THE POTENTIAL OF MISDIAGNOSIS OF HIGH IQ YOUTH BY PRACTICING MENTAL HEALTH PROFESSIONALS: A MIXED METHODS STUDY

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The difficulty of distinguishing between genuine disorder and characteristics that can be attributed to high IQ increases the likelihood of diagnostic error by mental health practitioners. This mixed methods study explores the possibility of misdiagnosis of high IQ youth by mental health professionals. Participants were private practice mental health professionals who read case study vignettes illustrating high IQ youth exhibiting characteristics associated with their population. Participants then completed a survey and provided an assessment of the hypothetical client. In the study, 59% of participants were unable to recognize behavioral characteristics associated with high IQ youth unless suggested to them, and 95% of participants were unable to recognize emotional characteristics associated with high IQ youth unless suggested. The results of this study provide much-needed empirical exploration of the concern for misdiagnosis of high IQ youth and inform clinical practice and education.

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THE POTENTIAL OF MISDIAGNOSIS OF HIGH IQ YOUTH BY PRACTICING MENTAL HEALTH PROFESSIONALS: A MIXED METHODS STUDY

Introduction

The problem of mental health misdiagnosis with high IQ youth is a frequently-mentioned concern among gifted education professionals (Edwards, 2009; Pfeiffer, 2009; Webb, Amend, Webb, Goerss, Beljan, & Olenchak, 2005; Wellisch & Brown, 2013). Hartnett, Nelson, and Rinn (2004), in their study of misdiagnosis and ADHD, found that graduate students studying counseling failed to consider high IQ as a factor when presented with characteristics that were similar for both ADHD and intellectual giftedness, unless prompted to do so. Recognition of characteristics that might emerge in relationship to high IQ represents a particular challenge for mental health professionals, because many of these characteristics can present similar to disorders such as ADHD, oppositional defiant disorder (ODD), obsessive compulsive disorder (OCD), and bipolar disorder (Webb et al., 2005). The difficulty in distinguishing between genuine disorder and aspects of high IQ increases the likelihood of misdiagnosis by mental health practitioners (Pfeiffer & Stocking, 2000).

While the concern for misdiagnosis is frequently mentioned by professionals working in the field of gifted and talented education, there is a significant lack of research to support it (Amend & Beljan, 2009). This study adds to the research on misdiagnosis of high IQ youth by testing the ability of practicing mental health professionals to recognize non-pathological characteristics related to high IQ, providing much-needed empirical evidence to support the belief that misdiagnosis represents a quiet crisis for the field of gifted and talented education. To address the issue of misdiagnosis with regard to high IQ youth, it is important to begin with an understanding of diagnostic error and why it is a concern in the mental healthcare.

The Risks of Diagnostic Errors

Diagnostic error comprises a number of potential errors, including missed diagnosis and delayed diagnosis, but the two most frequently cited in the literature are overdiagnosis and misdiagnosis (Coon, Quinonez, Moyer, & Schroeder, 2014). Overdiagnosis refers to the accurate detection of a disorder but without benefit to the client diagnosed (Coon et al.), and it is cited as a common occurrence with childhood emotional and behavioral problems (Batstra et. al, 2012). Overdiagnosis results from the medicalization of previous non-medical conditions (Kristjansson, 2009) and the compulsion for diagnosis among medical professionals (Freudenreich, Kontos, & Querques, 2013). Two of the most commonly overdiagnosed disorders are ADHD (Bruchmüller, Margraf, & Schneider, 2012; Chilakamarri, Filkowski, & Ghaemi, 2011; Connor, 2011) and bipolar disorder (Mitchell, 2012). Assigning a clinical diagnosis or "sick role" to anyone who seeks help, without distinguishing between pathological and non-pathological symptoms, is cited by Freudenreich, Kontos, and Querques (2013) as a contributing factor to this problem.

Whereas overdiagnosis is an unwarranted but correct diagnosis, misdiagnosis is a diagnosis arrived at in complete error (Coon et al., 2014). Much like overdiagnosis, ADHD is frequently cited as being one of the most-often misdiagnosed conditions in children (Hartnett et al., 2004; Lawler, 2000; Webb et al., 2005). Nearly one million children in the United States may be misdiagnosed with ADHD on the basis of their age at the time of diagnosis alone (Biederman, Petty, Fried, Woodworth, & Faraone, 2014; Elder, 2010). In the case of bipolar disorder, Zimmerman, Ruggero, Chelminski, and Young (2008) found that bipolar disorder is correctly diagnosed less than 50% of the time. Perhaps not coincidentally, according to Webb et al. (2005), ADHD and bipolar disorder are among the misdiagnoses most frequently mentioned by those concerned with misdiagnosis of the intellectually gifted. The most common reason for

misdiagnosis is cognitive error, or flaws in diagnostic thinking, which accounts for 74% of diagnostic errors (Graber, Franklin, & Gordon, 2005). The process of diagnosis is often subjective, and Bruchmüller et al. (2012) indicated that therapists often do not strictly adhere to diagnostic manual criteria, preferring to rely on their perceptions of disorders. This can lead to bias in clinical judgment and contribute to misdiagnosis (Klotter, 2013). In addition, managed care providers often require specific diagnosis to authorize treatment, so the mental health professional may feel compelled to provide a diagnosis of disorder to ensure reimbursement (Anderson, 2001). This problem extends beyond managed care organizations and includes the insurance panels under which most independent practitioners provide services.

The consequences of diagnostic error can be severe. Children and adolescents who have been wrongly diagnosed are very often medicated unnecessarily (Roberts, 2006). In addition, treatment may fail to address the real issues facing the client, and the client's situation may grow worse (Walker & Shapiro, 2010). Establishment of an incorrect diagnosis can also be hard to correct; diagnosis tends to become anchored once made and the momentum of past diagnoses can influence future therapists who work with the client (Croskerry, 2003). Certain diagnoses can also be professionally damaging in the future, and can follow clients through their lives and limit their job prospects (Wahl, 1999). Finally, clients may lose faith in the ability of counseling to help them, and they may not seek future assistance when they are struggling (Lilienfeld, 2007). In an effort to avoid these serious consequences with high IQ youth, mental health professionals must be cognizant of the non-pathological characteristics of this population (Peterson & Morris, 2010).

Characteristics and Issues of High IQ Youth

While there are no characteristics of high IQ youth that are wholly unique, there is a constellation of characteristics that are commonly seen in intellectually-gifted youth. Many of these characteristics can create social and emotional difficulties for high IQ youth that can result in the youth seeking counseling (Webb et al., 2005). What follows is a list of some of the most common characteristics that may create social and emotional difficulties among high IQ youth.

Asynchronous Development

Asynchronous development, which can be defined as development in cognitive areas that is more advanced than physical, social, and emotional development, is a fundamental characteristic of giftedness (Colangelo & Wood, 2015; Columbus Group, 1991; Silverman, 1997). Asynchronous development can be an issue for the gifted, particularly when their cognitive development far outpaces their emotional development and maturity level, leading to anxiety, feelings of being out of sync, and isolation (Cross & Cross, 2015).

Perfectionism

Silverman (1999) states that perfectionism is the characteristic most associated with intellectual giftedness. Perfectionism is associated with test anxiety as well as academic satisfaction and performance (Eum & Rice, 2011; Hanchon, 2010; Miquelon, Stoeber, Feast, & Hayward, 2009; Vansteenkiste et al., 2010). Perfectionism is not necessarily problematic, though, unless it impairs an individual's ability to function. This usually involves unrealistic self-expectations and criticism, and an avoidance of performance on tasks where perfection may not be possible (Flett & Hewitt, 2006; Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett,

1991; Pacht, 1984). Much of the research conducted on perfectionism among the intellectually gifted does not indicate a proportionately higher incidence of maladjusted perfectionism in the population (Baker, 1996; Margot & Rinn, 2016; Parker & Mills, 1996; Parker, Portesova, & Stumpf, 2001; Roberts & Lovett, 1994; Schuler, 2000). However, Christopher and Shewmaker (2010) conducted a study on the emotional impact of perfectionism with 240 high IQ children between 7 and 11 years of age, and they found a correlation between socially-prescribed perfectionism, which is the perceived unrealistic expectations of others concerning the self, and depression. According to Silverman (2007), high IQ children who are perfectionistic may be seen as neurotic, narcissistic, and, at times, lacking in self-esteem and confidence.

Overexcitabilities

Overexcitabilites can be defined as a more intense than average reaction to stimuli, external or internal (Piechowski, 1975). There are five types of overexcitability:

- Psychomotor overexcitability: People with a psychomotor overexcitability tend to be extremely active and full of energy; they appear enthusiastic, with rapid speech and a need for exceptional physical activity (Dabrowski & Piechowski, 1977; Piechowski, 1979, 1991; Piechowski & Cunningham, 1985). People experiencing a psychomotor overexcitability may be impulsive and competitive (Lind, 2000).

- Sensual overexcitability: People with a sensual overexcitability experience intense sensation emanating from taste, vision, touch, hearing, and smell (Dabrowski & Piechowski, 1977; Piechowski, 1979; 1991). People affected by a sensual overexcitability may develop an ecstatic love of art, music, or food, for example, and may have a peculiar reaction to sensory input (Lind, 2000).

- Intellectual overexcitability: People with an intellectual overexcitability have an exceptional need to learn, understand, conceptualize, and analyze (Dabrowski & Piechowski, 1977; Piechowski, 1979; 1991). Those with an intellectual overexcitability are voracious readers and intensely curious. They often enjoy problem solving and efforts that involve planning and reasoning.

- Imaginational overexcitability: People with an imaginational overexcitability experience an intensity of imagination, characterized by vivid imagery and fantasy. Individuals experiencing an imaginational overexcitability may pursue efforts in creative writing, poetry, or drama. They may appear as daydreamers (Dabrowski & Piechowski, 1977; Piechowski, 1979; 1991) and may have difficulty staying on task in a school or work setting (Lind, 2000).

- Emotional overexcitability: People experiencing an emotional overexcitability have an intensity of feelings, complex emotional responses, and great compassion and empathy (Piechowski, 1991). They may experience existential anxiety and even present with physical symptoms (Piechowski, 1979); consequently, they are often characterized as overreacting (Fonseca, 2015). People with emotional overexcitability may seem shy and self-critical, and may be more at risk for depression (Piechowski, 1979; 1991).

Individuals with overexcitabilities can be misdiagnosed as suffering from a number of pathological disorders, including ADHD and ODD (Amend & Beljan, 2009; Levy & Plucker, 2003). They may also behave in ways that suggest narcissim, obsessive and compulsive disorder, and borderline personality disorder (Dabrowski & Piechowski, 1977; Piechowski, 1991; Piechowski & Cunningham, 1985).

Loneliness

Loneliness is a critical issue for high IQ students, many of who struggle to create connections with peers (Janos, Marwood, & Robinson, 1985). They may feel out of sync, alienated, and even rejected (Coleman & Cross, 1988; Janos, Fung, & Robinson, 1985). High IQ students dealing with loneliness may be frustrated, crave love and recognition, and feel misunderstood, which may increase with the profundity of intellectual giftedness (Kaiser & Berndt, 1985; Peterson, 2006; Webb, 1993). They may attempt to hide their intellect or talents in an attempt to appear more desirable as a friend (Coleman & Cross, 2014; Freeman, 1994, Swiatek, 2001). These issues can be particularly stronger in smaller communities. A study of 52 gifted students in rural Nebraska, for example, found the gifted population scored near the top in terms of loneliness (Woodward & Kalyan-Masih, 1990). The struggle for high IQ individuals to make meaningful connections can be misinterpreted as anti-social personality disorder, and legitimate depression can result from these social struggles (Blaas, 2014; Needham, 2012).

Underachievement

Underachievement is also a concern that some high IQ youth experience (Blaas, 2014; Whitmore, 1986). Underachievement generally refers to gifted students performing below their full potential (Dowdall & Colangelo, 1982; Emerick, 1992; Rimm, 2002). The underachievement may be caused by a number of factors, including poor placement, lack of challenge, a failure to be identified as gifted, and social pressure (Baum, Renzulli, & Hebert, 1995; Reis, 2004; Renzulli, & Hebert, 1995; Robinson, 2002).

Because many characteristics of high IQ youth can be mistaken for disorders, mental health professionals should have knowledge of the differentiating characteristics of intellectually

gifted youth to effectively counsel them (Mendaglio, 2003). The risks of misdiagnosis and overdiagnosis of a child can be mitigated by learning how to nurture the child's developmental needs, thus having a positive effect on intersubjective experiences (Luvmour, 2011). Preparation, then, is the key.

