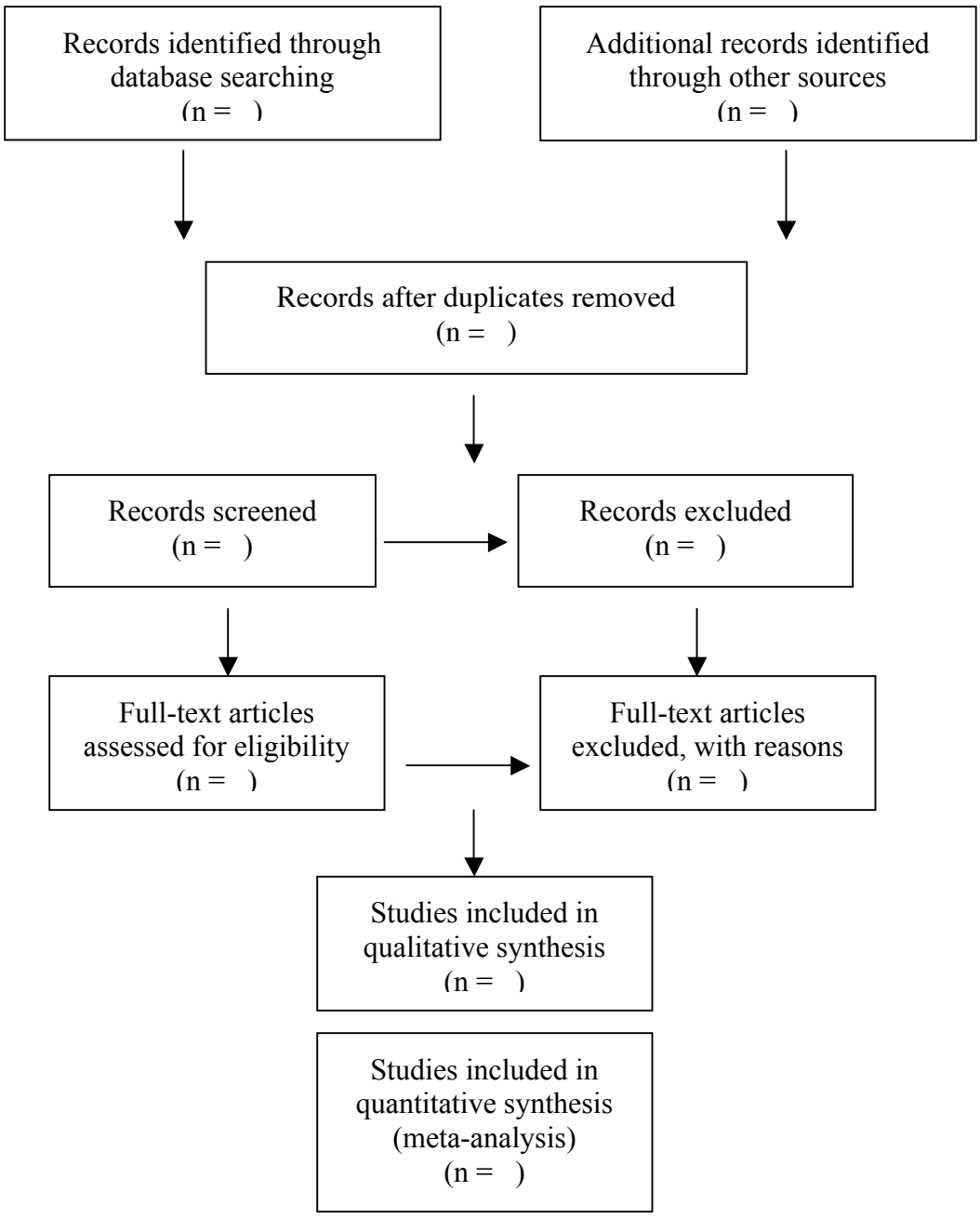
After the War, Dabrowski was again imprisoned (Tillier, 2008). This time, the Soviets imprisoned and then released him after he was "rehabilitated" (Tillier, 2008, p. 8). In Stalinist Poland, Dabrowski worked at tuberculosis centers and Universities. He also continued his research. Eventually, Dabrowski met Jason Aronson, an American academic who was traveling in Poland. The two men became friends, and Aronson invited Dabrowski back to the United States. Ultimately, the University of Alberta offered him a professorship. There, he published a number of works in English, including *Positive Disintegration* (Dabrowski, 1964), *Mental Growth through Positive Disintegration* (1970), *Psychoneurosis Is Not an Illness* (1972) and

several others. He also became friends with Abraham Maslow and debated with him about the nature of psychological development (Tillier, 2008).

