THE RELATIONSHIP BETWEEN LEVEL OF MATERNAL DISTRESS AND
ADOLESCENT- MOTHER DISCREPANCIES IN REPORTS OF ADOLESCENTS’
INTERNALIZING AND EXTERNALIZING SYMPTOMS

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ABSTRACT

The current study examined the relationship between maternal report and adolescent self-report of adolescents’ internalizing and externalizing symptoms, as well as the extent to which mothers’ own level of distress predicted discrepancies between adolescent self-report and maternal report of adolescent symptoms. A total of 924 biological mother – adolescent dyads served as the study sample. This participant data was drawn from the National Institute of Child Health & Human Development Study of Early Child Care and Youth Development (SECCYD). Adolescent symptoms were assessed using the Achenbach System of Empirically Based Assessment, specifically the Youth Self Report to assess adolescent report, and the Child Behavior Checklist to assess maternal report. Maternal distress was assessed using the Center for Epidemiologic Studies Depression Scale and the State-Trait Anxiety Inventory. Maternal level of distress was determined to predict discrepancy between adolescent self-report and maternal report of both adolescent internalizing and adolescent externalizing symptoms. The relationship between maternal distress and discrepancy did not differ between mother/son and mother/daughter dyads.
LIST OF ABBREVIATIONS AND SYMBOLS

\[ \alpha \] Cronbach’s index of internal consistent

\[ df \] Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data

\[ F \] Fisher’s \( F \) ratio: A ration of two variances

\[ M \] Mean: the sum of a set of measurements divided by the number of measurements in the set

\[ p \] Probability associated with the occurrence under the null hypothesis of a value as extreme or more extreme than the observed value

\[ r \] Pearson product-moment correlation

\[ t \] Computed value of \( t \) test
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CONTENTS

ABSTRACT .................................................................................................................. ii
LIST OF ABBREVIATIONS .................................................................................... iii
ACKNOWLEDGEMENTS ...................................................................................... iv
LIST OF TABLES .................................................................................................... vi
CHAPTER 1: INTRODUCTION .............................................................................. 1
CHAPTER 2: REVIEW OF THE LITERATURE ..................................................... 18
CHAPTER 3: METHODOLOGY ............................................................................. 40
CHAPTER 4: RESULTS .......................................................................................... 65
CHAPTER 5: DISCUSSION AND CONCLUSION ................................................ 101
REFERENCES ....................................................................................................... 126
APPENDICES ........................................................................................................ 141
LIST OF TABLES

1. Descriptive Statistics for Youth Self Report (YSR) Total Raw Scores......................68
2. Descriptive Statistics for Youth Self Report (YSR) Standardized T-Scores.............70
3. Descriptive Statistics for Child Behavior Checklist (CBCL) Total Raw Scores.........71
4. Descriptive Statistics for Child Behavior Checklist (CBCL) Standardized T-Scores.....73
5. Descriptive Statistics for YSR-CBCL Total Raw Score Difference Scores...............74
6. Descriptive Statistics for Center for Epidemiological Studies Depression (CES-D) Scores..................................................................................................................75
7. Descriptive Statistics for State/Trait Anxiety Inventory-State (STAI-S) Scores.......77
8. Intercorrelations Between all Variables.....................................................................79
9. Summary of Regression Analyses for Total CES-D, Total STAI-S, Gender*STAI-S and Gender*CES-D Predicting YSR-CBCL Internalizing Difference Score.....................94
10. Regression Coefficients Between Total CES-D, Total STAI-S, Gender*CES-D, Gender*STAI-S, and YSR-CBCL Internalizing Difference Score.....................................94
11. Summary of Regression Analyses for Total CES-D, Total STAI-S, Gender*CES-D and Gender*STAI-S Predicting YSR-CBCL Externalizing Difference Score.................98
12. Regression Coefficients Between Total CES-D, Total STAI-S, Gender*CES-D, Gender*STAI-S, and YSR-CBCL Externalizing Difference Score.................................98
CHAPTER 1 - INTRODUCTION

The current dissertation study was designed to investigate the relationship between level of maternal distress and the discrepancy between adolescent self-report and maternal report of adolescent symptoms of mental health problems. Low agreement between parent report and adolescent self-report of adolescent emotional and behavioral problems is well-documented, though little is known about factors which contribute to this discrepancy. In the present study, a comprehensive investigation of the relationship between maternal report and adolescent self-report of internalizing and externalizing symptoms of mental health problems guided the identification of specific maternal and adolescent factors which may relate to discrepancy between adolescents’ and mothers’ reporting of adolescent symptoms.

Adolescent symptoms were assessed using the Achenbach System of Empirically Based Assessment, specifically the Youth Self Report to assess adolescent report, and the Child Behavior Checklist to assess maternal report. Maternal level of distress was assessed using the Center for Epidemiologic Studies Depression Scale and the State-Trait Anxiety Inventory-State. Discrepancy between maternal report and adolescent self-report of adolescent symptoms is discussed with relevance to identification of symptoms of adolescent mental health problems access to mental health services for adolescents.

Adolescent Mental Health

Approximately 46.3% of American adolescents will experience clinically significant symptoms of mental health disorders before the age of 18 (Substance Abuse and Mental Health Services Administration, 2009). However, as many as 43% of adolescents with clinically significant levels of symptom expression will not receive treatment (Marianas, He, Brody,
Left untreated, symptoms of mental health disorders in adolescence are associated with declines in academic achievement (Gilman & Alderman, 2006), social skills impairment (Heinrich & Gullone, 2006), increased risk of suicide (Keyes, 2006), and increased risk for the development of severe mental health problems in adulthood (Burke, Hipwell, & Lobber, 2010). Thus, the large need-use discrepancy in the treatment of adolescent mental health disorders is of significant social concern.

Numerous factors have been hypothesized to account for this need-use discrepancy, including financial barriers to treatment, lack of awareness of treatment options, cultural barriers and beliefs regarding mental illness, and social stigma associated with seeking treatment for mental health problems (Kessler, Birnbaum, Bromet, Hwang, Sampson, & Shahly, 2010). One well-documented factor associated with low utilization of mental health services by adolescents is that adolescents are significantly less likely to self-refer to mental health treatment than are adults in need of services (DeLos Reyes, Goodman, Kleiwer, & Reid-Quinones, 2008).

Given the low frequency of adolescent self-referral, adults in close proximity to adolescents often serve as the primary means of referral for and obtaining treatment for adolescents in need of mental health services. However, research consistently shows that parents and teachers are not always accurate reporters of symptoms of mental health disorders in adolescents, especially when adolescents are experiencing significant internalizing distress (e.g. Pearcy, Clopton, & Pope, 2010).

Thus, adolescents may continue to suffer with undetected and untreated symptoms of mental health disorders. Although the low rates of congruence between parental report and adolescent self-report of mental health disorder symptoms are well-documented, less is known about the potential factors contributing to this low congruence.
Prevalence of Symptoms of Mental Health Disorders in Adolescence

Recent epidemiological data from the Substance Abuse and Mental Health Services Administration (2009) suggests that approximately 46.3% of American adolescents are either currently experiencing, or at some point before the age of 18, will experience clinically significant mental health symptoms. However, numerous studies assessing the utilization rates of mental health services by adolescents reveal that as many as 63% of adolescents in need of treatment do not receive services (Kessler et al., 2010). Even more disturbingly, as many as 43% of adolescents with clinically significant symptoms warranting diagnoses for mood disorders do not receive treatment (Merikangas et al., 2010).

Adolescent Use of Mental Health Services

Kessler and colleagues (2010) revealed a significant need-use discrepancy in the field of adolescent mental health treatment, indicating that a large percentage of adolescents in need of services are not receiving necessary treatment. Numerous hypotheses have been presented to explain the wide need-use discrepancy gap among the adolescent population. One of the most commonly documented factor in the research of adolescent mental health service usage is that adolescents in need of mental health treatment, in general, are significantly less likely to self-refer to mental health treatment than are adults in need of services (DeLos Reyes, Goodman, Kleiwer, & Reid-Quinones, 2008).

The pathway of access to services for adolescents often involves symptom identification, recognition of need, and referral to services by an adult (most commonly a teacher or parent) involved in the adolescent’s life (Logan & King, 2001). However, if adults in close proximity to adolescents are unable to detect mental health symptoms and adolescent distress warranting referral for treatment, adolescent is likely to continue to suffer with untreated mental health
symptoms. Unfortunately, research suggests that parents and teachers often fail to detect internalizing symptoms of emotional distress in adolescents (Pearcy, Clopton, & Pope, 2010).