Psychotherapist Preparation for Working with High IQ Youth

The literature suggests that, by and large, neither school counselors nor private practitioners are prepared to counsel high IQ youth. Ford and Harris (1995), in a study on race-based differences on counseling of the intellectually gifted, found that university counselors were generally unprepared to counsel high IQ students, regardless of race. Davis and Rimm (1998) called for better school counselor training on the subject of intellectual giftedness, and Colangelo (2002) said it was important that school counselors were trained in both counseling and gifted education to effectively help high IQ youth. Others have also expressed the need for school counselor training on intellectual giftedness (Betts, 1986; Colangelo & Wood, 2015; Kerr, 1986; Muratori & Smith, 2015; Myers & Pace, 1986; Parker, 1988; Tolbert, 1982).

The needs and characteristics of gifted and talented students is not an acknowledged area of competence in school counselor training (Evans, 1997; Peterson & Morris, 2010). Little training is conducted in the area, with some training simply modified versions of existing counseling training (Peterson, 2006; VanTassel-Baska, 1990). Consequently, school counselors often share misconceptions and stereotypes concerning high IQ students. Kerr (1986) reported that counselors did not believe that high IQ students had issues that needed attending. Consequently, they felt no need for training on the subject of intellectual giftedness. Some studies found that school counselors harbored negative attitudes about high IQ students (Deiulio,

1984; Carlson, Holcomb-McCoy & Miller, 2017). These findings were consistent with the apathy of teachers, administrators, school counselors, and school psychologists mentioned in the Marland report (1972), the first national report on gifted education presented to the United States Congress, which has also been supported by recent research (Troxclair, 2013).

If school counselors appear to be so poorly equipped to deal with high IQ children and adolescents, private practice and institutional counselors and psychologists are likely even less prepared. According to Webb et al. (2005), most mental health care professionals receive no training on the subject of intellectual giftedness and the characteristics associated with high IQ. A review of the literature suggests that no research has presently been conducted to determine the extent to which mental health professionals outside of the school system have educational preparation for addressing issues associated with high IQ youth. This should be a concern because parents are likely to take their high IQ youth to mental health professionals outside the school system when social and emotional problems arise, particularly if they are of a higher socioeconomic status (Lurie, 1974; Turner, 2012).

Research Questions

A holistic understanding of the whole child is important for proper diagnosis. Lack of a full understanding of the abilities and disabilities of the presenting client, coupled with the inclination by mental health professionals to diagnose by perception rather than criteria, increases the likelihood of misdiagnosis (Richman, Ryan, Wilgenbusch, & Millard, 2004). Little empirical research has been conducted to address the possibility of misdiagnosis of high IQ youth, but the research that has been conducted indicates that a lack of knowledge about a client's high IQ can contribute to misdiagnosis (Hartnett et al., 2004; Mullett & Rinn, 2015).

Previous research by Hartnett et al. (2004) and Rinn and Nelson (2009) looked at graduate students studying counseling and pre-service teachers, respectively, and focused solely on the possibility of ADHD misdiagnosis. No research has yet been conducted that looked at professionals currently in practice or that has expanded beyond ADHD misdiagnosis. Therefore, the purpose of this proposed mixed methods study is to explore the possibility of misdiagnosis of high IQ youth by mental health professionals in a clinical environment. This study seeks to answer the following research questions:

> RQ1: What is the likelihood that psychotherapists will recognize and consider characteristics associated with high IQ youth when presented with a high IQ client?
>
> RQ2: Are there differences in the likelihood of identification of high IQ depending upon the type of psychotherapist, whether the presenting issues are behavioral or emotional, years in practice, whether the practice focuses on youth, whether the clinician has had training on intellectual giftedness, and whether assessment options are provided?
>
> RQ3: What is the rationale of the psychotherapists in arriving at their conclusions?

Methods

This study evaluated the likelihood of identification and consideration of high IQ characteristics by mental health clinicians' during clinical decision making involving high IQ youth. Predictive factors included type of practitioner, years of experience, whether the clinician's practice focuses on youth, whether the presenting issues are behavioral or emotional, whether the possibility of high IQ is suggested or not, and whether the clinician has had training for working with high IQ youth. Clinician decision making was assessed using two structured vignettes and an accompanying survey.

The study design called for integration of both quantitative and qualitative measures for a more complete analysis (Teddlie & Tashakkori, 2009). To best simulate the experience of psychological assessment by the participants, and to elicit candid information about the

participants' reasoning, broad, open-ended, qualitative questions were used for half the surveys; to compare whether prompting of the subject of high IQ influences outcomes, quantitative, closed-ended questions with a guided response format were used in the remaining surveys. Additionally, quantitative questions were used to collect demographic information.

Development of Clinical Vignettes

Two clinical vignettes were created that depict hypothetical clients with presenting challenges that reflect the issues high IQ children and adolescents face and with characteristics that are unambiguously consistent with an assessment of high IQ (see Appendix for vignettes). The vignette method of study is an established method of studying diagnostic ability in medical and social science research (Bose & Rossi, 1983; Munday, 2013). Sniderman and Grob (1996) have suggested vignettes accompanied by questionnaire instruments demonstrate both internal and external validity, arguing that they should replace the standard survey. The case vignettes for this study are modeled on the vignettes featured in the *DSM-IV Casebook* (Spitzer, Gibbon, Skodol, Williams, & First, 1994), a collection of vignettes designed to provide diagnostic practice for mental health professionals. Each vignette used in this study illustrates common characteristics of high IQ youth, but characteristics that are believed to be commonly misdiagnosed by psychotherapists (Webb et al., 2005). Tables 1 and 2 provide a comparison of DSM-V criteria and the high IQ characteristics presented in the vignettes. In Vignette One, the presenting issues are behavioral; the hypothetical client is having difficulty concentrating in school, fidgeting, daydreaming and disruptive. He is described as highly intelligent but underachieving. These behaviors commonly associated with high IQ children are similar to symptoms of ADHD and Oppositional Defiant Disorder. In Vignette Two, the presenting issues

are emotional; the hypothetical client reports issues with extreme emotional sensitivity and existential anxiety. She is described as a straight A student who struggles to connect with peers but also prefers time alone with her intellectual or creative pursuits. These characteristics of high IQ youth are similar to symptoms of adjustment and personality disorders. See Tables 1 and 2 for a side-by-side comparison of high IQ characteristics compared to diagnostic criteria for the characteristics and behaviors illustrated in the vignettes. To establish content validity and inter-rater reliability, the vignettes were reviewed and approved by a master's-level counselor, a doctoral-level psychologist with specific expertise in the subject of high IQ and misdiagnosis, and a master's-level educator and educational diagnostician in the field of gifted education.

Table 1

*A Comparison of DSM-V criteria for ADHD and the High IQ Characteristics Presented in Vignette 1**

DSM-V criteria for ADHD	Behaviors Associated with Giftedness
Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort; fails to follow through on instructions, schoolwork, or chores; does not seem to listen when spoken directly (mind seems elsewhere)	Struggles with maintaining concentration due to boredom, daydreams rather than attend; considers schoolwork a waste of time
Impulsivity, poor ability to delay gratification	May be impatient with others
Difficulty waiting for his or her turn; interrupts or intrudes on others;	Disturbs others; interrupts others
Hyperactivity, often fidgets, moves around when inappropriate	High activity level; may fidget or appear restless
Difficulty adhering to rules and regulations	May challenge authority; questions rules, customs, and traditions; may impolitely correct adults; may resist class routines

*Based on information from: American Psychiatric Association (2013); Webb et al. (2005)

Table 2

*A Comparison of DSM-V criteria for Adjustment and Personality Disorders and the High IQ Characteristics Presented in Vignette 2**

DSM-V criteria for Personality Disorders	DSM-V criteria for Adjustment Disorders	Behaviors Associated with Giftedness
Interpersonal hypersensitivity, intense, unstable, and conflicted close relationships (Borderline type)	Emotional symptoms and a disturbance of conduct; marked distress that is out of proportion to the severity or intensity of the stressor	Intense emotional behavior (overexcitabilities)
Rigid perfectionism: insistence on everything being without errors, including one's own performance (Obssessive-Compulsive type)		Perfectionism
	Low mood; tearfulness; feelings of hopelessness; depression and anxiety	Existential depression (overexcitabilities)
Significant impairments in self-identity and interpersonal functioning	Significant impairment in social functioning	Feeling different and wanting to be normal; difficulty making friends; introversion

*Based on information from: American Psychiatric Association (2013); Webb et al. (2005)

Survey Instrument

Each case vignette was accompanied by a mixed-method survey. Mixed-method surveys contain both quantitative and qualitative questions which allow for the efficient acquisition of some data while helping to illuminate aspects of the phenomenon being studied (Teddlie & Tashakkori, 2009). All participants were asked basic demographic questions, as well as type of degree, type of license, number of years in practice, percentage of youth seen in practice, and whether they had specific training for working with high IQ youth (this last question was saved until the end of the survey so as not to bias the responses). To address the primary research question, the questionnaire asked the participant to assess the presenting client in the attached

case vignette. In order to explore whether the suggestion of high IQ influences diagnostic decision making, two versions of the questionnaire was used in this study. Survey A asked for unguided responses to the assessment question. Responses were coded in the following manner: attributed to a disorder, attributed to characteristics of high IQ, or attributed to both high IQ and a disorder. Survey B had specific guidelines that required the participants to choose from a list of three options, which were comprised of the aforementioned codes. Finally, in each version of the survey, the participants were asked to explain their rationale for arriving at their clinical decision.

Participants

A list of 5,000 potential participants was selected from within the United States. Selections and contact information were gathered via public information provided by state licensing boards, the National Board for Certified Counselors, *Psychology Today's* Therapist Directory, and the National Register for Health Service Psychologists. To ensure appropriate randomization, a total of 67,000 potential participants were gathered into a spreadsheet, randomized, and then the first 5,000 in the spreadsheet were retained for the study.

Of the 5,000 email invitations to participate that were sent, 211 were returned as undeliverable. For the remaining invitations, 342 clinicians returned surveys, indicating a crude response rate of 6.8% or a corrected response rate of 7.1%. Twelve responses were eliminated from the sample owing to failure to provide the psychological assessment, yielding a final sample of 330 responses.

Among the 330 responses, 132 were counselors, 76 were psychologists, 67 were social workers, and 55 were marriage and family therapists. With regard to type of survey completed, 154 participants completed the version of the survey that offered no guidelines for assessment;

210 completed the survey with specific assessment guidelines. Further, 169 participants completed the survey based upon the behavioral issues vignette and 161 completed the survey based upon the emotional issues vignette. Table 3 presents information on the characteristics of the participants broken down by vignette/survey combinations.

Table 3

Characteristics of Participants by Survey/Vignette Combination

Characteristics		No guidelines survey with behavioral issues vignette (*n* = 91)	No guidelines survey with emotional issues vignette (*n* = 63)	Specific guidelines survey with behavioral issues vignette (*n* = 78)	Specific guidelines survey with emotional issues vignette (*n* = 98)
Type of License	Counselor	33	32	25	42
	Marriage and Family Therapists	19	10	16	10
	Social Worker	19	8	19	21
	Psychologists	20	13	18	25
Years of Experience	Less than 10 years	51	32	39	50
	10 years or more	40	31	39	48
Focus on Youth	Focused	35	25	32	28
	Not Focused	56	38	46	70
Training on High IQ	Yes	18	16	16	22
	No	73	47	62	76

Survey Process

Invitations to participate in the study were sent out via email with a link to a vignette and an accompanying survey. The version of the vignette and the version of the survey were randomly assigned to the participants. Surveys invitations were sent out in July of 2017 with an incentive to enter to win one of two $50 Amazon gift cards. Participants were given three weeks

to complete the survey. Non-respondents for the first round of emails we sent a reminder after two weeks. Gift card winners were notified and received their gift cards in August.

Statistical Analysis

Classification and regression trees analysis (Breiman et al., 1984), otherwise known as CART, was employed to determine the order of predictive importance of the six independent variables on the psychological assessment. CART is a non-parametric data mining technique frequently used in medical diagnosis studies (Austin et. al, 2013; Lemon et. al, 2003). CART employs recursive partitioning to divide a large heterogeneous dataset into smaller, more homogeneous nodes, based on a target variable, to produce a decision tree. The full sample (or root node) is first analyzed and a dichotomous split is made via the most discriminating variable, maximizing the purity (homogeneity) of the classification. The resulting internal nodes are then analyzed and split based upon the same criteria. The process continues until the resulting terminal nodes are completely homogeneous or certain pre-determined conditions, such as desired tree depth, are met. The CART analysis method was chosen over other types of analyses, such as multivariate logistic regression, because of its ability to classify complex interactions while managing instances of zero frequencies in the dependent variable (Trendowicz & Jeffery, 2014).