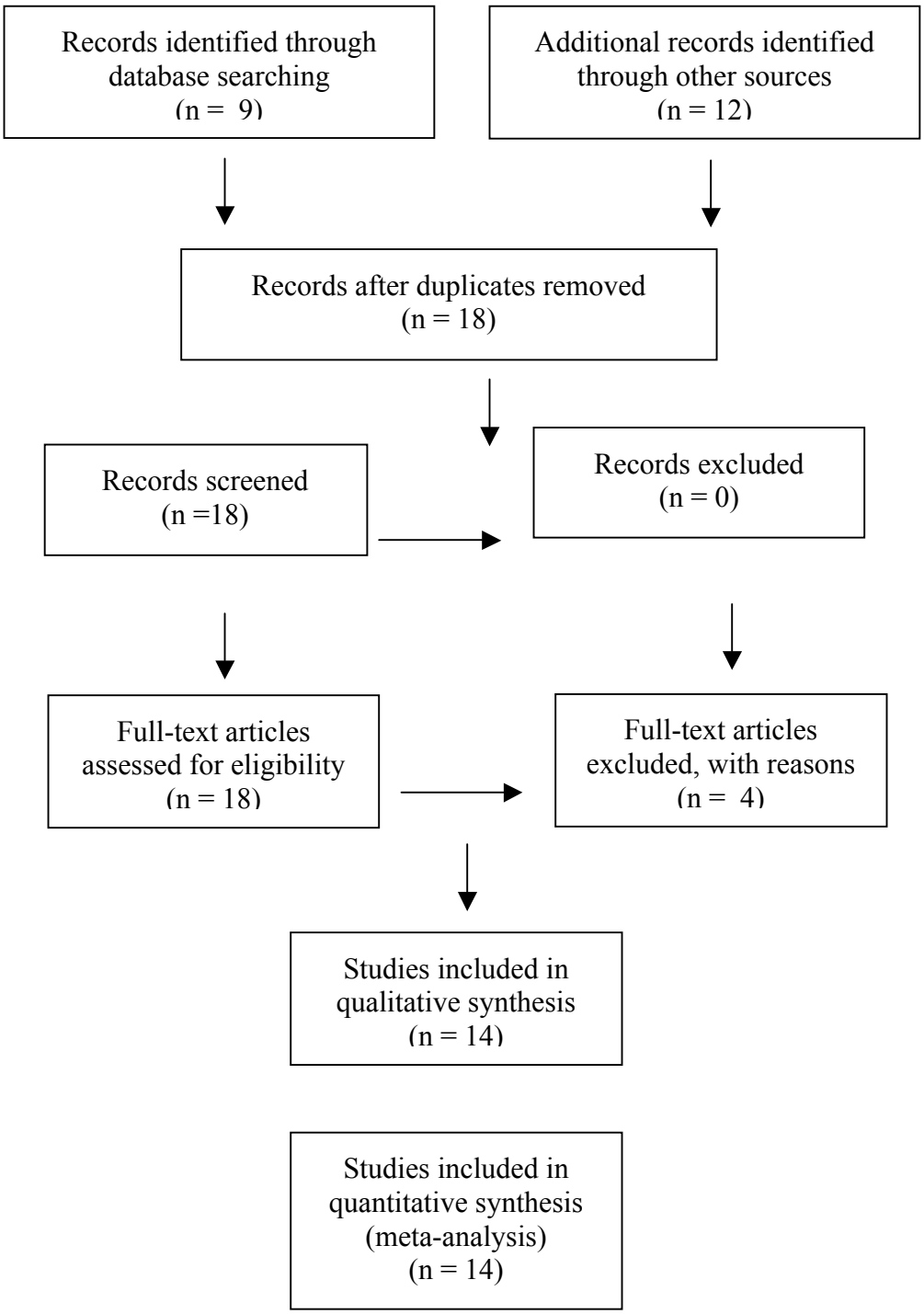
In 1979, Dabrowski suffered a severe heart attack while he was in Canada (Tillier, 2008). Dabrowski swore that he would not die on foreign soil, and did manage to survive long enough to return to Poland. There, he died in 1980, but his ideas have continued to grow in Canada, America, Spain, Peru, and several other countries. He published hundreds of works in Polish, and many others in Spanish and French. He published far fewer works in English, his last learned language.

A number of his students have conducted a great deal of work on TPD (see Mendaglio, 2008). Many others have continued to study Dabrowski's overexcitabilities, especially popular in gifted education (see Daniels & Piechowski, 2009). This relationship has been studied in Spain, Hong Kong, Turkey, Canada, South Korea, the United States (e.g. Falk et al., 2008), and Germany (Wirthwein & Rost, 2010). There are also professional organizations, conferences, digital communities, and Dabrowski research centers in Spain and in Peru dedicated to the study and promotion of Positive Disintegration and other Dabrowskian ideas (Tillier, 2008).

APPENDIX B
PRISMA FLOWCHART TEMPLATE



APPENDIX C
COMPLETED FLOWCHART



VITA

Daniel Winkler was born in New Orleans, Louisiana, but spent most of his early life in Slidell, Louisiana. As is the case with many high school graduates, he went to college, specifically Louisiana State University. There, he stayed longer than most, slowly accumulating degrees. Ultimately, Daniel hopes to graduate. He even awkwardly wrote this Vita in the third person due to stylistic mandate.