**Prognosis of Untreated Symptoms of Mental Health Disorders in Adolescence**

The fact that many adolescents experiencing mental health symptoms do not receive treatment is particularly troubling due to the well-documented association between adolescent mental health problems and current and future social, cognitive, and emotional functioning (Costello, 2006). Declines in academic achievement (Gilman & Anderman, 2006), social skills impairment (Heinrich & Gullone, 2006), increased risk of suicide (Keyes, 2006), and increased risk for the development of severe mental health problems in adulthood (Burke, Hipwell, & Loeber, 2010) are all documented associations with untreated mental health problems in adolescence. Thus, it is important to examine potential factors serving as barriers to adolescent usage of mental health services in order to proactively reduce the need-use discrepancy and improve access to care when mental health symptoms first present in adolescence.

**Pathways of Referral to Mental Health Services for Adolescents**

**Teachers as a referral source.** For many adolescents, the school often serves as the most easily accessible means of referral for mental health services, as public health initiatives have promoted programs to increase teachers’ awareness of signs of adolescent mental health problems and educate teachers on how to refer adolescents to needed treatment (Individuals with Disabilities Education Act Amendments of 2004). Research about school-based referrals and use of school-based mental health services repeatedly shows that adolescents exhibiting externalizing behavioral symptoms are identified and referred by teachers at significantly higher rates than are adolescents exhibiting internalizing mental health symptoms (Evans, Foa, Gur, & Hendin, 2005; Fergusson, Horwood, Ridder, & Beautris, 2005).
Researchers have suggested that the symptomatic expression of adolescents with mood disorders and internalizing mental health symptoms is not easily identifiable to outside observers, and that the quiet nature of this symptom expression does not prove disruptive to the classroom as do externalizing behavioral problems, thus these adolescents often are not perceived by teachers as needing mental health treatment (Percy, Clopton, & Pope, 2010). These findings indicate that adolescents experiencing significant internal distress are often undetected in the school setting, thus likely to continue to suffer with untreated symptoms. Originally termed the “quietly disturbed” by Ostrov and colleagues (1984), these adolescents have been identified as being at high risk for developing adult pathology (Johnson & Wang, 2008; Lee, 2010). Given the poor prognosis for untreated mental health symptoms, it is important to examine additional pathways of referral to services to determine if these adolescents are being identified by other adult observers who may serve as a useful referral source.

**Mothers as a referral source.** Mothers serve as potentially rich informants regarding the mental health symptoms of their adolescents, as they have unique information of the adolescent’s developmental history, typical behavior, and emotional expression and are familiar with adolescents’ functioning across time and situation (De Los Reyes, Goodman & Kleiwer, 2010). Thus, mothers may be the first to note changes in adolescent behavior and mood which may indicate the presence of mental health symptoms or distress. However, research investigating the relationship between maternal report of adolescent mental health symptoms and adolescent self-report of mental health symptoms consistently documents low inter-rater reliability with regards to internalizing symptoms (Baldwin & Dadds, 2007). Thus, mothers, like teachers, appear to be more reliable in identifying externalizing symptom expression than internalizing symptom expression in adolescents (Collishaw, Goodman, & Ford, 2009). In order to identify ways to
increase maternal detection of mental health symptoms in adolescents, it is important to identify the potential barriers impeding accurate maternal detection.

**Maternal Report of Adolescent Symptoms of Mental Health Disorders**

Researchers interested in the ability of mothers to accurately report on adolescent’s mental health symptoms have examined the relationship between maternal report of adolescent symptoms and adolescent self-report of these same symptoms. Studies examining the discrepancy between these reports reveal that there is generally greater discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms than of adolescent externalizing symptoms (Baldwin & Dadds, 2007; Collishaw et al., 2009; Whitbeck, 2006). Thus, mothers are less likely to detect problems and refer adolescents for treatment when adolescents are experiencing primarily internalizing symptoms than when adolescents are experiencing primarily externalizing symptoms.

**Maternal distress in relation to maternal detection of adolescent symptoms.** Given the findings of discrepancy between maternal report of adolescent symptoms and adolescent self-report of symptoms (Baldwin & Dadds, 2007; Collishaw et al., 2009), it is important to examine the potential factors associated with the relationship between maternal report and adolescent self-report of symptoms. One potential factor influencing maternal detection of adolescent symptoms is a mother’s own psychological distress. A small body of literature has examined mothers’ own distress in relation to a mother’s ability to detect adolescent internalizing symptoms, and results suggest that maternal distress, in particular depression, is associated with impaired ability to detect internalizing symptoms in adolescents who are reporting high levels of distress on self-report measures. Thus, there is greater discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms in mother-adolescent dyads in which the mother is experiencing significant personal distress (Collishaw et al., 2009: Tan & Rey, 2005).
Assessing the relationship between maternal report and child self-report of disruptive behavior, Youngstrom and colleagues found the correlation to be influenced by maternal distress, with mothers experiencing higher levels of personal distress reporting significantly more behavioral problems in their children than did child self-report or third-party trained observers (Youngstrom, Loeber & Stouthamer-Lober, 2000). Thus, mothers experiencing higher levels of personal distress reported significantly more behavioral problems in their children than did child self-report or third-party trained observers. The current dissertation study was designed to further investigate maternal distress factors that may relate to the relationship between maternal report of adolescent symptoms and adolescent self-report of symptoms, and to provide a theoretical conceptualization from which to understand this relationship.

**Adolescent gender in relation to maternal detection of adolescent symptoms.**

Although there is a small body of evidence (e.g. Tan & Rey, 2005; De Los Reyes, Goodman & Kleiwer, 2010) suggesting a relationship between maternal distress and discrepancy between adolescent self-report and maternal report of adolescent symptoms, there currently does not exist any evidence of a potential contribution of adolescent gender to the relationship between maternal distress and reporter discrepancy. Thus, does the relationship between maternal distress and discrepancy between adolescent self-report and maternal report of adolescent symptoms differ in mother/son and mother/daughter dyads?

This is an important question, as several recent studies indicate that adolescent offspring of mothers with symptoms of mental health problems are themselves more likely to experience symptoms of mental health problems than are adolescents whose mothers do not have a history of mental health problems (Foster, Garber, & Durlak, 2008; Garber, Keiley & Martin, 2002; Hammen & Brennan, 2003; Nelson, Hammen, Brennan & Ullman, 2003). Furthermore, research consistently shows that females are more likely to manifest internalizing symptoms of mental
health problems during adolescence, whereas males are more likely to manifest externalizing symptoms (Cohen, Cohen, Kasen & Velez, 1993; Costello et al., 2006; Kuperman, Schlosser, Lidral & Reich, 1999; Ohannessian et al., 2010).

Behavioral learning and attachment theorists have argued that children and adolescents identify more strongly with their same-sex parent (e.g. Liu, 2003; Maccoby, 1994; Thornton et al., 1995), particularly during the adolescent period which is proposed to be a crucial period of gender role saliency (Hill & Lynch, 1983). Additionally, psychodynamic theorists repeatedly demonstrate that same-sex parents are the most critical points of reference for children’s development of social coping and resiliency (Freud, 1949). However, mothers who are experiencing significant distress have been found to be less emotionally available to their adolescents to help the adolescents mitigate stressful life events or effectively cope with negative experiences (Klimes-Dougan, 2002), two skills which are necessary components for healthy resilient development and protective factors from development of affective disorders (Nolen-Hoeksema, 1991).

Thus, the combination of unique genetic, attachment, and behavioral learning factors may suggest a differential relationship between maternal distress and the discrepancy between adolescent self-report and maternal report of adolescent symptoms of mental health problems in mother/son and mother/daughter dyads. The current dissertation study included an exploratory analysis of the potential differential relationship between maternal distress and the discrepancy of adolescent self-report and maternal report of adolescent internalizing and externalizing symptoms among mother/son and mother/daughter dyads.

**Statement of the Problem**

American adolescents are experiencing mental health symptoms at alarmingly high rates, and many of these symptoms remain untreated due to adolescent underutilization of mental
health services. Adolescents as a population are less likely to self-refer to mental health services than are adults in need of treatment; thus, adolescents’ access to services generally involves symptom detection by a teacher or parent. However, internalizing symptoms of adolescent distress, common in mood disorders of adolescence, are significantly less commonly identified by parents and teachers than are externalizing behavioral symptoms. Thus, adolescents with internalizing distress and mood disorders in need of treatment are commonly undetected and continue to suffer in silence, remaining at increased risk for negative prognostic outcomes associated with untreated mental illness in adolescence.