Statistical analysis was undertaken using SPSS version 24 and SPSS Modeler version 18.1. For classification trees, the performance of a model is measured in terms of its misclassification error rate through a process of cross validation. The CART model was validated by random partitioning of the dataset into two sets, with 30% (n = 100) going to a testing set and the remainder (n = 230) to a training dataset. The training set was then used to

build the model and the test set was used to measure its performance. To avoid overfitting of the model, the depth of the tree was limited to five levels and the tree was also pruned. Pruning involves removing lower-level splits that do not provide a significant contribution to tree accuracy. Pruning helps simplify the tree, making interpretation easier and can improve generalizability (Lemon et. al, 2003).

Results

Responses to Clinical Vignettes

Table 4 shows the average number of respondents in each survey group who suggested disorder, high IQ, or a combination of both as their psychological assessment of the hypothetical client presented in their vignette. Overall, a judgment of disorder was made in 44.3% of cases, high IQ in 19.4% of cases, and a judgement of both high IQ and disorder in 36.4% of cases.

Table 4

Assessment Percentages by Survey/Vignette Combination

Psychological Assessment	No guidelines survey with behavioral issues vignette (n = 91)	No guidelines survey with emotional issues vignette (n = 63)	Specific guidelines survey with behavioral issues vignette (n = 78)	Specific guidelines survey with emotional issues vignette (n = 98)
Disorder	59.3%	93.6%	7.6%	27.5%
High IQ	25.2%	4.7%	25.6%	18.3%
Disorder and High IQ	15.3%	1.5%	66.6%	54.1%

The results of the CART analysis are shown in Figure 1. The classification variable is presented beneath each node. Sample size and the percentage of participants in each category is listed in each node. The resulting tree ended in 10 terminal nodes. The estimated

misclassification error rate (explained error) was 26.52%, which is comparable with other diagnostic studies utilizing CART analysis (Byeon & Cho, 2016; Lord et. al, 2012; Silvera et. al, 2014), indicating an acceptable model fit.

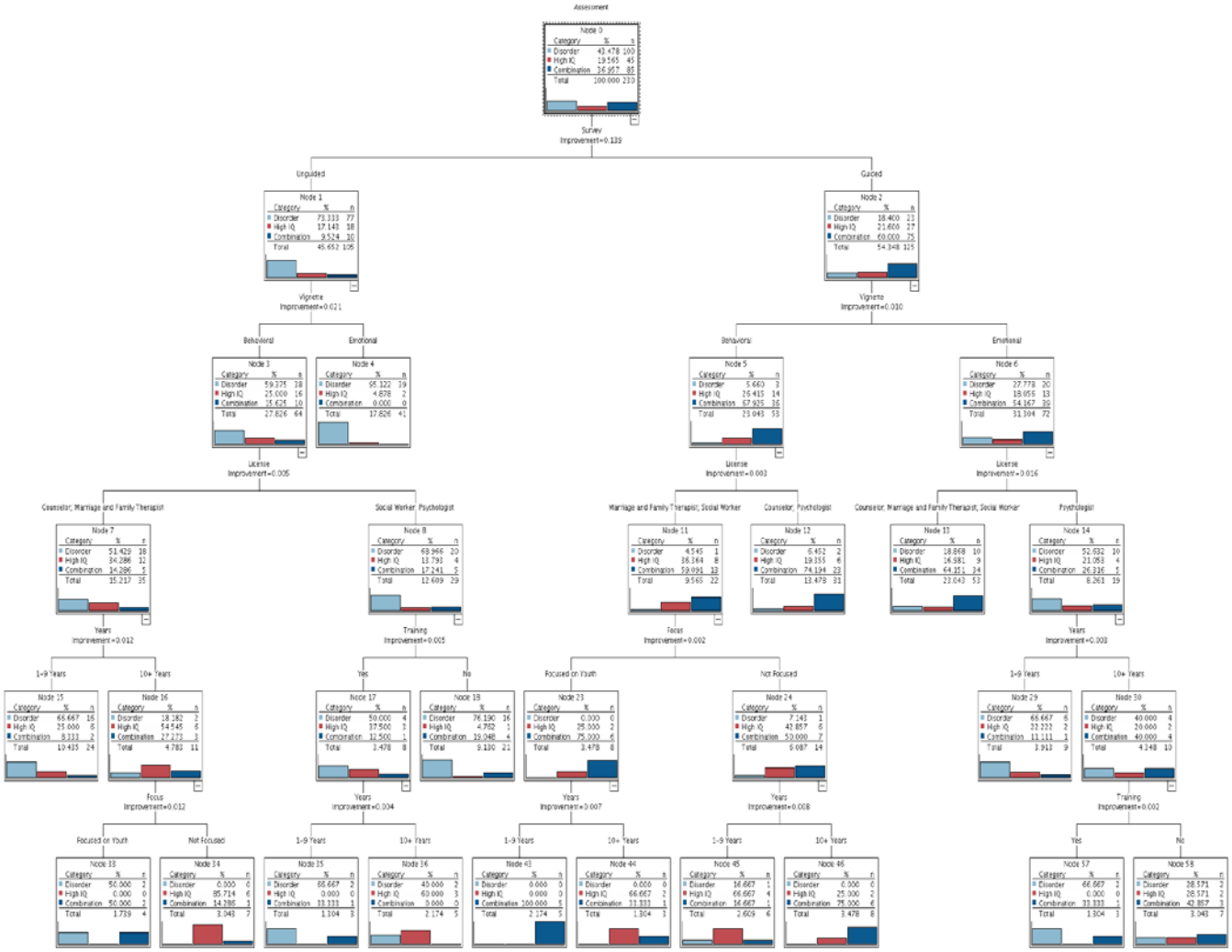

Figure 1. Decision tree produced with classification and regression (CART) analysis. The tree shows the predictors of clinical judgment in order of importance.

A measure of variable importance score was calculated during the CART analysis using the improvement measure of each variable as a primary or surrogate splitter. The total value of the improvements for each node are summed then scaled relative to the best performing variable. According to the model generation, whether the survey was guided (high IQ suggested) or

unguided (no suggestions given) was detected as the most important factor in 59.9% of occasions. Whether the vignette was based on behavioral or emotional issues was the next most important factor, albeit considerably less important, with vignette type being detected as most important in 14.7% of occasions. The type of license of the participant was most important in 13.5% of occasions. The remaining factors were negligible, with focus on youth detected as most important in 6.6% and years of experience in 3% of occasions. Whether or not an individual had training on high IQ had the smallest effect on assessment outcome, viewed as most important in only 2.2% of occasions.

Tree Analysis

As previously stated, type of survey (whether guided or unguided) was the most important predictive factor in assessment outcomes, followed by type of vignette and type of license. In the first split, 73.3% of participants (n = 105) made a judgment of disorder when completing the unguided survey, while 18.4% (n = 125) chose disorder when completing the guided survey. There was only a marginal difference in affirmative high IQ judgments – 17.1% for the unguided survey versus 21.6% for the guided survey. The most prominent difference in clinical decision making was a shift from a majority disorder to a combined high IQ/disorder; the unguided survey yielded 9.5% for the combined type versus 60% for the guided survey.

The next split for each of the survey binary nodes was type of vignette. Under the unguided survey branch, 59.3% of participants (n = 64) rendered a judgment of disorder for the behavioral vignette, 25% attributed it to high IQ, and 15.6% as combined type. For the emotional vignette under the unguided survey branch, 95.1% of participants (n=n = 41) rendered a judgment of disorder and 4.9% attributed presenting issues to high IQ resulting in almost

complete homogeneity and the first terminal node of the tree. Under the guided survey branch, 5.7% of participants (n = 53) rendered a judgment of disorder for the behavioral vignette, 26.4% attributed it to high IQ, and a large majority (67.9%) selected the high IQ/disorder combination. For the emotional vignette under the guided survey branch, 27.7% of participants (n = 72) rendered a judgment of disorder, 18% attributed presenting issues to high IQ, and 54.2% attributed the presenting issues to the combined type.

Tertiary branches broke down across types of license. Under the unguided survey/behavioral vignette branch, license split into a counselor/marriage and family therapist node and a social worker/psychologist node. Under the counselor/marriage and family therapist node, 51.4% of participants (n = 35) made a judgment of disorder, 34.3% attributed it to high IQ, and 14.3% attributed it to a high IQ/disorder combination. There was no split under the emotional vignette branch owing to it terminal at the secondary level. Under the guided survey/behavioral vignette node, license split into marriage and family therapist/social worker and counselor/psychologist nodes. Under the marriage and family therapist/social worker node, 4.5% of participants (n = 22) rendered a judgment of disorder for the behavioral vignette, 36.4% attributed it to high IQ, and 59.1% selected the high IQ/disorder combination. Under the counselor/psychologist node, 6.5% of participants (n = 31) rendered a judgment of disorder for the behavioral vignette, 19.3% attributed it to high IQ, and another large majority (74.2%) selected the high IQ/disorder combination. Under the guided survey/emotional vignette node, license was broken up into counselor/marriage and family therapist/social worker node (n = 53; 18.9% disorder, 17% high IQ, and 64.1% combination) and psychologist node (n = 19; 52.6% disorder, 21.1% high IQ, and 26.3% for combination).

Clinical Reasoning

Qualitative examination of the participants' rationalizations for their assessments was conducted on all 330 observations. Coding for the rationalizations was undertaken using a thematic analysis approach. Thematic analysis is an accessible and theoretically-flexible option for analyzing qualitative data (Braun & Clarke, 2006). According to Braun and Clarke, thematic analysis has a six-phase process. In the first phase, the researchers familiarize themselves with the data, actively reading the data and searching for meaning and patterns. In the second phase, the researchers begin generating initial codes, identifying elements of the data that are of interest and speak to the phenomenon. In phase three, the researchers begin sorting codes into different themes. Those themes are then reviewed in phase four, eliminating, separating, and combining as needed. In phase five, the themes are further revised and the "essence" of the themes defined. In the final phase, the analysis and write-up is completed. To ensure the validity of the thematic coding, two coders were used to develop and integrate the codes. The second coder was a research assistant in a clinical psychology program.

The first theme, proposed explanations for the issues presented in each vignette, was the simplest to define, as it required little coding – participants specifically identified, by name, high IQ or the disorder that they believed explained the issues in the case study vignette. Slight variations in terminology (for example, using the term "gifted" instead of high IQ) required reconciliation. In some cases, the participants gave multiple possible explanations for the issues presented in the vignettes. The first theme was grouped by vignette as the proposed explanations were dependent upon the presenting characteristics of the vignette. The second theme was awareness of high IQ characteristics, which emerged as a theme based upon the explanations of the participants. Many were neutral, however a number of responses gave clues to the

participant's level of awareness of high IQ issues or illustrated common misconceptions. The third theme, novel reasoning, emerged based upon reasoning by a number of participants that was not supported by the details described in the vignettes, suggesting that past experience, bias, or their own imaginations were influencing their recall of vignette details. Conversely, while some participants were adding details, others were suggesting that more information would be required for them to make their best assessment, which comprised the final theme.

The themes that emerged from the participants explanations are described in detail below. Themes that emerged from the qualitative questions help contextualize the results of the clinical assessments provided by participants by giving us more insight into the participants' clinical reasoning and provide further understanding of the depth and complexity of the phenomenon (such as indicating cognitive biases or lack of knowledge regarding high IQ youth).

Proposed Explanations for the Behavioral Issues Vignette

Figure 2 shows the proposed explanations for the hypothetical client's issues in the behavioral issues vignette. For the unguided responses of the behavioral issues vignette, ADHD was referenced as a possible explanation of the client's presenting issues 67 times out of 91 responses, anxiety disorder 34 times, autism or depression 21 times each, mood disorder 17 times, trauma or PTSD (post-traumatic stress disorder) 16 times, and bipolar disorder 13 times. Oppositional defiant, adjustment, and personality disorders were among the less frequent suggested explanations. Although ADHD was overwhelmingly cited as a factor in the behavioral issues of the hypothetical client, intellectual giftedness was a consideration for some clinicians. Intellectual giftedness was mentioned as a possible explanation 29 times. Guided responses on the behavioral vignette included suggestions of ADHD as the proposed explanation 32 times out

of 78 responses, anxiety disorder eight times, and trauma or PTSD six times. Under the guided survey, there were no mentions of bipolar disorder or personality and adjustment disorders. High IQ or intellectual giftedness was suggested 21 times.

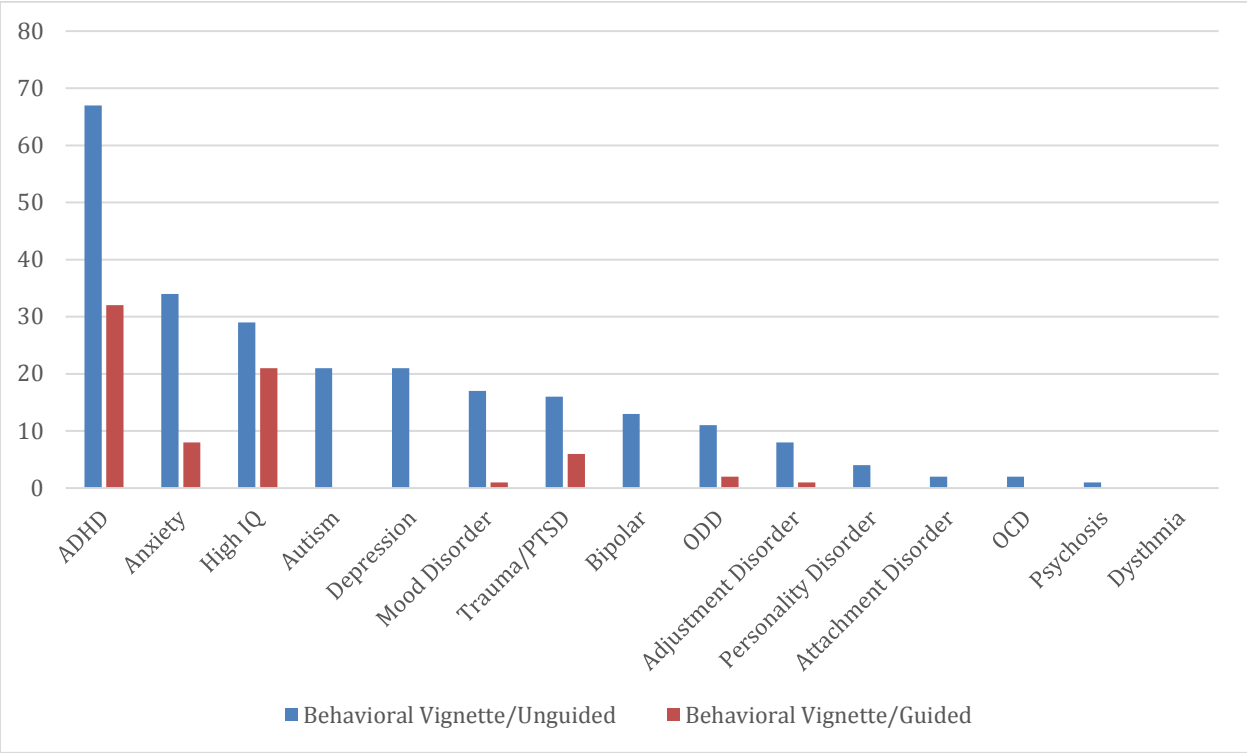

Figure 2. Chart illustrating the proposed explanations for client issues presented in the behavioral-based case vignette. Proposed explanations are organized in order of most frequent to less frequent based upon the unguided survey.

Responses on the unguided survey varied a great deal more than on the guided survey. Perhaps the best summation of the reasoning of the clinicians on the unguided responses could be found in the assessment of one particular clinician: “First thought is ADHD. Second thought is gifted. Third thought is bipolar disorder” (survey response, July 17, 2017).

Proposed Explanations for the Emotional Issues Vignette

Figure 3 shows the proposed explanations for the hypothetical client’s issues in the emotional issues vignette. Among unguided responses on the emotional issues vignette, anxiety

disorder was mentioned as a possible explanation 41 times out of 62 responses, clinical depression was suggested 67 times, trauma or PTSD 23 times, adjustment disorder 18 times, autism 17 times, obsessive compulsive disorder 15 times, and mood disorder 13 times. Intellectual giftedness was mentioned seven times, but only suggested twice as a possible factor. In the other five cases, the clinicians acknowledged that the hypothetical client was intellectually gifted but still reasoned that her issues were stemming strictly from clinical disorders. For the guided responses to the emotional issues vignette, anxiety disorder was referenced as a potential diagnosis 27 times out of 98 responses times, depression 24 times, obsessive compulsive disorder 14 times, and adjustment disorder 12 times. The remaining proposed explanations, including autism, mood, personality, and attachment disorders, were in single digits.

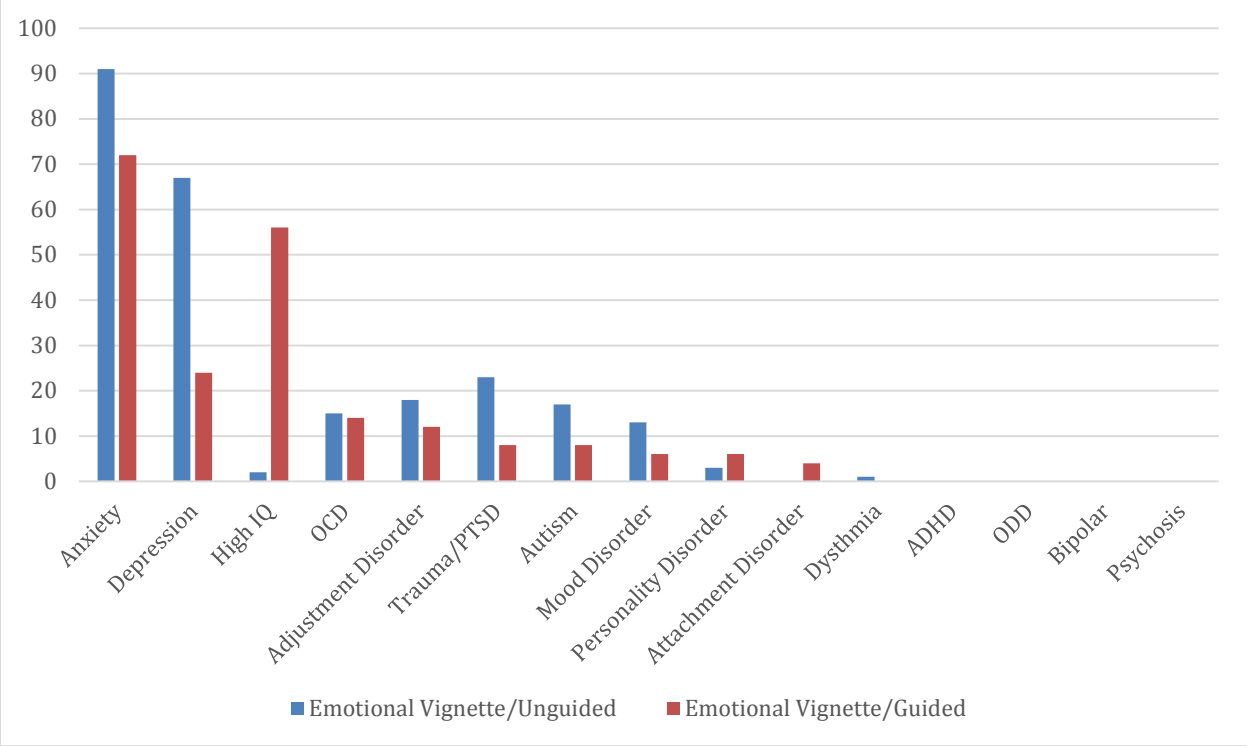

Figure 3. Chart illustrating the proposed explanations for client issues presented in the emotional-based case vignette. Proposed explanations are organized in order of most frequent to less frequent based upon the unguided survey.

Awareness of Issues relating to High IQ Youth

A number of participants dismissed high IQ as a possible explanation for client's issues in the behavioral vignette, citing the boy's unremarkable academic performance. One clinician noted in his rationale: "The main issues are pretty classic ADHD traits. With him being in the 98th percentile, he should be earning excellent grades, but is not" (survey response, July 19, 2107). Nonetheless, several participants demonstrated awareness of high IQ-related traits and their convergence with the characteristics of the hypothetical client. In contradiction to the participant who suggested that the behavioral characteristics were classic symptoms of ADHD, another participant suggested that the hypothetical client showed classic signs of a gifted child. Five participants suggested his behavior was normal for a child of his intelligence; they suggested his problem was academic fit and his issues might be resolved by a differentiated curriculum or academic acceleration. Some cited lack of intellectual stimulation as a contributing factor. Two clinicians even suggested that the hypothetical client may be twice exceptional, a term used in gifted and talented education to refer to a child who is both gifted and has a learning or other disability. Another related, in their rationale for their assessment, a similar experience with a previous client: "I had a client the same age. His parents were divorced and the child's mother was constantly contacting the father because the teachers were frustrated with the child because he was not focused in class. The scenario is almost identical. The child also loved to read. The recommendation was that the child be tested. He was tested and was found to be gifted. It wasn't readily apparent, but the end result was he was tested, moved to the appropriate learning environment, and is thriving" (survey response, August 2, 2017).

Considerably less participants proposed high IQ as an explanation with the emotional issues vignette. As stated previously, only two clinicians proposed high IQ as an explanation

during the unguided survey out of 62. Degrees of knowledge about intellectual giftedness were more apparent in the guided response surveys, with high IQ proposed as at sole or partial explanation 56 out of 99 times. There was noticeably more acknowledgement of the characteristics of high IQ in the participants clinical reasoning; awareness of heightened sensitivities, difficulties connecting to peers, perfectionistic tendencies, and loneliness related to high IQ were indicated by participants. One participant even expressed discomfort at the idea of applying the label of disorder to "pathologize" high IQ. Yet, erroneous assumptions about high IQ youth also remained. One participant, for example, suggested that "Students with high IQ without a disorder such as an anxiety disorder, mood disorder or Asperger's would be happy and socially connected" (survey response, July 19, 2017).

Novel Reasoning

A number of clinicians cited factors that were not present in the vignettes to support their clinical judgment. Concerning the behavioral issues vignette, one clinician suggested that the hypothetical client's behavioral issues were the result of poor vision, despite no mention of vision problems in the vignette. Another suggested that his issues were the result of lack of sleep. A third clinician wrote that it was "probable" that the boy's parents were abusing drugs. One clinician even suggested the boy in the vignette may be psychotic.

There were similar examples of novel reasoning with the emotional issues vignette. In one example in which the participant diagnosed the girl in the emotional vignette with Autism Spectrum Disorder, the clinician cited "rigidity in body and actions" as a diagnostic factor, even though no such physical characteristics were described in the vignette (survey response, July 25, 2017). Another suggested that the girl might be questioning her sexual identity although, again,

no such indications were provided in the vignette and, on the contrary, the vignette described a recent breakup with her boyfriend.

A Need for Additional Information

A number of participants, although willing to provide a diagnosis, suggested that they would customarily require more information not included in the vignette to make a definitive diagnosis, such as family history and physical health history. In total, 47 participants suggested that they would gather more information before making a diagnosis if the client was in their office.

Discussion

In this randomized vignette study we tested the possibility of misdiagnosis of high IQ youth by mental health professionals in a clinical environment. We used CART analysis on data gathered from 330 participants to develop a decision tree to predict the likelihood of a diagnosis of disorder being rendered for high IQ youth experiencing behavioral or emotional issues related to their intelligence. We also examined the stated rationale of the participants in arriving at their clinical judgments to determine what themes and commonalities emerged, as well as develop insight into their depth of knowledge on high IQ characteristics.

A principal finding of this study was that, regardless of whether high IQ is suggested as a possible explanation of the presenting issues of a high IQ youth, mental health clinicians still leaned toward some type of diagnosis of disorder (82.9% for unguided vs. 78.4% for guided, difference 4.5%), whether that diagnosis was solely disorder or a combination of disorder and high IQ. A prompt resulted in little measurable improvement in judgments of solely high IQ

(17.1% unguided vs. 21.6% guided, difference 4.5%). A prompt did, however, result in a large improvement in the combination disorder/high IQ combined assessment (9.5% unguided vs. 60.0% guided, difference 50.5%). This finding indicates that the concern for misdiagnosis of high IQ youth is valid, and that high IQ youth face a substantial risk of being misdiagnosed with a disorder if seeking services from a mental health clinician.

The results of the study also indicate that mental health clinicians appear to be somewhat better informed regarding the intersection of high IQ and characteristics of ADHD than characteristics of emotional disorders and high IQ. While selection of solely high IQ on the behavioral vignette ranged between 17.1% and 21.6% between surveys, only 4.9% choose high IQ on the emotional survey when unprompted; when prompted, the participants choose solely high IQ 18.1% of the time and a combination of high IQ and disorder 54.2% of the time. Therefore, the selection of high IQ as a possible factor in the presenting issues of the high IQ youth featured in the vignette (whether alone or in combination with a disorder) was heavily dependent upon prompting (4% vs. 72.2%, difference 67.3%). Overall, though, mental health clinicians were less likely to recognize characteristics of high IQ or intellectual giftedness in their clinical decision making unless prompted to do so. This is consistent with the findings of Hartnett, Nelson, and Rinn (2004), whose own vignette-based study of graduate school counseling students found that future counselors, too, were less likely to consider characteristics of high IQ if the consideration is not suggested to them.