Mothers may serve as a potential source of referral to services for their adolescent sons and daughters, yet research shows that mothers commonly report fewer internalizing symptoms in their adolescents when compared to adolescent self-report of symptoms. In order to identify ways to increase maternal detection of mental health symptoms in adolescents, it is important to identify potential barriers which may contribute to discrepancies between maternal report and adolescent self-report of symptoms. The current dissertation study was designed to examine the relationship between maternal report of adolescent symptoms and adolescent self-report of internalizing and externalizing symptoms, as well as to investigate potential factors associated with discrepancies between reports.

**Purpose of the Dissertation Study**

The current dissertation study was designed to examine an important source of identification of adolescent mental health symptoms and referral to services: maternal report of adolescent symptoms. Maternal report of adolescent symptoms was examined with relation to adolescent self-report of symptoms to determine the relationship between reporters, as well as discrepancies between reports. Thus, “discrepancy” in the current study reflects the extent to
which mothers report or do not report symptoms in their adolescents that the adolescents are endorsing on self-reports. Discrepancies between maternal report and adolescent self-report of internalizing and externalizing symptoms were examined in detail to investigate potential factors related to discrepancy, specifically level of maternal distress and adolescent gender.

This dissertation study utilized data collected as part of the National Institute of Child Health & Human Development Study of Early Child Care and Youth Development (SECCYD). This comprehensive four-phase, multi-site, prospective, longitudinal study was designed to examine the relationships between child development and child care during infancy, early childhood, middle childhood, and middle adolescence. The SECCYD constitutes the most comprehensive study conducted to date of children and the many environments in which they develop. The current dissertation study utilized data from Phase IV of this study, collected during home visits when the youth participants were 15 years of age.

**Hypotheses by Specific Purposes of the Study**

**Research purpose 1.** The first broad research purpose of the dissertation study was to determine the relationship between maternal report and adolescent self-report of adolescent mental health symptoms within the study sample.

**Specific purpose 1a.** Determine the relationship between maternal report and adolescent self-report of adolescent internalizing and externalizing symptoms.

*Hypothesis 1a.i.* The correlation between maternal report and adolescent self-report of adolescent internalizing symptom report will be low, with the criterion of $r < .3$ used to determine a low correlation (Hemphill, 2003).

*Hypothesis 1a.ii.* The correlation between maternal report and adolescent self-report of adolescent externalizing symptom report will be low, with the criterion of $r < .3$ used to determine a low correlation (Hemphill, 2003).
**Specific purpose 1b.** Determine if a significant difference exists between the relationship of maternal report and adolescent self-report of adolescent internalizing symptoms, and the relationship of maternal report and adolescent self-report of externalizing symptoms.

**Hypothesis 1b.** The correlation between maternal report and adolescent self-report of adolescent internalizing symptoms will be lower than the correlation between maternal report and adolescent self-report of adolescent externalizing symptoms.

**Research purpose 2.** The second broad research purpose of the dissertation study is to examine the relationship between self-reported maternal level of distress, adolescent gender, and the discrepancy between adolescent self-report and maternal report of adolescents’ internalizing and externalizing symptoms.

**Specific purpose 2a.** Determine the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of internalizing symptoms in boys and girls.

**Hypothesis 2a.i.** Maternal level of distress will significantly predict the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms.

**Hypothesis 2a.ii.** The relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms in mother/son dyads will be significantly different than the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms in mother/daughter dyads.

**Specific purpose 2b.** Determine the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms.
Hypothesis 2b.i. Maternal level of distress will significantly predict the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms.

Hypothesis 2b.ii. The relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms in mother/son dyads will be significantly different than the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms in mother/daughter dyads.

Significance of the Dissertation Study

The current study is unique in that it is among the first to examine the relationship between level of maternal distress and discrepancy between adolescent self-report and maternal report and adolescent symptoms of mental health problems in a community-based sample. Maternal distress has been found to increase mothers’ sensitivity to externalizing behaviors in young children, which is believed to result in mothers reporting higher levels of symptoms of behavioral disorders in children in comparison to child self-report or third-party reports (Chi & Hinshaw, 2002; Donovan, Leavitt, & Walsh, 1998; Schmidmast, Hall, & Ickes, 2006). Given the developmental progression of the expression of symptoms of mental health problems from primarily externalizing (young children) to internalizing (adolescents), findings of discrepancy in internalizing symptom report may suggest that adolescent mental health problems may be less likely to be detected by mothers due to the internalizing nature of the primary symptom expression.

In addition to clinically significant experiences of Depression, maternal distress more broadly defined has shown to relate to maternal detection of symptoms of mental health problems in children and adolescents (e.g. Lovejoy, Graczyk, O’Hare & Neuman, 2000). Given that subclinical levels of subjective maternal distress are more common among the general
population than are clinically significant mental health disorders, findings of a relationship between maternal distress and discrepancies in maternal report and adolescent self-report of symptoms of mental health problems may have important implication for maternal detection of, and adolescent referral to treatment for, symptoms of mental health problems in adolescence.

Thus, a community-based sample was selected for the current dissertation study, which is among the first to investigate the relationship between maternal distress and discrepancy between adolescent self-report and maternal report of adolescent symptoms in a community (non-clinical) sample. Furthermore, this study is among the first to incorporate a consideration of adolescent gender in the examination of the relationship between maternal distress and discrepancy between adolescent self-report and maternal report of adolescent symptoms.

**Implications for the Practice of School Psychology**

The current dissertation study may provide important implications for the practice of school psychology. First, information about the prevalence and presentation of mental health disorder symptoms in adolescents is useful for school psychologists in designing in-service educational programming for teachers and school personnel to increase awareness of symptoms of mental health problems in adolescents. The current study aimed to determine if adolescents in this large community-based (e.g. non-clinical) sample were experiencing internalizing and externalizing symptoms of distress that were not detected by their mothers. This information can be used by school psychologists to educate teachers and school personnel to better detect symptoms of distress so that adolescents in distress may be more readily identified and referred for treatment through the school-based mental health services.

Increased awareness about the relationship between maternal level of distress and discrepancies in reports of adolescent symptoms is useful in designing parent education materials and developing strong home-school collaboration programs to increase awareness of the signs of
mental illness in adolescents, and to inform parents on how to access services for their adolescents in need. Finally, significant findings of a relationship between maternal distress and undetected adolescent distress may be useful for school psychologists in collaboration with other mental health professionals in providing comprehensive family services or wrap-around service provision for the families of mothers in significant distress.

**Limitations of the Study**

It is important to address potential limitations of the current dissertation study. The current study utilizes an archival dataset of participant data collected in 2007-2008 as part of the National Institute of Child Health & Human Development Study of Early Child Care and Youth Development (SECCYD). Thus, analyses and interpretations utilize data that is four years old. The majority of adolescents in the current study sample reported levels of internalizing and externalizing symptoms that fell within the average/non-clinical range of significance, thus interpretations about the discrepancy between maternal report and adolescent self-report of symptoms may be limited with respect to generalization to samples of adolescent/mother dyads in which adolescents are experiencing significant clinical distress. Furthermore, there was a limited age range of the adolescent participants in the current study (M = 15.38 years, SD=0.30), thus interpretations of the results should be made with consideration of the potentially limited generalization to the full range of ages in the period of adolescence.

However, there currently does not exist in the literature any comprehensive examination of the relationships between maternal distress, adolescent gender, and discrepancies between maternal and adolescent-self report of symptoms. Furthermore, there is no research examining these relationships within a theoretical conceptualization to provide empirical support for the relationships. Finally, there are potentially rich implications for improved education, symptom identification, and service provision in the field of adolescent mental health treatment. Thus, the
author proposes that the potential limitations of the current study are outweighed by the potential positive implications of the study.

**Definition of Key Terms**

**Maternal Distress.** For the purposes of the current study, maternal distress was defined as a subjective experience of psychological distress due to emotional, economic, social or interpersonal factors (Lovejoy, Graczyk, O’Hare, & Neuman, 2000). Maternal distress in the current study was ascertained through maternal self-report of their own level of distress on the State-Trait Anxiety Inventory-State (STAI-S; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) and the Center for Epidemiological Studies- Depression Scale (CES-D; Radloff, 1977), with higher scores on each measure indicating higher symptoms of distress.