Why do mental health clinicians fare so much better unprompted with the intersection of ADHD and high IQ? ADHD misdiagnosis and overdiagnosis are subjects that have been given a great deal of media and academic attention (Abramovitch, 2016; Ahmed, & Virani, 2017; Schwarz, 2017), including the risk of high IQ youth being erroneously diagnosed as having

ADHD (Mullett & Rinn, 2015), so this is likely due to a heightened general awareness of the pitfalls of ADHD diagnoses. It may be that emotional characteristics related to high IQ have not had the same level of attention and exposure, nor may there be a general concern for emotional issues and misdiagnosis in a counseling environment. Clinicians may therefore be much more confident and much less cautious about rendering a judgment on issues relating to emotions or mood.

Factors such as years of experience and clinical focus on youth did not appear to make much of a difference in assessment outcomes. Surprisingly, training on high IQ youth appears to show the least amount of predictive importance. This finding may suggest that attitude about high IQ youth is a more important factor than training, or it may suggest that the training that is available is inadequate. However, it is also possible that some participants were overstating their training on the subject or may have faulty recollections that the subject was addressed in their college coursework.

Misconceptions toward high IQ youth was also evident in the reasoning of participants who did not choose high IQ as a factor. For example, a number of participants suggested that intellectual giftedness could not be a factor for the hypothetical child in the behavioral issues vignette because the child's grades were unremarkable. And at least one participant suggested that high IQ youth are always sociable and happy.

Finally, clinicians appeared to project attributes onto the hypothetical clients - attributes that were not included in the vignettes. These projected attributes informed their clinical judgments. Possible reasons for this could be transference of personal experience and perspective or a cognitive bias toward issues and characteristics with which they are most familiar in their clinical practice.

Limitations and Direction for Future Research

An important limitation of this study is that it only explores the possibility of misdiagnosis and not the degree to which misdiagnosis of high IQ youth actually occurs. Although the vignette-based approach to studying diagnostic practice is well established (Machuca, 2017), the vignette does not allow the clinician to make a more extensive inquiry, nor does it capture the subtleties of body language and vocal inflection, which may inform clinical judgment. Additionally, response bias is a concern with any survey (Hainmueller, Hangartner, & Yamamoto, 2015), and respondents may be influenced in their responses by the need to provide socially acceptable answers or to respond in the manner that they believe is desired by the researcher. Should similar studies be conducted in the future, a larger sample size should be sought to improve generalizability and illuminate new avenues of understanding on this issue.

Future research should explore the performance of psychiatrists and pediatricians in similar situations. In addition, the use of video-based case studies may provide further insight into clinician judgment. Clinician attitudes and knowledge regarding high IQ youth should also be explored. A study should be conducted on the educational programs for mental health professionals to develop a better understanding of the depth of their training on high IQ characteristics. Current training for clinicians with regard to high IQ youth and their needs should be reviewed and evaluated for its effectiveness. Finally, the experiences of high IQ youth who have received counseling and their parents should be investigated.

For advocates of high IQ youth, these findings also suggest an effort should be made to get more training on the psychological aspects of high IQ youth included in counseling program curricula. These findings would support the argument for its inclusion. In addition, efforts may be made to develop and market for-credit continuing education classes for mental health

professionals on the subject of high IQ youth and psychosocial issues. That may be the most likely avenue of increasing awareness and developing clinicians who can serve the needs of high IQ youth.

Conclusion

This study used CART analysis on a dataset of mental health clinician survey responses to construct a decision tree that was found to be predictive of clinical decision making with regard to high IQ youth, as well as qualitative thematic analysis which gave greater insight into the participants' clinical reasoning. The findings reveal patterns that support the belief that high IQ youth are at risk of misdiagnosis by mental health clinicians. This study represents a major step forward in the research, and hopefully discussion, on the subject of misdiagnosis and high IQ youth. The results have important implications for advocates seeking to improve the experiences of high IQ youth in counseling environments.

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Appendix 1: ASE Study Vignettes

Vignette 1

David, a 10-year-old boy, is brought into your office for professional assessment and counseling. While he has always been a highly active child since birth, David's parents worry that he is having difficulty concentrating and staying on task in school. David seems to fidget quite a bit in class, and is often caught daydreaming.

David is also disruptive in the classroom, and his teachers are growing increasingly frustrated with him. He demonstrates difficulty in waiting for his turn to speak; he tends to interrupt others and blurt out answers before other students have the opportunity to contribute. And even more concerning, David is growing increasingly defiant, arguing against or even refusing to do tasks in class that he feels are irrelevant, constantly questioning the rules and assignments in the classroom.

David's grades in the class are normal but unremarkable. Although he scored in the 98th percentile on a standardized intelligence test, David maintains an overall B average in his classes.

As you talk to David, he seems preoccupied with the books in your office, asking you about certain titles and their contents. Getting to the issue at hand, you ask David why he doesn't like to perform the tasks in his class. He grows visibly frustrated at the question. He says that the

schoolwork is stupid, absurd, and a repetitive waste of his time. He feels like his teachers are set against him. When you try to press him further on the issue, he returns to the subject of your library, asking you how many books you own and telling you, with some obvious pride, about his own collection.

During the consultation, you note that David is an articulate and somewhat precocious young boy with a full range of affect. He has a pleasant mood and respectful demeanor, and seems to enjoy engaging you in conversation. He claims not to be depressed but did admit to trouble with falling asleep at night, due to the difficulty in turning off the ideas in his head.

Vignette 2

Yvette is a 15-year-old high school student who is brought to your office by her divorced mother for a consultation. Yvette's mother describes her as very smart and a model student, but Yvette is struggling emotionally. Yvette's mother states that Yvette is overly sensitive and cries easily. As a result, her mother and her siblings feel like they have to "walk on eggshells" around Yvette. In addition, Yvette is a perfectionist, and can become very frustrated with herself if she makes less than an A on a class assignment.

Yvette's mother is also concerned about Yvette's pre-occupation with tragedy. She constantly fixates on the notion of suffering and why God would allow it in the world. Neither her mother nor her church pastor can provide her with satisfactory answers. As a result, the family takes extra precautions to shield Yvette from any news or other media involving violence, abuse of children and animals, and the suffering of the poor.

Yvette states that she has a very small social circle - just one really close friend and a few other people she might call acquaintances. She says she feels “different” and has a hard time making friends. But she also says that she is happiest when she is alone, painting or reading.

Yvette recently broke up with boyfriend, and is having a hard time dealing with it. He broke up with her, and she feels abandoned and alone. She blames herself for the loss of the relationship and wishes she could be like “normal” people.

Psychological testing in the school environment indicated she scored in the 98th percentile on an intelligence test and her records indicate that she is an A student. No particular issues have been reported by the school but her teachers, during parent conferences, have commented with concern about her sensitivity and her perfectionism.

In her meeting with you, you note that Yvette is an unusually quiet adolescent who seems shy, offering only an occasional nervous smile. She does not initiate conversation but provides responses when engaged. She is articulate, with an exceptional vocabulary, but seems serious, self-conscious, and hesitant when speaking, choosing her words very carefully. Her demeanor is guarded, and when she spoke of being different, tears noticeably welled up in her eyes.

Appendix 2: Survey Questions

Age (fill in the blank)

1. Race
    a. American Indian or Alaskan Native
    b. Asian
    c. Black or African American
    d. Native Hawaiian or Other Pacific Islander

    e. White
    f. Multi-racial
2. Gender
    a. Male
    b. Female
    c. Other
3. Type of Degree
    a. Ed.D
    b. Psy.D
    c. M.A.
    d. M.S.
    e. Ph.D
    f. Other
4. Type of License
    a. Counselor
    b. Marriage and Family Therapist
    c. Social Worker
    d. Art Therapist
    e. Clinical Psychologist
    f. Counseling Psychologist
5. Number of years in practice (Fill-in-the-blank)
6. What would be your psychological assessment of the client in the attached vignette?
    a. Version #1 - Open-ended response

b. Version #2

i. Client's presenting issues can be attributed to a disorder

ii. Client's presenting issues can be attributed to characteristics of high IQ

iii. Client's presenting issues can be attributed to both high IQ and a disorder

7. Please describe your rationale for arriving at this assessment. (Open Ended)
8. Have you had specific training in working with high IQ youth?

FACTORS THAT MIGHT INFLUENCE DIAGNOSTIC ERROR OF CHILDHOOD DISORDERS IN HIGH IQ YOUTH: A SYSTEMATIC LITERATURE REVIEW

Introduction

> *It is a capital mistake to theorize before you have all the evidence. It biases the judgment.*
>
> Sherlock Holmes

Clinical diagnosis, at its most basic, involves selecting a number of initial hypotheses and using them to guide the collection of data, which suggests the expected findings and shapes the inquiry (Elstein & Schwarz, 2002). The gestalt of the information collected then presents a probability that a given condition exists and informs the diagnostic decision (Swets, Dawes, & Monahan, 2000). Correct diagnosis is extremely important in the counseling process; effective treatment is dependent upon the counselor or psychologist's accurate assessment of the issues and needs of the client, selecting the appropriate interventions, and implementing those interventions during the therapeutic process (Robinson & Halliday, 1987).

Unlike diagnoses of physical health, which are directly typically observable and measurable, mental health diagnoses are constructs created by psychological professionals to characterize and classify psychological phenomena (McKenzie, 1999). Diagnoses are influenced by a number of objective and subjective variables, including standard classifications and the judgment and intuition of the clinician (Swets et al., 2000). While codification and classification of diagnostic criteria helps to make these diagnoses reliable, it also sacrifices validity (Balsis, Segal, & Donahue, 2009; Kendell, 1993). Consequently, diagnostic error, which includes misdiagnosis (a diagnosis arrived at in complete error), overdiagnosis (an accurate but unnecessary diagnosis), and delayed diagnosis (a diagnosis that should have been made earlier), is a constant concern in the counseling environment (Coon, Quinonez, Moyer, & Schroeder,

2014) and can be difficult to identify, particularly because such errors are often the result of multiple causes and can only be identified in hindsight (Norman & Eva, 2010).

Childhood is a particularly delicate time for the human mind. According to Kessler et al. (2005), 50% of all lifetime cases of mental illness begin before the age of 14, and Perou et al. (2016) reports that 13-20% of all children in the United States experience a mental health disorder each year. Mental health issues for youth appear to be on the rise. From 2007-2010, psychotherapy visits for children increased from 2.25 to 3.17 per 100 even as adult visits decreased from 8.37 to 6.36 (Olfson et al., 2014); there was also a 24% increase in inpatient mental health admissions for children during the same period (Health Care Cost Institute, 2012). Perhaps most shocking, it is suggested that at least one in three adolescents will meet the criteria for a mental disorder by age 16 (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003).

Psychiatric disorders are the third most-commonly-misdiagnosed conditions in pediatric practices (Singh et al., 2010), with ADHD being the most frequent diagnosis given to a child (Perou et al., 2016). Yet, according to a recent meta-analysis of five decades of research on the effects of psychological therapy on children, only 63% of youth benefited from treatment (Weisz et al., 2017), while up to 20% of the 2.5 million children diagnosed with ADHD in the United States are misdiagnosed (Elder, 2010). These findings suggest that there is considerable room for improvement in clinical mental health care for youth, including diagnosis. The challenge to effectively meet the needs of youth increases for mental health professionals dealing with atypical clients.

Challenges Associated with High IQ Youth

While some studies suggest that high IQ youth have no more psychological or emotional

issues than their average-ability peers, (Gallucci, 1988; Grossberg & Cornell, 1988; Howard-Hamilton & Franks, 1995; Nail & Evans, 1997; Olszewski-Kubilius, Kukieke, & Krasney, 1988; Parker & Mills, 1996), at least some high IQ youth face psychological challenges complicated by or that are directly the result of their high IQ (Moon, 2003; Moon, Kelly, & Feldhusen, 1997; Piirto, 1992; Robinson & Noble, 1993; Webb, 1993; Webb, Meckstroth, & Tolan, 1982). These high IQ-related issues compound the general issues faced by children (Andreasen, 1988; Silverman, 2013).

Academic issues arising from or compounded by intellectual giftedness include unhealthy perfectionism (Neihart, 1999; Yoo & Moon, 2006), which, according to Silverman (1999), is the characteristic most associated with high IQ. Perfectionism is frequently tied to test anxiety as well as satisfaction and performance in an academic setting (Eum & Rice, 2011; Hanchon, 2010; Miquelon, Stoeber, Feast, & Hayward, 2009; Vansteenkiste et al., 2010). High IQ youth with unhealthy perfectionism tend to hold themselves to impossible-to-achieve standards, demonstrate extreme self-criticism with regard to failure, and avoid activities in which there is a potential of less-than-perfect performance (Flett & Hewitt, 2006; Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991; Pacht, 1984). Another academic issue for high IQ youth is asynchronous development. Described as a defining characteristic of intellectual giftedness (Columbus Group, 1991), this is one of the most common issues for high IQ youth. According to Webb and Latimer (1993), high IQ youth may complete unchallenging work rapidly and spend a large portion of their school day frustrated and bored, waiting for classmates to catch up. Their cognitive development may far outpace their emotional development and maturity level, which can lead to anxiety and an inability to relate to same-age peers (Silverman, 1997). Finally, and perhaps surprisingly, underachievement is an academic issue that is also associated with intellectual

giftedness (Blaas, 2014; Dowdall & Colangelo, 1992; Emerick, 1992; Rimm, 2003; Whitmore, 1986). Underachievement may be caused by a number of factors, including poor placement, lack of challenge, a failure to be identified as high IQ, and social pressure (Baum, Renzulli, & Hebert, 1995; Reis, 2004).

Behavioral issues that may develop with high IQ youth include issues arising from frustration with their environment. High IQ youth may become restless, fidgety, and inattentive in an environment in which they are not intellectually challenged or stimulated (Gallagher, Harradine, & Coleman, 1997; Mullet & Rinn, 2015). Frustrated high IQ youth may also act out with behavioral disruptions, in some cases as the result of stress from the expectations placed upon them by parents and teachers (Hewitt et al., 2002) and, in other cases, due to frustration with undiagnosed learning disabilities masked by their high IQ (Brody & Mills, 1997). In addition, high IQ youth may experience a form of physical intensity associated with psychomotor overexcitabilities (Dabrowski & Piechowski, 1977; Piechowski, 1979, 1991; Piechowski & Cunningham, 1985) that can present very similar to ADHD (Levy & Plucker, 2003). High IQ youth with a psychomotor overexcitability may also be impulsive and competitive (Lind, 2000).

Psychosocial issues relating to high IQ may be present because of a number of factors (Neihart et. al, 2002). Many high IQ youth experience intense loneliness (Janos, Marwood, & Robinson, 1985; Wood, 2010). They may feel isolated, misunderstood, alienated, and struggle to create connections with their peer group (Coleman & Cross, 1988; Fornia, & Frame, 2001; Janos, Fung, & Robinson, 1985; Kaiser & Berndt, 1985). Such feelings may increase with the profundity of their intellectual giftedness (Webb, 1993). High IQ youth may also experience emotional overexcitability, which involves a greater-than-normal intensity of feelings and

complex emotional responses, including great compassion and empathy (Piechowski, 1991). The children may present as too intense, poorly capable of controlling their emotions, immature, and overreactive (Fonseca, 2015). These factors can, whether singularly or cumulatively, create social and emotional challenges in the lives of high IQ youth (Piirto, 1992; Robinson & Noble, 1993; Webb, 1993; Webb, Meckstroth, & Tolan, 1982).

Purpose

Given the challenges, arising from or associated with their intellectual giftedness, that high IQ youth may experience, a number of authors have suggested that high IQ youth are at even greater risk of misdiagnosis in psychological settings than average IQ youth, with the problem characterized as a "possibility" (Hartnett, Nelson, & Rinn, 2004, p. 73), as occurring "often" (Assouline, Nicpon, & Doobay, 2009, p. 93), as a "prevalent phenomenon" (Amend & Beljan, 2009, p. 131), and even as a "modern tragedy" (Webb et al., 2005, p. xix).

The reason most frequently cited for this concern regarding misdiagnosis is that behaviors and characteristics associated with high IQ youth can be mistaken for disorder in a clinical setting (Amend & Beljan, 2009). Experts have suggested that high IQ youth that are subject to diagnostic error in a counseling environment can experience harmful labeling and be subjected to courses of treatment that fail to address their true needs (Hartnett et al., 2004; Roeper, 1996). The concern is so great that the non-profit organization SENG (Serving the Emotional Needs of the Gifted) launched an initiative, directed toward pediatricians, to address the issue of misdiagnosis with high IQ youth (Reducing the Risk of Medical Misdiagnosis, n.d.). The purpose of this review, therefore, is to develop a comprehensive understanding of what

factors may lead to diagnostic error in a counseling environment, in general, and with high IQ youth, specifically.

Method

A systematic literature search was conducted of the electronic databases Ebsco, Academic Search Complete, PsycARTICLES, PsycCRITIQUES, Psychology and Behavioral Sciences Collection, PsycINFO, ERIC, and Google Scholar. Search terms included the following: overdiagnosis mental, misdiagnosis mental, misdiagnosis gifted, misdiagnosis high IQ, overdiagnosis gifted, overdiagnosis psychological, misdiagnosis psychological, misdiagnosis psychiatric, diagnosis accuracy, diagnostic error clinical, diagnostic error psychiatry, and diagnostic bias. In addition, a manual search was conducted for the peer-reviewed journals "Gifted Child Quarterly" and "Roeper Review," both of which focus on gifted and talented studies, and relevant references cited in the full text of included articles were also reviewed and included, as appropriate. The search was limited to the period from 1980 to the present, based upon two factors: (1) Dohrenwend's (1982) estimation of the modern period of psychiatric epidemiology studies since the turn of the twentieth century, the beginning of which coincides with the release of the *Diagnostic and Statistical Manual of Mental Disorders' (DSM)* third volume in 1980, and (b) the beginning of a surge of interest in the social and emotional wellbeing of high IQ youth during the 1980s (Webb, 1993), coinciding with the release of one of the first books on the subject, "Guiding the Gifted Child" (Webb et al., 1982). The initial search returned 323 titles. The following inclusion criteria was applied to the articles: (1) The articles were in English, (2) addressed the cognitive factors influencing the diagnostic process or directly addressed the issues of misdiagnosis or overdiagnosis, or (3) addressed issues concerning the

counseling of high IQ clients. Also included were studies concerning diagnostic error in healthcare fields other than psychology and psychiatry, provided that the research focused on the cognitive factors inherent in misdiagnosis or overdiagnosis. Articles that did not address the cognitive mechanisms involved in the diagnostic process were excluded. Based upon the selection criteria, a total of 67 articles were selected for inclusion.

Data from articles included in this systematic literature review were categorized thematically using a thematic analysis approach (Braun & Clarke, 2006). Thematic analysis is a six-phase process for identifying patterns across data sets in which the researcher becomes familiar with the data, conducts initial coding, develops initial themes, reviews and revises the themes, finalizes themes, and produces a report on the themes. Themes that develop from thematic analysis are specific to the research questions and the phenomenon being studied. In an analysis of the 67 articles selected for inclusion in this study (Table 5), the following thematic areas emerged as factors that might influence diagnostic error: (a) counselor education and preparation; (b) counselor practices and attitudes; (c) heuristics and cognitive biases; and (d) professional and ethical conflicts.

Table 5

Diagnostic Error Causes and Categories

Article	Specific Cause Attributed	Category
Amend & Beljan, 2009	Medication Performance	Counselor Practices and Attitudes
Amend & Beljan, 2009	Lack of knowledge about high IQ characteristics	Counselor Education and Preparation
Amend & Beljan, 2009	Undiagnosed learning disability	Counselor Education and Preparation
Amend & Beljan, 2009	Ties to Drug Companies	Professional and Ethical Conflicts

(table continues)

Table 5 *(cont.)*

Article	Specific Cause Attributed	Category
Balsis et al., 2009	Criterion-based limitations	Counselor Education and Preparation
Baum & Olenchack, 2002	Medication Usage	Counselor Practices and Attitudes
Baum & Olenchack, 2002	Reliance on actuarial instruments	Counselor Practices and Attitudes
Berner & Graber, 2008	Overconfidence	Counselor Practices and Attitudes
Bradford, 2010	Lack of holistic knowledge of client and client's culture	Counselor Education and Preparation
Braun & Cox, 2005	Insurance Reimbursement	Professional and Ethical Conflicts
Brennan et al., 1991	Premature Closure	Counselor Practices and Attitudes
Brinson & Denby, 2008	Lack of holistic knowledge of client and client's culture	Counselor Education and Preparation
Bruchmüller, Margraf, & Schneider, 2012	Failure to consult DSM	Counselor Practices and Attitudes
Casas & Pytluk, 1995	Culture	Counselor Education and Preparation
Cook, 2015	Lack of holistic knowledge of client and client's culture	Counselor Education and Preparation
Coon, Quinonez, Moyer, & Schroeder, 2014	Focus on pathology	Counselor Education and Preparation
Coon, Quinonez, Moyer, & Schroeder, 2014	Ties to Drug Companies	Professional and Ethical Conflicts
Croskerry, 2003	Cognitive Error	Counselor Practices and Attitudes
Croskerry, 2003	Cognitive Biases	Heuristics and Cognitive Biases
Croskerry, 2003	Heuristics	Heuristics and Cognitive Biases
Dabrowski & Piechowski, 1977	Competency in recognizing emotional affect	Counselor Education and Preparation
Dallas & Baron, 1985	Confirmation Bias	Counselor Practices and Attitudes
Davis, Sudlow, & Hotopf, 2016	Categorization	Counselor Education and Preparation
Dawes, 2001	Cognitive Biases	Heuristics and Cognitive Biases

(table continues)

Table 5 *(cont.)*

Article	Specific Cause Attributed	Category
Dawes, Faust, & Meehl, 1989	Subjectivity	Counselor Practices and Attitudes
Dowrick & Frances, 2013	Ties to Drug Companies	Professional and Ethical Conflicts
Dumont & Lecomte, 1987	Cognitive Biases	Heuristics and Cognitive Biases
Dunning, Griffin, Milojkovic, & Ross, 1990	Overconfidence	Counselor Practices and Attitudes
Epley and Gilovich, 2006	Heuristics	Heuristics and Cognitive Biases
Ford & Harris, 1995	Lack of knowledge about high IQ characteristics	Counselor Education and Preparation
Friedlander & Stockman, 1983	Premature Closure	Counselor Practices and Attitudes
Garb, 1998	Cognitive Biases	Heuristics and Cognitive Biases
Graber et al., 2012	Subjectivity	Counselor Practices and Attitudes
Graber, 2005	Poor history taking and bias toward simplicity	Counselor Practices and Attitudes
Graber, 2005	Premature Closure	Counselor Practices and Attitudes
Graber, Franklin, & Gordon, 2005	Cognitive Error	Counselor Practices and Attitudes
Graber, Gordon, & Franklin, 2002	Subjectivity	Counselor Practices and Attitudes
Grove & Meehl, 1996	Subjectivity	Counselor Practices and Attitudes
Guenther, 1995	Lack of knowledge about high IQ characteristics	Counselor Education and Preparation
Hartnett et al., 2004	Reliance on actuarial instruments	Counselor Practices and Attitudes
Hartnett et al., 2004	Focus on pathology	Counselor Education and Preparation
Hartnett et al., 2004	Lack of knowledge about high IQ characteristics	Counselor Education and Preparation
Hartnett et al., 2004	Heuristics	Heuristics and Cognitive Biases
Heckers, 2015	Criterion-based limitations	Counselor Education and Preparation

(table continues)

Table 5 *(cont.)*

Article	Specific Cause Attributed	Category
Hen & Goroshit, 2011	Competency in recognizing emotional affect	Counselor Education and Preparation
Hollon & Kriss, 1984	Heuristics	Heuristics and Cognitive Biases
Hutchison & Gerstein, 2012	Competency in recognizing emotional affect	Counselor Education and Preparation
Iwakabe, Rogan, & Stalikas, 2000	Competency in recognizing emotional affect	Counselor Education and Preparation
LaFramboise & Rowe, 1983	Lack of holistic knowledge of client and culture	Counselor Education and Preparation
Lichtenberg, 1984	Heuristics	Heuristics and Cognitive Biases
Mannarino, Loughran, & Hamilton, 2007	Focus on pathology	Counselor Education and Preparation
McClennan, Culkin, & Courtney, 1994	Premature Closure	Counselor Practices and Attitudes
Mele, 1997	Overconfidence	Counselor Practices and Attitudes
Mendaglio, 2003	Competency in recognizing emotional affect	Counselor Education and Preparation
Morrow, & Deidan, 1992	Heuristics	Heuristics and Cognitive Biases
Morrow, & Deidan, 1992	Focus on pathology	Counselor Education and Preparation
Neal & Grisso, 2014	Cognitive Biases	Heuristics and Cognitive Biases
Pain & Sharpley, 1988	Heuristics	Heuristics and Cognitive Biases
Piechowski & Cunningham, 1985	Competency in recognizing emotional affect	Counselor Education and Preparation
Piechowski, 1991	Competency in recognizing emotional affect	Counselor Education and Preparation
Rabinowitz and Garelik-Wyler, 1999	Overconfidence	Counselor Practices and Attitudes
Sank, 1997	Insurance reimbursement	Professional and Ethical Conflicts
Silverman, 2013	Lack of knowledge about high IQ characteristics	Counselor Education and Preparation
Smith & Agate, 2004	Cognitive Biases	Heuristics and Cognitive Biases