**Adolescent Internalizing Symptoms.** Internalizing symptoms include the over-controlled behavioral expression of intrapsychic conflict, in which the individual’s symptoms are subjectively experienced and expressed as internal distress, but which are not generally regarded as disruptive of a larger social system (Costello, Foley & Angold, 2006). Adolescent self-report of internalizing symptoms was measured through adolescent responses on the 31 items loading onto the Internalizing factor scale of the Youth Self Report Age 11-18 Form (YSR; Achenbach & Rescorla, 2001). Maternal report of adolescent internalizing symptoms was measured through maternal responses on the 31 items loading onto the Internalizing factor scale of the Child Behavior Checklist Age 6-18 Form (CBCL; Achenbach & Rescorla, 2001).

**Adolescent Externalizing Symptoms.** Externalizing symptoms are defined as behavioral expressions of intrapsychic conflict that manifest as functional disruptions in a larger social system (e.g. family, school, peer group) and that typically result in interpersonal conflict with peers and adults (Mash & Barkley, 2003). Adolescent self-report of externalizing symptoms was measured through adolescent responses on the 30 items loading onto the Externalizing factor
scale of the Youth Self Report Age 11-18 Form (YSR; Achenbach & Rescorla, 2001). Maternal report of adolescent externalizing symptoms was measured through maternal responses on the 30 items loading onto the Externalizing factor scale of the Child Behavior Checklist Age 6-18 Form (CBCL; Achenbach & Rescorla, 2001).

**Discrepancy.** For the purposes of the dissertation study, discrepancy was defined as the difference between adolescent self-report and maternal report of adolescent symptoms of mental health problems.

**Discrepancy of internalizing symptom report.** Discrepancy between reports of adolescent internalizing symptoms was determined by subtracting the mother’s CBCL Internalizing total raw score from the adolescent’s YSR Internalizing total raw score for each adolescent in the study sample report, yielding the variable YSR-CBCL Internalizing Difference Score. Positive value YSR-CBCL Internalizing Difference scores indicate higher adolescent self-report of internalizing symptoms relative to maternal-report of adolescent internalizing symptoms. Negative value YSR-CBCL Internalizing Difference scores indicate higher maternal-report of adolescent internalizing symptoms relative to adolescent self-report of internalizing symptoms.

**Discrepancy of externalizing symptom report.** Discrepancy between reports of adolescent externalizing symptoms was determined by subtracting the mother’s CBCL Externalizing total raw score from the adolescent’s YSR Externalizing total raw score for each adolescent in the study sample report, yielding the variable YSR-CBCL Externalizing Difference Score. Positive value YSR-CBCL Externalizing Difference scores indicate higher adolescent self-report of externalizing symptoms relative to maternal-report of adolescent externalizing symptoms. Negative value YSR-CBCL Externalizing Difference scores indicate higher maternal-
report of adolescent externalizing symptoms relative to adolescent self-report of externalizing symptoms.
CHAPTER 2 - REVIEW OF THE LITERATURE

Epidemiological data suggests that approximately 21.4% of American adolescents have clinically significant mental health problems that warrant treatment (Merikanges, Burstein, Swanson, Avenevoli, Cui, Benjet, & Georgia, 2010). However, approximately 63% of adolescents in need of treatment do not receive mental health services (Kessler, Birnbaum, Bromet, Hwang, Sampson, & Shahly, 2010). Numerous factors are hypothesized to contribute to this need-use discrepancy, and one consistently documented factor associated with low service use is that adolescents rarely self-refer to mental health treatment (De Los Reyes, Goodman, Kliewer, & Reid-Quinones, 2008; Collishaw, Goodman, & Ford, 2009). Thus, it is crucial that adults in proximity to these adolescents (e.g. parents and teachers) are able to identify symptoms of mental health problems in adolescents and facilitate adolescent access to mental health treatment.

For many adolescents, the school serves as the most easily accessible means of referral to mental health services. However, research on school mental health services reveals that teacher referrals of adolescents for mental health services for externalizing behaviors are significantly greater than are those for internalizing symptoms (Zwaanswik et al., 2003). Thus, adolescents suffering from mental health problems with primarily internalizing symptom expression are often undetected in the school setting, as they do not exhibit problematic behaviors in the classroom. In a seminal study of dichotomous symptom expression, Ostrov and colleagues coined the term “quietly disturbed” to describe these adolescents (Ostrov, Offer & Hartlage, 1984), and this population is repeatedly identified as being at high risk for developing adult pathology (e.g. Pravin-Israel, Thomsen,& Kjell, 2007; Lee, 2010).
Given that the common referral pathway of the school setting is often underutilized for these adolescents, the question arises as to whether the “quietly disturbed” are identified by parents as needing mental health services. Unfortunately, research reveals that parents are often poor reporters of symptoms of internalizing distress in their adolescents (De Los Reyes, Goodman, Kliwer, & Reid-Quinones, 2008; Berg-Nielson, Vika, & Dahl, 2003). The following literature review identifies potential factors impacting mothers’ abilities to detect symptoms of internalizing distress in their adolescent sons and daughters, including mothers’ own psychological distress and the gender of the adolescent. A thorough investigation of factors associated with maternal detection of symptoms of mental health problems in their adolescent sons and daughters is a crucial component in developing parent education materials and programming to increase awareness of the symptoms of adolescent mental health problems as well as the importance of treatment of mental health problems in adolescence.

**Adolescent Mental Health Symptoms**

**Prevalence of Symptoms of Mental Health Disorders in Adolescence**

Epidemiological estimates indicate that approximately 46.3% of American adolescents either currently have, or, at some point between the ages of 13 to 18 will experience, significant symptoms of a mental health disorder (Substance Abuse and Mental Health Services Administration, 2009). At any one time, approximately 21.4% of American adolescents have clinically significant mental health problems that warrant treatment (Merikanges, Burstein, Swanson, Avenevoli, Cui, Benjet, & Georgia, 2010). Specific prevalence rates of depression among adolescents aged 13-18 have been estimated at 7.4% for females and 4.9% for males (Kessler, et. al, 2010).

Unfortunately, a majority of the adolescents in need of mental health services are unlikely to receive treatment (Costello, 2006). Three nationally representative surveys of the use of
mental health services among youth in the late 1990s demonstrated that only 6-8% of youth aged 6-17 in need of treatment received mental health services (Kataoka, Zhang, & Wells, 2002). Current estimates indicate that approximately 63% of adolescents in need of treatment do not receive mental health services (Kessler, Birnbaum, Bromet, Hwang, Sampson, & Shahly, 2010), and that only approximately 43% of adolescents with clinically significant mood disorders receive treatment for their illnesses (Merikangas, He, Brody, Fisher, & Bourdon, 2010).

Prognosis of Untreated Symptoms of Mental Health Disorders in Adolescence

Left untreated, mental health problems of adolescence may cause severe impairment in multiple domains of functioning. Numerous studies have documented the relationship between mental health problems and academic functioning, such that as mental health problems increase, academic achievement declines (Gilman & Anderman, 2006). Studies of interpersonal relationships and social functioning among adolescents with mental health problems consistently show a negative correlation between symptoms and functioning (Heinrich & Gullone, 2006). Chronic psychological distress can lead to foreclosed developmental attainment, limited social network and loneliness, physical health problems, higher levels of stress, and missed educational and occupational opportunities.

In addition to impairment in current functioning, adolescent mental health problems contribute to increased risk for the development of adult pathology (Costello, Foley, & Angold, 2006; Burke, Hipwell, & Loeber, 2010). Many psychological disorders have their roots in adolescence, and if left untreated, have poor prognosis in adulthood. The incidence of depression increases markedly in early adolescence following the onset of puberty (Evans, Foa, Gur, & Hendin, 2005). One notable longitudinal epidemiological study followed approximately 1,000 individuals from age 3 to age 21, assessing mental health at ages 11, 13, 15, 18, and 21. Results indicate that the 1st episode of depression peaks in adolescence (Newman et al., 1996; Newman,
Seventy percent of individuals with major depressive episode at age 21 (N=161) had experienced previous depressive episode(s), and 100% of individuals with dysthymia (N=28) had been previously diagnosed. Thus, for a large majority of young adults with mood disorders, pathology first emerged in adolescence.

Adolescent depression, if left untreated, is a known risk factor for major depressive disorder in adulthood (Walker, 2002). It has been estimated that twenty to forty percent of adolescents with unipolar Major Depression will eventually develop bipolar disorder (Garber et al., 1988), and depressed adolescents are five times more likely to attempt suicide than are healthy peers (Weissman et al., 1999; Keyes, 2006). Recent studies have shown that even a subclinical level of depressed mood in adolescence is a risk factor for the development of adult pathology (Evans, Foa, Gur & Hendin, 2005; Fergusson, Horwood, Ridder, & Beautrais, 2005).