(table continues)

Table 5 *(cont.)*

Article	Specific Cause Attributed	Category
Smith & Agate, 2004	Heuristics	Heuristics and Cognitive Biases
Smith & Agate, 2004	Overconfidence	Counselor Practices and Attitudes
Smith, 1991	Overconfidence	Counselor Practices and Attitudes
Stewart, Brown, Weston, & Freeman, 2003	Lack of holistic knowledge of client and culture	Counselor Education and Preparation
Sue & Morishima, 1982	Lack of holistic knowledge of client and culture	Counselor Education and Preparation
Swets, Dawes, & Monaghan, 2000	Premature Closure	Counselor Practices and Attitudes
Widiger & Trull, 2007	Criterion-based limitations	Counselor Education and Preparation
Widiger & Spitzer, 1991	Cognitive Biases	Heuristics and Cognitive Biases
Wylie, 1995	Insurance reimbursement	Professional and Ethical Conflicts
Young 2013	Criterion-based limitations	Counselor Education and Preparation

Counselor Education and Preparation

General Counselor Education

The emphasis on categorical diagnoses in counselor education can contribute to diagnostic error. Counseling students are taught to rely on artificial categories that may not accurately reflect the issues presented to mental health professionals (Davis, Sudlow, & Hotopf, 2016). The *Diagnostic Manual of Mental Disorders* (2013), or "DSM", which counseling students are taught to regard as the definitive word on mental health (Hansen, 2003), has a number of criterion-based limitations that can contribute to diagnostic error (Heckers, 2015; Young 2013). The DSM was developed in 1952 to provide a categorical system that made diagnosis consistent and provided clear demarcations for disorders (Balsis, Segal, & Donahue,

2009). The process of determining what constitutes a mental disorder in the DSM is determined by a committee of experts, not by scientific research (Thomason, 2014). The first edition of the DSM had 106 diagnoses; the current version, the DSM-V, lists 757 disorders, conditions, or problems (Hagan & Guilmette, 2015). However, categories with binary "yes/no" options oversimplify the reality of the client and diminish content validity (Widiger & Trull, 2007). For a diagnostic criterion to have strong content validity, the different features of the pathology must be weighed appropriately (Balsis et al., 2009). And when a client's symptomology does not fit neatly into a categorization, the DSM allows for a category of "Not Otherwise Specified" that avoids addressing the categorization problem (Balsis et al., 2009).

A more fundamental but related criticism of the DSM is that it's focus is strictly on pathology and disregards non-pathological factors of the individual, like culture, to the detriment of marginalized or underrepresented groups (Mannarino, Loughran, & Hamilton, 2007). Cultural competence, the ability to interact effectively with clients of different cultures and understand the normative behaviors of their cultures, can play a considerable factor in accurate diagnosis (Brinson & Denby, 2008; LaFramboise & Rowe, 1983). Successful bicultural or multicultural counseling is a product of acculturation which involves cultural learning, attitude, and behavioral changes (Casas & Pytluk, 1995). If a mental health professional lacks knowledge of the cultural characteristics of their clients, they may draw the wrong conclusions in their assessments. Mannarino et al. suggest that the DSM fails to consider larger adjustment issues. This issue is not limited to the DSM, as most of the resources available for mental health professionals are oriented toward pathological treatment rather than consideration of social, situational, or environmental factors (Morrow & Deidan, 1992).

Another area in which counselor education appears to be lacking is developing competency in recognizing emotional affect, the ability to accurately assess a presenting client's emotions and intensity (Hen & Goroshit, 2011). The proper identification of a person's emotional intensity is critical to accurate diagnosis, according to Hutchison and Gerstein (2012), who suggested that counselors are not being adequately trained to recognize the emotional intensity of facial expressions. In the study, the authors found that graduate counseling students were no better at recognizing facially expressed emotions than non-psychology undergraduates. In some instances, the non-psychology undergraduates actually performed better than the graduate counseling students. Hutchison and Gerstein also found that ethnicity and culture impacted how the counseling students perceived facially-expressed emotions.

Counselor Preparation for Working with High IQ Youth

Given that high IQ youth may present unusual challenges, it seems appropriate that mental health professionals would have some measure of training for working with the population; however, most graduate psychology programs do not even address the subject of high IQ (Amend & Beljan, 2009). Consequently, mental health professionals tend to have little knowledge about intellectual giftedness and the professional literature, diagnostic tools, instructional approaches, and counseling applications (that form the basis of their clinical worldview) focus strictly on typical development (McLaughlin, 2002). With a focus on typical development, mental health professionals draw conclusions and make diagnoses based upon principles of similarity to the norm without considering additional, relevant factors (Neal & Grisso, 2014). The recollection of the characteristics of large classes, such as typical children, tends to be easier than the recollection of less frequent classes, such as high IQ youth (Neal &

Grisso). Assuming that a high IQ child is part of the typical class of children ignores the child's true group identity, which, in counseling, is determined by a group's shared experience, common values, and emotional and symbolic ties (Smith, 1991). Insensitivity to the unique needs, perspectives, and values of a certain group can lead to systematic diagnostic errors (Sue & Morishima, 1982).

Lack of preparation and lack of knowledge for specifically working with high IQ clients are cited as principal factors in the misdiagnosis of high IQ youth (Ford & Harris, 1995; Hartnett et al., 2004; Silverman, 2013; Webb et al., 2006). Studies have shown that the accuracy of clinical diagnosis is dependent upon the clinician's holistic knowledge of the client or patient (Bradford, 2010; Cook, 2015; Stewart, Brown, Weston, & Freeman, 2003). Failure to recognize a child's intellectual giftedness and the role it can play in his or her presenting issues, or choosing to disregard it, can result in the mental health professional proceeding down an incorrect path of diagnostic inquiry (Amend & Beljan, 2009). An inability to understand atypical emotional attributes, for example, can lead a mental health professional to misinterpret the intensity and meaning of the high IQ client's emotions (Hutchison & Gerstein, 2012). Unprepared for the perceived emotional intensity of the client, the clinician may incorrectly attribute it to distress or to personality and mood disorders such as narcissistic personality disorder, obsessive/compulsive disorder, bipolar disorder, oppositional defiance disorder, and borderline personality disorder (Dabrowski & Piechowski, 1977; Iwakabe, Rogan, & Stalikas, 2000; Mendaglio, 2003; Piechowski, 1991; Piechowski & Cunningham, 1985). This initial misinterpretation based upon assumptions about the high IQ client's affective presentation may negatively influence the therapeutic relationship from the outset (Iwakabe et al., 2000). Additionally, if a child's behaviors are observed as negative, they are even less likely to be

identified as intellectually gifted (Guenther, 1995), and the common use of behavior checklists, which only focus on the expressions of behavior rather than the causes, can increase the risk of misdiagnosis or overdiagnosis (Baum & Olenchack, 2002; Hartnett et al., 2004). Complicating recognition further, high IQ youth may attempt to hide their intellect or talents to appear more relatable or to avoid perceived negative judgment (Freeman, 1994). Such pressure to hide intellectual giftedness may be further heightened by gender and race expectations (Freeman, 1994; Luthar, Zigler, & Goldstein, 1992; Stambaugh & Ford, 2015). Lastly, high IQ youth may have a hidden learning disability, concurrent with their high IQ, which complicates identification as intellectually gifted (Amend & Beljan, 2009).

Counselor Practices and Attitudes

Even with a comprehensive education, a mental health professional's own practices and attitudes may become an impediment to proper diagnosis. Diagnosis is inherently subjective; it begins with how the clinician perceives the presentation of symptoms (Graber, Gordon, & Franklin, 2002), which informs subsequent clinical judgment. Flaws in diagnostic thinking, called cognitive error, are responsible for 74% of diagnostic errors (Graber, Franklin, & Gordon, 2005). The issue of cognitive error has been so problematic that some mental health professionals have advocated for the emphasis of actuarial instruments over clinical judgment, as actuarial instruments are shown to be more accurate (Dawes, Faust, & Meehl, 1989; Graber et al. 2012; Grove & Meehl, 1996). Croskerry (2003) suggests that understanding these cognitive errors in the diagnostic process will help the field of psychology develop solutions to reduce the possibility of diagnostic error.

One of the most common forms of cognitive error for both new and experienced healthcare professionals is premature closure, the tendency to quickly foreclose on initial perceptions of a client without considering other possibilities (Friedlander & Stockman, 1983; Graber, 2005). Such initial impressions can bias the subsequent decisions of a clinician, regardless of new information presented (McClennan, Culkin, & Courtney, 1994). Graber (2005) found that poor history taking and a bias toward a simplistic explanation were correlated with premature closure. Consequently, premature closure frequently results in the correct diagnosis not even being considered (Brennan et al., 1991).

Berner and Graber (2008) suggested that diagnostic error is also a consequence of overconfidence. A study on healthcare professionals and error recall showed that 94% of diagnosticians believe they perform among the top of their professions and that they have difficulty recalling their own errors (Mele, 1997). Specifically regarding counselors, Smith and Agate (2004) suggested that overconfidence is a common struggle for the mental health field, and Rabinowitz and Garelik-Wyler (1999) found that confidence did not correlate with diagnostic accuracy for mental health professionals. Compounding this problem, experienced mental health professionals are also more inclined to make a diagnosis without consulting the DSM (Bruchmüller, Margraf, & Schneider, 2012). Counterintuitively, experience and confidence may make mental health professionals more inclined toward premature closure (Dunning, Griffin, Milojkovic, & Ross, 1990).

Even with some knowledge on the subject, a counselor's attitude toward intellectual giftedness may lead the professional to overlook high IQ as a factor in a client's presenting issues. While some research has indicated a negative attitude toward the intellectually gifted label by mental health professionals (Deiulio, 1984; Robinson, 1986), the mindset is

considerably influenced by the nature of mental health diagnosis itself, which is to diagnose disorder, an abnormality to be remedied (Coon, et al., 2014). Hartnett et al. (2004) found counseling students demonstrated they were more likely to render a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) when presented with vignettes of a child that described characteristics shared by both ADHD and high IQ, demonstrating, once again, the availability heuristic previously mentioned in this article. The mental health professional might be inclined to arrive at a conclusion too soon and before gathering all the necessary information, a diagnostic bias known as premature closure (Swets et al., 2000). Premature closure may be the result of a hurried diagnosis or may be the result of the professional's inability to consider high IQ and gather relevant data (Graber, 2005). In some cases, mental health professionals may also use medication as a diagnostic tool; a client's improved performance on medication may be seen as validation of the clinician's initial judgments (Amend & Beljan, 2009). In such cases, high IQ youth may achieve compliant behavior at the expense of their intellectual giftedness (Baum & Olenchak, 2002).

External evaluations can considerably influence a child and need not be overt to have an effect (Greenspon, 1998). The negative labeling of a disorder stigmatizes high IQ youth, and pervasive negative feedback can be psychologically damaging (Park, Imboden, Park, Hulse, & Unger, 1992). The attitudes of mental health professionals toward the "gifted" label can also have an effect on high IQ youth (Robinson, 1986).

Heuristics and Cognitive Biases

Heuristics and cognitive biases are contributing factors to overconfidence and premature closure (Smith & Agate, 2004). Heuristics are mental operations – cognitive shortcuts – that are

performed in judgment under uncertainty and, while economical, increase the likelihood of diagnostic errors. There are three specific heuristics that influence decision making (Neal & Grisso, 2014). In the first of these, the anchoring and adjustment heuristic, the mental health professional will begin with a most basic conceptualization of the issue, the anchor, and adjust as more knowledge becomes available. According to Epley and Gilovich (2006), the locking in of initial beliefs too early in the diagnostic process creates drag on subsequent adjustments; consequently, these adjustments are often insufficient because the diagnostician tends to close upon a diagnosis prematurely and is reluctant to revise his or her judgment in light of new or contradictory information (Lichtenberg, 1984; Pain & Sharpley, 1988). The second heuristic, the representativeness heuristic, is a decision made based upon frequency or probability. A mental health professional may make a diagnosis based upon the frequency of a disorder in a population, such as the frequency of ADHD among children. According to Morrow and Deidan (1992), this heuristic leads to diagnostic error because mental health professionals may not consider other factors that could influence the presentation of symptoms (Hollon & Kriss, 1984). The third heuristic, the availability heuristic, is the inclination to arrive at judgments that readily come to mind. So, for example, if a mental health professional is most knowledgeable on the subject of Borderline Personality Disorder, for example, they may be more inclined to diagnose a client with that disorder due to its saliency (Morrow & Deidan, 1992). According to Croskerry (2003), this type of heuristic can lead to misdiagnosis, overdiagnosis, and, when a disorder is not often seen, underdiagnosis.