Classification of Adolescent Mental Health Symptoms

Classification of psychopathology historically has been the subject of significant debate (e.g. Zigler & Phillips, 1961; Achenbach & Edelbrock, 1983; Clark, Watson, & Reynolds, 1995). Somewhat more recently, the development of clinically and empirically derived dimensions of internalized and externalized symptoms of psychopathology has become a widely accepted shorthand dichotomy for describing most forms of clinical psychopathology (De Los Reyes & Kazdin, 2005; Costello, Foley, & Angold, 2006).

**Internalizing symptom expression.** Internalizing symptoms include the over-controlled behavioral expression of intrapsychic conflict, in which the individual’s symptoms are subjectively experienced and expressed as internal distress, but which are not generally regarded as disruptive of a larger social system (Costello et al., 2006). A variety of depressive and anxiety disorders are regarded as syndromes predominated by internalizing symptoms.
Externalizing symptom expression. Externalizing symptoms are defined as behavioral expressions of intrapsychic conflict that manifest as functional disruptions in a larger social system (e.g. family, school, peer group) and that typically result in interpersonal conflict with peers and adults (Mash & Barkley, 2003; Achenbach & Edelbrock, 1983; American Psychological Association, 2000). Examples include aggression, antisocial behavior and oppositional-defiant behavior. Externalizing symptoms can also be described as “turning against others” whereas internalizing symptoms are “turning against self” (Zigler & Glick, 1986).

It is important to note that internalizing and externalizing dimensions are not mutually exclusive, and delineation does not imply a distinction between the etiology of problems in each domain. Instead, the distinction between externalizing and internalizing pathology indicates the differential symptom expression of mental health problems (Achenbach, 1991; Achenbach, 2006; APA, 2000). The current dissertation study utilized this dichotomous classification to examine parental identification of adolescent symptom expression.

Adolescent Utilization of Mental Health Resources

Given the prevalence of adolescent mental health disorders and the poor prognostic indication they hold for the development of adult psychopathology, it is essential that adolescents with mental health problems receive treatment. However, reports of service availability and usage indicate that adolescents are one of the most underserved populations in terms of mental health services (Kessler et al., 2010; Zwaanswijk, Van der Ende, Verhaak, Bensing, & Verhulst, 2003).

The Need/Use Discrepancy in Adolescent Mental Health Services

One factor in the discrepancy between need for treatment and receipt for treatment is that adolescents, unlike adults, are unlikely to self-refer to mental health treatment. In a national survey of mental health referrals, Saunders and colleagues (1994) reported that only 23%
clinically referred adolescents had sought help for themselves. Similarly, Verhulst and Van der Ende (1997) found that 209 of 1120 adolescents surveyed scored in the clinically significant range of the Youth Self Report Internalizing Problems scale, however only 7.7% of these adolescents sought treatment for themselves. More recent estimates suggest that fewer than one third of adolescents with major mood disturbances receive treatment, and that low incidence of self-referral is a major contributing factor to the large need-use discrepancy (Collishaw, Goodman & Ford, 2009; De Los Reyes, Goodman, Kliewer, & Reid-Quinones, 2008).

**Development of autonomy in adolescence.** Researchers have hypothesized that the developmentally appropriate striving for autonomy, which occurs during adolescence, increases reluctance to admit need and/or seek professional help (Saunders, Resnick, Hoberman & Blum, 1994; Verhulst & Van der Ende, 1997; Youngstrom, Findling, & Calabrese, 2004; Zwaanswijk et al., 2003). Logan and King (2001) stressed the importance of adult involvement in adolescent mental health service utilization due to the conflicting pursuit of autonomy characteristic of adolescent development. Given the low frequency of self-referral, the most common means of adolescent access to mental health services are via parent and teacher referral.

**Pathways of Referral to Services**

For many adolescents, the school serves as the most easily accessible means of referral to mental health services. Public health initiatives and mental health policies (e.g. Americans with Disabilities Act of 1990; IDEA, 1997; IDEA Amendments 2004) have promoted educational programs aimed at teacher awareness of mental health problems and service availability. However, research on school mental health services reveals that teacher referrals of adolescents for mental health services for externalizing behaviors are significantly greater than are those for internalizing symptoms (Epkins, 1993; Epkins & Meyers, 1994; Verhulst, Koot,& Van der Ende, 1994; Zwaanswik et al., 2003). For example, Stanger and Lewis (1993) found that teacher report
of externalizing behavior was the only significant predictor of adolescent referral to mental health services among ninety-eight adolescents surveyed. Adolescent self-report of internalizing symptoms was not correlated with teacher identification of adolescents in need of mental health services, indicating that teachers are actively referring students with externalizing behavior symptoms, yet not recognizing the presence of internal distress. More recent studies of school-based referrals (Evans, Foa, Gur & Hendin, 2005; Fergusson, Horwood, Ridder, & Beautrais, 2005) consistently show that teachers report significantly more referrals for externalizing behaviors despite indicating beliefs that students with internalizing problems are in need of services (Pearcy, Clopton, & Pope, 2010).

**Referral for externalizing symptom expression.** Adolescents expressing emotional distress via externalizing behaviors are commonly teacher-referred for mental health services, as the behavioral expression of their distress is regarded as disruptive to the classroom environment, and symptoms are readily observable. Individuals who experience emotional distress only through internalizing symptoms are less likely to be identified (e.g. Tarullo & Richardson, 1995). Their symptomatic expression is often not apparent to outside observers, thus, their distress is often undetected. In a seminal study of dichotomous symptom expression, Ostrov and colleagues coined the term “quietly disturbed” to describe these adolescents (Ostrov, Offer & Hartlage, 1984), and this population is repeatedly identified as being at high risk for developing adult pathology (e.g. Garland & Zigler, 1992; Johnson & Wang, 2008; Lee, 2010; Pravin-Israel, Thomsen & Kjell, 2007).

**Referral for internalizing symptom expression.** Depressed mood has been identified as one of the most common internalizing mental health disorders among adolescents, with prevalence studies showing that at any one time between 15 and 20 percent of the child and adolescent population shows some symptoms of depression (Merikanges et al., 2010). Depressed
mood is often considered the best indicator of general psychological distress and is associated with many problems of adolescence (U.S. Department of Health and Human Services, 1999). It is therefore important for adolescents with depressed mood to be identified and referred.

Unfortunately, symptoms of depression such as hopelessness, helplessness, isolation and lethargy suggest that depressed individuals are unlikely to seek help for their illness (Keyes, 2006; Lee, 2010). This phenomenon, in combination with evidence that adolescents in general do not frequently self-refer to mental health services, indicates that adolescents with depression are at high risk of not receiving treatment without being identified and referred by an outside source (i.e. teacher or parent). The concern follows from the evidence of poor prognostic functioning in adulthood if adolescent depression is unidentified and left untreated.

As research shows that these adolescents are frequently undetected and underserved in the schools, the question arises as to whether the “quietly disturbed” are identified by parents as needing mental health services. Are parents, in particular mothers who are more likely to be primary caregivers, able to adequately attend to symptoms of internal distress in adolescents?

Assessment of Mental Health in Adolescence

Mental health disorders in adolescence are most commonly diagnosed through the use of diagnostic screening measures to detect specific symptom expression clusters associated with various mental health disorders (American Psychiatric Association, 2000). The Youth Self Report (Achenbach, 2001) and the Child Behavior Checklist (Achenbach, 2001) are instruments of the Achenbach System of Empirically Based Assessment (ASEBA) commonly used to screen for symptoms of mental health disorders in children and adolescents. The ASEBA represents a diagnostic approach to child and adolescent mental health known as multiaxial empirically based assessment (Achenbach, 2001). The assessment is multiaxial in that it incorporates data obtained from multiple sources (parents, adolescents, teachers, direct observations, etc). The ASEBA is
considered an empirically based class of instruments in that the derivation of scales resulted from multiple factor analytic studies with varied samples. The YSR and CBCL have been used in over 4,000 published studies with translations in 65 languages (Berube & Achenbach, 2002). Reliability and validity have been documented among numerous culturally and ethnically diverse samples (Achenbach, 2006; Achenbach, Dumenci & Rescorla, 2002).