The errors resulting from the aforementioned heuristics are called cognitive biases (Croskerry, 2003). See Table 6 for a list of cognitive biases that can result in diagnostic error. According to Widiger and Spitzer (1991), there are three types of cognitive bias that can lead to

diagnostic error: sampling, assessment, and criterion bias. A sampling bias occurs when the client has significant differences from the representative population (Garb, 1998). Ascertainment bias (the diagnostician's cognitive processes are influenced by prior expectation) and representativeness restraint (ignoring patterns over concerns about the representativeness heuristic) are examples of this type of bias. Errors in information collection that lead to misdiagnosis are known as assessment bias (Dawes, 2001). Diagnosis momentum (the tendency to adhere to a potential diagnosis provided by intermediaries) and the unpacking principle (failure to gather all relevant information in order to make a diagnosis) are examples of this category of cognitive biases. Finally, criterion bias occurs when the criteria for diagnosis is less valid for a particular group (Garb, 1998). Fundamental attribution error (finding clients at fault for their conditions rather than considering the circumstances) and gender bias (determining the probability of a diagnosis based upon gender) may be examples of this category. Cognitive biases are pervasive in diagnostic processing and even seasoned professionals can be influenced by these biases (Dumont & Lecomte, 1987).

Table 6

Types of Cognitive Bias in Clinical Diagnosis

Bias Name	Definition	Consequence
Aggregate Bias	The belief that aggregated data does not apply to a particular client	May lead to errors of commission
Ascertainment Bias	The diagnostician's cognitive processes are influenced by prior expectation	Could lead to stereotyping
Confirmation Bias	The tendency to look for evidence to confirm an existing belief and to ignore evidence that contradicts it	Could result in premature closure and failure to consider all possible answers

(table continues)

Table 6 *(cont.)*

Bias Name	Definition	Consequence
Diagnosis Momentum	The tendency to adhere to a potential diagnosis provided by intermediaries	Other possibilities become excluded
Feedback Sanction	A lack of immediate feedback to indicate that a diagnosis is in error	Misdiagnosis or overdiagnosis may go undiscovered and persist
Framing Effect	How the situation is framed by the client or intermediaries may influence the diagnostic outcome	Incorrect framing will increase the risk that the diagnostician will draw incorrect conclusions about the client
Fundamental Attribution Error	Finding clients at fault for their conditions rather than considering the circumstances	May victimize members of already marginalized groups
Gender Bias	Determining the probability of a diagnosis based upon gender	Overdiagnosis of favored gender and underdiagnosis of the neglected gender
Hindsight Bias	An unrealistic view of events that led up to a diagnostic error based upon knowing the outcome	May compromise learning from the experience and skew the estimation of the diagnostician's abilities
Multiple Alternatives Bias	The tendency to revert to a smaller set of diagnostic options when faced with a multitude of options	Increases the likelihood that the correct diagnosis will not be considered
Omission Bias	The tendency to avoid action for fear of making a mistake	May result in a client's underdiagnosis
Order Effects	The tendency to remember the first and last parts of a case more strongly than the information that they bookend	May fail to consider important diagnostic information
Outcome Bias	The tendency to arrive at diagnoses that will result in positive outcomes	Increases likelihood that a correct but more serious diagnosis could be missed
Overconfidence Bias	The tendency of a diagnostician to believe they know more than they do	Diagnostician may act on incomplete information; places too much emphasis on opinion
Premature Closure	Tendency to arrive at a diagnostic decision before all information has been considered	Diagnostician may miss important information that would support a correct diagnosis
Representativeness Restraint	Ignoring patterns over concerns about the representativeness heuristic	Atypical variants may be missed

(table continues)

Table 6 *(cont.)*

Bias Name	Definition	Consequence
Search Satisfying	The tendency to halt further inquiry once something is found	May miss comorbid or dual diagnoses
Sutton's Slip	The tendency to go for the obvious diagnosis	May not give sufficient consideration to all possibilities
Sunk Costs	The tendency to disregard alternatives the more a diagnostician has invested in a particular diagnosis	Diagnostician may be unwilling to abandon an incorrect diagnosis
Unpacking Principle	Failure to gather all relevant information in order to make a diagnosis	Diagnostician may arrive at incorrect diagnosis based upon poor history taking
Vertical Line Failure	Narrow diagnostic cognition resulting from routine and repetition	Diagnostician may be limited and inflexible during the diagnostic process; may fail to consider the atypical
Visceral Bias	The tendency for emotional reactions to clients to skew clinical judgment	May result in missed diagnoses

Note. Based on information from: Croskerry (2003), Morrow & Deidan (1992)

Professional and Ethical Conflicts

Professional and ethical conflicts can play a role in the misdiagnosis and overdiagnosis of children. This is particularly true when the diagnostician has ties to businesses that profit from mental healthcare, such as the pharmaceutical industry. Drug companies, whose products are used in the treatment of mental health disorders, directly benefit from misdiagnosis and particularly overdiagnosis (Coon et al., 2014; Dowrick & Frances, 2013). The growth of this industry and its influence is staggering. Since the 1990s, psychostimulant use has increased by 700% (LeFever, Arcona, & Antonuccio, 2003) while 75% of panel members responsible for defining the most common diseases had ties to drug companies that directly benefit from the expanded diagnosis of those diseases (Coon et al., 2014). But while that may result in a financial windfall for drug companies, individuals who are overdiagnosed or misdiagnosed do not get the

appropriate treatment that they need and may even be labeled with pathological disorders that they do not truly have (Amend & Beljan, 2009).

Insurance can also provide an ethical challenge. Intellectual giftedness is not a reimbursable mental health condition with any insurer, so even without the temptations provided by the pharmaceutical industry, mental health professionals may still be influenced by the need to be paid. To receive insurance reimbursement, insurance utilization reviews generally require mental health professionals to supply a DSM or ICD-10 (International Classification of Diseases) diagnostic code (Sank, 1997). “Diagnosing for dollars” (Wylie, 1995, p. 22) involves submitting inaccurate mental health diagnoses to insurance companies in order to be reimbursed. This intentional misdiagnosis or overdiagnosis is usually done with the consent of the client or client’s parents, in order to ensure that the client can receive treatment paid for by insurance (Braun & Cox, 2005).

Discussion

The purpose of the current study was to explore the factors that may lead to diagnostic error in a counseling environment, in general, and with high IQ youth, specifically. The research was categorized into themes: (a) counselor training and preparation; (b) counselor practices and attitudes; (c) heuristics and cognitive biases; and (d) professional and ethical conflicts. A review of the literature revealed three findings of note, which will be discussed as follows.

First, there is sufficient research to support the idea that youth, in general, are at risk of diagnostic error (Elder, 2010; Weisz et al., 2017). The evidence indicates that cognitive factors such as heuristics and biases are responsible for the majority of diagnostic errors (Graber, Franklin, & Gordon, 2005). Mental health professionals use a number of heuristic shortcuts to

arrive at their clinical diagnoses that, while economical, can contribute to bias and facilitate diagnostic error (Smith & Agate, 2004). Consequently, clinicians may lock into beliefs too early and fail to consider all evidence or collect all necessary information that may contribute to a client's presenting problems, including high IQ (Graber, 2005). Clinicians are also more inclined to render diagnoses of which they are most familiar, which may influence the treatment that high IQ youth receive (Morrow & Deidan, 1992). In addition, clinicians may wrongly base their judgment on the representativeness of certain indicators in the general population without taking into account the influence that a child's high IQ may have on those indicators (Morrow & Deidan, 1992). However, at least one cognitive bias, aggregate bias (in which a clinician believes that aggregate data does not apply to a specific client), can be potentially favorable to high IQ youth, if the clinicians are then compelled to look beyond representativeness and consider high IQ as a factor (Croskerry, 2003).

Second, while cognitive error represents the lion's share of responsibility for diagnostic error, mental health professionals' training and practices also impact diagnostic accuracy with both the general population and high IQ youth (Brinson & Denby, 2008; Ford & Harris, 1995; Hen & Goroshit, 2011; Hutchison & Gerstein, 2012; Silverman, 2013; Webb et al., 2005). On the whole, mental health professionals do not appear to be prepared to work with high IQ youth (Amend & Beljan, 2009; Hartnett et al., 2004). Training for clinicians on the subject of intellectual giftedness appears to be minimal, if it occurs at all, and some clinicians even hold a negative perspective on the subject of intellectual giftedness (Deiulio, 1984; Robinson, 1986). Additionally, mental health professionals are trained to view presenting issues as disorders to be treated (Coon, et al., 2014; Mannarino et al., 2007) which can prejudice the diagnostic process from the outset, because high IQ youth often seek counseling for help with thoughts, feelings,

and behaviors that may not be maladjusted for their group but can be considered disordered in the context of the general population (Hartnett et al., 2004; Silverman, 2013; Webb et al., 2005). The need to be compensated for services can also pressure the mental health professional to make ethically-questionable diagnoses in order to receive insurance reimbursement (Braun & Cox, 2005). And in some of the most objectionable situations, the clinician may be influenced to arrive at certain diagnoses by ties to the pharmaceutical industry (Amend & Beljan, 2009; Coon et al., 2014).

Finally, over-reliance on the DSM and categorical measures harms high IQ youth. Categorical diagnoses, because they are based upon representativeness in the general population, tend to exclude high IQ from consideration (Mannarino et al., 2007). The failure to consider such important information increases the risk of diagnostic error. A more dimensional system of diagnosis would better capture the unique subtleties of the individual person, rather than lumping them into broad categories that focus solely on the negative aspects of the person's functioning (Mannarino et al., 2007; Widiger & Samuel, 2005). Such an approach toward a more holistic understanding of clients and their presenting symptoms would avoid the issue of representativeness that complicates the diagnostic accuracy with regard to high IQ youth.

More effort needs to be made to educate mental health professionals on the psychosocial issues and potential presenting characteristics of high IQ. Additionally, the existing research demonstrates a need to explore ways to promote self-awareness and reflection among mental health professionals, which is critical for improving diagnostic accuracy. Clinicians must be willing to examine their own biases and be open to the possibility that not every presenting issue is a sign of disorder.

Recommendations for Future Research

This review of the literature revealed a significant lack of research on the subject of high IQ youth and diagnostic error. Most of the supporting evidence mentioned in the literature is anecdotal, beyond a handful of case studies and one vignette study (Baum & Olenchak, 2002; Hartnett et al., 2004). Empirical studies that test the belief that high IQ youth are at risk for misdiagnosis are clearly needed. Future research should consider empirically testing mental health professionals' ability to recognize high IQ, as well as its contribution to a presenting client's issues. Only one study has presently been conducted to examine the ability of counseling students to recognize high IQ (Hartnett et al., 2004), and the focus of that research was ADHD misdiagnosis. None of the research discovered in the review of the literature attempted to test mental health professionals in clinical or private-practice settings. Given the likelihood that the parents of high IQ youth may seek help for their children outside of the school system (Neihart, 1999), empirical research on the ability of licensed, practicing mental health professionals to recognize high IQ in their clients is important research that can be conducted to support the belief that diagnostic error is a concern for high IQ youth.

The attitudes and biases of mental health professionals toward intellectual giftedness is a subject that also needs to be explored in greater depth. No recent studies have been conducted, and perspectives can change over time, especially if the clinicians' general knowledge of intellectual giftedness has evolved. Re-examining such perspectives can suggest whether grass-root efforts to educate mental health professionals about intellectual giftedness have had any success. A related proposed avenue of exploration would be to specifically look at which heuristics and biases are most commonly seen in the diagnostic process with high IQ youth. This could allow for more targeted efforts to address specific biases that may be occurring.

There also needs to be more empirical evidence to support the belief that mental health professionals are not getting appropriate formal training about high IQ. Future research should endeavor to address this gap by exploring the extent to which graduate programs are addressing the subject. Researchers may also consider surveying mental health professionals to ascertain their perspectives on the extent of training they may have received on intellectual giftedness.

Conclusion

Counseling can play an important role in the lives of high IQ youth; under the guidance of the right mental health professional, high IQ youth can develop more self-awareness and navigate the developmental challenges that may be created or complicated by their high IQ. Conversely, under the treatment of a clinician who does not understand intellectual giftedness, lacks the ability to identify it, and is driven to ascribe disorder to every presenting issue, high IQ youth may find their issues unresolved, perhaps worsened, and, quite possibly, multiplied.

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