Multi-Axial Assessment as the Gold Standard

A multiaxial (multi-informant, multimethod) approach is now considered the “gold-standard” in child and adolescent mental health assessment (Achenbach, McConaughy & Howell, 1987; Collishaw et al., 2009). The most common reporters are the child or adolescent, parents, and teachers. It is believed that each informant can potentially contribute valuable unique information relevant to the referral problem, as each has exposure to the child or adolescent in different settings. One significant reason for the importance of multiple reporters in assessing child and adolescent pathology is the consistent reporting of low correlation among individual raters. As such, single-source diagnosis is difficult.

In their original meta-analytic review assessing the psychometric properties of the ASEBA measures, Achenbach and colleagues (1987) found that mean correlations among informants were statistically significant, though in the low to moderate range. For example, Achenbach and colleague’s initial meta-analysis of parent-child agreement revealed a correlation of 0.25 between CBCL and YSR scores (Achenbach et al., 1987; Achenbach & Rescorla, 2006). To further explore the nature and potential clinical implications of multiple reporter discrepancies, Achenbach and colleagues examined the relationships between factors such as demographic variables, adolescent problem behavior symptoms, parenting characteristics, parental mood and stress symptoms, and family discord with respect to the strength of correlation between multiple informant ratings (teacher, parent, clinician report) of child
symptomology (e.g. Achenbach, McConaughy & Howell, 1987; Achenbach, Dumenci & Rescorla, 2002). Results consistently show low inter-rater agreement, though empirical evidence supporting any theoretical explanation of the cause of this discrepancy is lacking in the field.

More recent studies have assessed this correlation among various community and clinical samples, and results consistently reveal poor parent-child agreement of child distress (e.g. Seiffge-Krenke & Kollmar, 1998; Berg-Nielson, Vika & Dahl, 2003; Ford, Sayal, Meltzer, & Goodman, 2005; Seiffge-Krenke & Kollmar, 1998; Silberg, Maes & Eaves, 2010; Tan & Rey, 2005). Often the term “accuracy” is utilized in the research literature concerning multiple-reporter discrepancies of child and adolescent symptom report. Specifically, questions arise with regards to which report (teacher, parent, clinician, etc) provides the most “accurate” assessment of the child or adolescent’s present symptom expression. The current dissertation study was concerned not with the “accuracy” of maternal report of adolescent symptomology, but rather the focus was on the degree to which mothers are detecting the subjective distress reported by adolescents, thus able to assist in securing mental health services for the adolescent who is experiencing subjective distress which may warrant treatment.

**Relationship between multiple-informant reports.** Findings of low agreement among multiple reporters have led to debate regarding the accuracy of various reporters. A major obstacle in assessing the empirical validity of informant report is the lack of any sound criterion by which to compare informant reports (Berg-Nielson, Vika & Dahl, 2003; De Los Reyes, Goodman, Kliwer & Reid-Quinones, 2008). Some studies have utilized trained evaluators to obtain objective reports of child behavior, yet this process is costly, time-consuming, and not feasible for diagnostic use in the general population (Achenbach, 2006; Briggs-Gowan, Carter & Schwab-Stone, 1996; Cicchetti & Toth, 1991).
Older children have been found to become more reliable self-informants with age (Collishaw et al., 2009; Edelbrock, 1985; Richters, 1992; Youngstrom et al., 2004). In the original standardization study of the ASEBA, Achenbach and colleagues (1987) demonstrated that, while parents’ reports are more reliable than are children’s for young children, older children are more reliable reporters about their own emotional distress than are their parents, when evaluated for agreement with report from trained observers. Metacognitive abilities (the ability to self-report on one’s own thinking or mental state) and emotional awareness during adolescent development facilitate an increased ability towards self-identification of emotional experiences. Adolescent self-report of emotional problems has become generally accepted as a valid indicator of the distress the adolescent is experiencing, and adolescent self-reports have been found to be both reliable and valid (e.g. Achenbach, 1991; Berg-Nielson et al., 2003; Edelbrock, 1987; Verhulst, Vervuurt-Poot & De Joung, 1989).

Adolescent self-report is believed to be the most accurate source of information regarding internalizing symptoms, as the adolescent is privy to the unique personal experience of his or her own emotions. Assessing agreement of parent or teacher report with adolescent self-report of symptoms has been proposed as a method of evaluating the ability of parents and teachers to detect internalizing symptoms in adolescents (King, Schwab-Stone & Flisher et al., 2001; Tarullo & Richardson, 1995). The current study is concerned not with the “accuracy” of maternal or adolescent report as an objective assessment of adolescent symptom levels, but rather with the implications of maternal-adolescent incongruence itself. It has been suggested that low agreement between parent and adolescent reports is in and of itself a variable of interest that may have clinical significance (Achenbach, 1991). Reporter agreement is often addressed in research of assessment reliability and validity, yet rarely is there mention of the potentially valuable contribution to the discussion of treatment access, utilization, and efficacy.
Factors associated with low relationship between multiple reporters. Of particular interest to the current dissertation study are mother-adolescent dyads in which mothers report significantly fewer adolescent internalizing symptoms relative to adolescents’ self-report. Research has repeatedly shown that adolescents rarely self-refer to mental health services, and that mothers are potentially valuable referral sources, as they are often familiar with their adolescent’s functioning across time and situations (Achenbach, 1991; De Los Reyes, Goodman & Kleiwer, 2010; Edelbrock, Costello Dulcan, Clabro, & Kala, 1986; Kerr & Stattin, 2000; Waters, Brown, & Fitzpatrick, 2003). However, if mothers are not identifying internal distress in their adolescent, the need for services is not likely to be met. The present study addresses the relationship between maternal-report and adolescent self-report to ascertain the degree to which mothers are effectively identifying adolescents’ subjective experience of distress.

Studies examining the relationship between maternal and adolescent report of adolescent distress indicate that discrepancy is generally greater when reporting on internalizing symptoms than when reporting on externalizing symptoms (Collishaw et al., 2009: Rubio-Stipec, Fitzmaurice, Murphy, & Walker, 2003). Edelbrock, Costello, Dulcan, Conover and Kalas evaluated maternal-child report of child symptoms for 299 clinically referred children and adolescents (1986). A total correlation of overall symptom report revealed low mother-child agreement across all symptom scales (r = 0.27 for total symptom report), with significantly lower correlations for internalizing symptom report than for externalizing behaviors. Adolescents reported more internalizing problems than did their mothers, indicating that mothers were less aware of their adolescents’ internal distress. More recent studies have assessed this correlation among various samples, and results consistently reveal poor parent-child agreement of child distress (e.g. Berg-Nielson, Vika & Dahl, 2003; Ford, Sayal, Meltzer, & Goodman, 2005; Seiffge-Krenke & Kollmar, 1998; Silberg, Maes & Eaves, 2010; Tan & Rey, 2005).
Results of a recent prevalence study by Whitbeck and colleagues (2006) revealed differential relationship between maternal report and adolescent self-report on externalizing and internalizing disorders. Whereas youth self-reports of internalizing symptoms were significantly higher than maternal reports (3.0% compared to 1.5% prevalence, respectively), maternal reports of externalizing symptoms was significantly higher than youth self-reports (12.1% and 4% prevalence, respectively). This discrepancy is consistent with repeated findings that mothers are more likely to report externalizing symptoms than internalizing symptoms in their adolescents (Baldwin & Dadds, 2007; Hartung, McCarthy, Milich & Martin, 2005; Hope, Adams, Reynolds, Powers, Perez & Kelley, 1999).

Empirical studies confirm the fact of discrepancy between maternal and adolescent reports, but these findings are generally presented in the absence of any theoretical explanation of the mechanisms through which discrepancy emerges. To better understand theoretical reasons for discrepancy between maternal report and adolescent self-report, we turn to a discussion of the Signal Detection Theory of stimulus perception.

**Signal Detection Theory and Maternal Detection of Child/Adolescent Symptoms**

Signal detection theory was first developed in the 1950’s by Tanner and Swets with the goal of separating sensitivity from bias in perceptual discrimination (Green & Swets, 1966; Macmillan & Creelman, 1991; Swets, Tanner, & Birdsall, 1955). Originally derived from the field of electrical engineering, signal detection theory in psychology is the study of individual’s tendencies to make correct judgments and errors in response to perceptual stimuli. The traditional signal detection study is a discrimination task, in which an individual must determine whether or not a designated stimulus has been presented, by responding “yes” or “no” to each trial. There are four possible response classes in the signal-detection experiment. The first, in which the signal is present and the subject responds “yes”, is called a hit (correct affirmative
response). The second response class, in which a signal is present and the subject responds “no” is called a miss or error of omission (a failure to detect the signal). The response of “no” when a signal is absent is considered a correct negative response. Finally, the response of “yes” in the absence of a signal is called a false positive, or error of commission.

Signal detection theory has been used in various applications to test theories of memory, attention, and categorization (Donovan, Leavitt & Walsh, 1997; Donovan & Leavitt, 1998; Erev, 1998; Siegel, Vukicevic & Spitzer, 1990). An integral concept of signal-detection theory is the idea that “internal noise” (cognitive distraction) interferes with one’s ability to appropriately attend to stimuli. An individual’s cognitive capacity is not infinite, therefore any cognitive activity unrelated to the detection of the target stimulus is believed to reduce cognitive capacity and hinder performance in detection tasks (Balakrishnan & Ratcliff, 1996; Gold, Sekuler & Bennett, 2004; Green & Swets, 1966). Signal detection theory has been adopted by medical researchers to examine symptom detection and diagnostic accuracy (Siegel, Vukicevic, Elliott & Kraemer, 1989). One common implementation is in the evaluation of tumor detection by x-ray technicians. In these studies, internal noise is operationalized through cognitive distraction of x-ray technicians. Thus, with increased cognitive load, significantly more “misses” are documented, as internal noise impairs accurate detection.

Signal detection theories of cognitive noise interference are common in social psychology research examining satisfaction in interpersonal relationships and efficacy of group decision-making. For example, Schmidmast, Hall, and Ickes, (2006) conducted a study of hierarchies in interpersonal relationships in which individuals’ pre-existing conceptions of the relative strength of study confederates served as cognitive noise interfering with the ability to accurately detect assertions of power by these confederates. The study of group decision-making tasks has also employed signal detection theory to determine the impact of differential cognitive
distraction upon group members’ tendencies to defer to predetermined group decisions as opposed to personally evaluating available evidence. For example, when informed of a group decision in which contradictory evidence was readily available to the subject, subjects under conditions of induced cognitive distraction repeatedly failed to detect the contradictory evidence and vote to change the group decision (Hinsz, 1990).

**Signal Detection Theory in Maternal-Child Interactions**

Drawing upon signal detection theory to examine the relationship between maternal depressed mood and attentiveness to infant distress, Donovan and colleagues assessed emotional distress in fifty-five mothers of newborns, and found that higher levels of depressed mood predicted a decreased ability to discriminate small differences in infant’s cries (Donovan, Leavitt & Walsh, 1998). In this study, maternal distress served as cognitive noise interfering with the mother’s signal detection abilities. Though distressed mothers were more likely to express irritation at the sound of the infants’ cries (externalizing symptom expression), they were less able to attend to subtle differences in the infants’ cries. The authors propose that characteristic cognitive sequelae of depressed mood, including decreased emotional energy, distractibility, negative self-talk and perceived helplessness, resulted in less cognitive capacity available to process their infant’s signals. Specifically, they were not able to discern subtle differences in the infant’s cry which mothers in the control group perceived as indicative of differential infant need. As a result, the psychologically distressed mothers were less able to appropriately respond to the infant’s distress. It is important to note that mothers rated as mildly depressed performed similarly to mothers diagnosed with major depressive disorder on the signal detection tasks (Bettes, 1998; Donovan & Leavitt, 1989). This suggests it is important to consider sub-clinical levels of parental distress, as the cognitive sequelae of such distress may interfere with detection of child symptoms.
Expanding upon the infant research, subsequent studies have examined the relationship between maternal distress and detection of behavior problems in school-aged children. Assessing the relationship between maternal report and child self-report of disruptive behavior, Youngstrom and colleagues found the correlation to be influenced by maternal distress, as consistent with the findings of Donovan, et al. (Chi & Hinshaw, 2002; Youngstrom, Loeber & Stouthamer-Lober, 2000). Thus, mothers experiencing higher levels of personal distress reported significantly more behavioral problems in their children than did child self-report or third-party trained observers.

Experiencing increased levels of distress impaired mothers’ accurate detection of deviant behavior by lowering the threshold of behavioral tolerance. Specifically, mothers committed more errors of “false positives” in reporting normal child behaviors as deviant. In each of these studies, signal detection theory was employed to evaluate the mothers’ ability to accurately report on externalizing symptoms of distress (i.e. infant cries, child behavioral problems). Similarly, Schmidt and colleagues (2006) found that distressed mothers reported normative adolescent behaviors as clinically significant externalizing behaviors, whereas non-distressed mothers reported these same behaviors as normative. Externalizing symptoms are classified as “strong signals” due to their overt nature and ease of detection by outside observers. Results of these studies show that maternal distress serves as cognitive noise which leaves mothers with less cognitive energy to tolerate children’s behavior.

Utilizing signal detection theory as a conceptual framework for evaluating maternal report of their child’s externalizing symptoms of distress raises the question as to whether or not the same impaired detection will emerge with relation to internalizing symptoms. Internalizing symptoms are considered “weak signals” within the conceptualization of signal detection theory, as these symptoms are generally covert and do not directly impact others (Donovan, Leavitt &
Walsh, 1998). Drawing upon work from medical diagnostic studies, it is predicted that internal noise will interfere with the detection of the relatively more subtle internalizing symptoms.

Whereas maternal distress is believed to lower the tolerance threshold for externalizing symptoms, the cognitive interference should lower the detection sensitivity for internalizing symptoms. In the original signal detection terms proposed by Tanner and Swets, maternal distress serves as internal noise which will increase the rate of “false positives” in detection of externalizing symptoms while concurrently increasing the rate of “misses” in detection of internalizing symptoms. This differential impact is attributed to the relatively stronger signal strength of externalizing behaviors.

Maternal distress serves as cognitive noise. A small body of literature has examined mothers’ own mental health problems in relation to their report of their child’s internalizing symptoms. The most commonly addressed variable in these studies is maternal depression, and findings repeatedly indicate that maternal depression is correlated with discrepancy between parent-child reports of child problems (Jensen, Rubio-Stipec, Canino, Bird, Dulcan & Schwab-Stone, 1999; Rickard, Forehand, Wells, Greist & McMahon, 1981; Tan & Rey, 2005). This is an important area of research because it has been repeatedly documented that children of mothers with mental health disorders are themselves at increased risk for pathological development. It follows, then, that children at high biological risk for pathological development are also at increased risk for suffering with internal distress that goes undetected by their mothers.

Though heritable disposition for mental illness is an inherent risk factor (APA, 2000), family environment has been shown to either buffer or incubate symptom expression (e.g. Patterson, 1982). Research on family comorbidity has shown that the mechanisms through which maternal distress impacts children are mainly through family discord and interference with parenting function (Beardslee & Wheelock, 1994; Downey & Coyne, 1990; Rutter, 1990; Tan &
Rey, 2005). For example, depressed mothers have been found to show more sustained negative affect (Cohn et al., 1990), use more verbal aggression, criticism and negativism (Gordon et al., 1989), which decreased the quality of the parent-child relationship. In addition, Beardslee & Podorefsy (1988) documented poor quality and quantity of communication between depressed parents and their children. Results of such studies are often interpreted as indicative of increased risk for pathology among children of emotionally distressed mothers.

It is interesting that few researchers have addressed the possibility of maternal distress impeding the early detection and treatment of youth symptoms of mental health disorders. The combined risks of increased disposition for pathology and decreased maternal attention to the adolescent’s emotional symptoms increase the probability of untreated mental disorders. It is important to determine the factors that may impact maternal recognition of adolescent distress and to identify their role in treatment access.

Weissman, Orvaschel, and Padain (1987) evaluated mother-child agreement of problem behaviors among a group of children whose mothers were diagnosed with depression. Findings indicated that these children reported significantly more internalizing problems than their mothers reported about them, indicating that mothers were not aware of the child’s internal distress. Numerous studies have demonstrated a relationship between maternal depression and low agreement between parent-report and child self-report of children’s mental health problems (Briggs-Gowan, Carter & Schwab-Stone, 1996; Collishaw et al., 2009; Rubio-Stipec et al., 2003; Youngstrom et al., 2000).

In addition to the impact of maternal depression, researchers have begun to examine the impact of maternal distress more broadly defined. This includes the experience of various social, economic, emotional and interpersonal problems that can interfere with the parent’s ability to adequately attend to their child’s symptoms of emotional distress (Lovejoy, Graczyk, O’Hare &
Neuman, 2000). In addition to clinical cases of depression, mothers with mildly depressed mood (Bettes, 1998) and those with subjective experiences of psychological distress (Zuckerman & Beardslee, 1987) have been found to be less attentive to signs of their child’s emotional distress. As subclinical levels of depressed mood and subjective experience of psychological distress are much more prevalent in the general population than is the clinical syndrome of depression, it is important that we begin to examine these factors in relation to parental detection of adolescent distress.

Though research has demonstrated a significant relationship between maternal self-report of distress and discrepancy in maternal report and adolescent self-report of behavioral symptoms, few studies have examined the relationship between maternal distress and the congruence of maternal and adolescent report of adolescent internalizing symptoms. It is important to determine factors impeding maternal identification of adolescent distress, as this knowledge may be useful in directing educational interventions to increase maternal awareness.

Potential Gender Differences in the Relationship Between Maternal Report and Adolescent Self-Report of Symptoms of Mental Health Problems

Attachment theorists have long stressed the important role of close and supportive mother-child relationships in children’s psychosocial development (e.g. Ainsworth et al., 1978; Bowlby, 1958). Healthy maternal-child attachments lay the foundation for lifelong internal working models of not only social functioning, but also healthy coping and resiliency (Black, 2002; Freeman & Brown, 2001; Ohannessian et al., 2010). In contrast, lack of maternal involvement, support, engagement and emotional warmth, have been shown to precipitate depressed mood in adolescents (Diego et al., 2003; Lewinsohn et al., 2003). Additionally, mothers who are emotionally unavailable to their adolescents are not able to help the adolescents mitigate stressful life events or effectively cope with negative experiences or trauma (Klimes-
Dougan, 2002), two skills which are necessary components for healthy resilient development and protective factors from development of affective disorders (Nolen-Hoeksema, 1991).

Several recent studies indicate that adolescent offspring of depressed women show both more internalizing problems and more externalizing problems than do adolescents whose mothers do not have a history of depression (Foster, Garber, & Durlak, 2008; Garber, Keiley & Martin, 2002; Hammen & Brennan, 2003; Nelson, Hammen, Brennan & Ullman, 2003). Given the crucial importance healthy attachments and emotionally supportive parenting, and the characteristic isolation and emotional withdrawal associated with maternal distress, it is possible that children and adolescents of emotionally distressed mothers are at increased risk for developing poor emotional coping skills. In fact, significant associations between low parental affect, poor attachment, and adolescent depressed mood are consistently reported in epidemiological studies of adolescent psychopathology (Collishaw et al., 2009; Essan 2004; Hartos & Power, 2000; Ohannessian et al., 2010).

**Gender Differences in the Expression of Symptoms of Mental Health Disorders**

Research consistently shows that females are more likely to develop internalizing symptomology during adolescence, whereas males are more likely to manifest externalizing symptoms (Cohen, Cohen, Kasen & Velez, 1993; Costello et al., 2006; Kuperman, Schlosser, Lidral & Reich, 1999; Ohannessian et al., 2010). Given that females consistently manifest more internalizing symptoms, they are more likely to fall into Ostrov’s group of the “quietly disturbed” thus be less frequently identified as in need of services in the schools. Given the higher rates of depression in female adolescents (Costello et al., 2006), in combination with the genetic and behavioral learning risk factors of emotional disorders, it stands to reason that female adolescents of distressed mothers are at unique risk of suffering undetected internalizing distress. Thus, a conceptualization of the relationship between adolescent gender and maternal detection
of symptoms within the tenets of gender difference theories would support a hypothesis that daughters of distressed mothers are more likely to suffer symptoms of mental health disorders that may be undetected by outside observers due to the common internalizing nature of symptom expression in adolescent females.

Gender Identification Theory and the Relationship to Maternal Detection

Behavior modeling and attachment theorists have argued that children and adolescents identify more strongly with their same-sex parent (e.g. Liu, 2003; Maccoby, 1994; Thornton et al., 1995). Additionally, psychodynamic theorists repeatedly demonstrate that same-sex parents are the most critical points of reference for children’s development of social coping and resiliency (Freud, 1949). The theory of “gender-role intensification” during adolescence (Hill & Lynch, 1983) argues that adolescence is a crucial period of saliency of social gender roles during which modeling of same-sex parent increases, including a modeling of coping and resiliency.

In addition to the social and behavioral-learning risk factors associated with maternal depression placing adolescent females at increased risk for affective disorders, biological and genetic components of mental illness are repeatedly documented risk factors for children and youth of depressed mothers (Aalto-Setala et al., 2002; Beardslee et al., 1996; Kovacs, 1996; National Institute of Mental Health, 2009). Some estimates contend that children of depressed mothers are six times more likely to be diagnosed with Major Depressive Disorder as adults than are children of non-depressed mothers (Downey & Coyne, 1990). The genetic risk factor likely places female adolescents of depressed mothers at increased risk of pathological emotional development (Jacobson & Rowe, 1999). Thus, adolescent females of distressed mothers may be at increased risk for developing negative coping, poor resilience and subsequent psychological distress due to the “perfect storm” of genetic, behavioral, and attachment risk factors associated with maternal depression.
Maternal projection onto same-gendered offspring. Whereas gender difference theories of symptom expression may support the hypothesis that symptoms of mental health disorders in adolescent females may be less likely to be detected by mothers experiencing personal distress, gender identification theories may contradict this hypothesis. Specifically, psychoanalytic theories of gender identification (e.g. Freud, 1987; Gabbard, 2010; Semeonoff, 1987) may provide support for a competing hypothesis in which distressed mothers will be more likely to endorse symptoms of mental health disorders in their daughters than in their sons due to the increased identification with same-gendered offspring and potential projection of maternal distress symptoms onto the same-gendered offspring. In this conceptualization, one can hypothesize that distressed mothers may indeed endorse more symptoms in their daughters than in their sons due to projection of the mother’s own symptoms of distress onto same-gendered offspring.

To date, there are no published reports of studies examining the potential differential relationship between maternal distress and discrepancies in adolescent self-report and maternal report of adolescent symptoms among mother/son and mother daughter dyads. Though an empirical test of these theoretical constructs was beyond the scope of the dissertation study, the current dissertation study included an examination of potential differences in the relationship between maternal distress and the discrepancy of adolescent self-report and maternal report of internalizing and externalizing symptoms among mother/son and mother/daughter dyads.
CHAPTER 3 - METHODOLOGY

The following sections outline the methodology of the dissertation study. First, the author presents a synopsis of the The National Institute of Child Health and Development (NICHD) Study of Early Child Care and Youth Development (SECCYD). The current dissertation study utilized data from Phase IV of this comprehensive study of child and adolescent development. This four-phase, multi-site, prospective, longitudinal study was designed to examine the relationships between child development and child care during infancy, early childhood, middle childhood, and middle adolescence. The SECCYD constitutes the most comprehensive study conducted to date of children and the many environments in which they develop. Following the SECCYD synopsis, a detailed description of the purposes and procedures for the current dissertation project are presented.

NICHD SECCYD Project

Purposes and Research Questions

The Study of Early Child Care and Youth Development (SECCYD) is comprehensive longitudinal study initiated by the NICHD. This four-phase, multi-site, prospective, longitudinal study was designed to examine the relationships between child development and child care during infancy, early childhood, middle childhood, and middle adolescence.

Methods

Setting. A diverse community-based sample of children and their families at 10 locations across the United States participated in the NICHD-SECCYD. Participants were recruited in 1991 from 10 research Universities in distinct geographic locations across the continental United States: The University of Arkansas (Little Rock, AR); The University of California at Irvine
Participants. During 24-hour recruitment windows, all women giving birth in the selected hospitals affiliated with each partnering University were screened for eligibility and willingness to participate. Of the 8,986 mothers who gave birth, 60% agreed to be contacted and met eligibility requirements (mother over 18, spoke English, healthy baby, not multiple birth or released for adoption, living within 1 hr of study site, moving from the area not planned in the next year, neighborhood not too dangerous to visit). Of eligible mothers, a sample of 3,015 was selected for a phone call according to a conditional random sampling plan that ensured that the recruited families reflected economic, educational, geographic and ethnic diversity. After the phone call, an additional 1,490 participants were excluded because of poor infant health, new plans to leave the area, or inability to contact after three phone calls. Ultimately, 1,364 mothers completed a home interview at 1 month and became part of Phase I of the study (United States Department of Health and Human Services, 2010).

SECCYD Longitudinal Study Procedures. Infants and their mothers participating in Phase I of the SECCYD study were seen in the laboratory and in their homes repeatedly from the time the child was 1 month of age until the child’s third birthday. Data during this phase of the study were collected by NICHD contributing research personnel using multiple methods: standardized observations of the child or the mother and child and interviews and questionnaires for the mothers. Primary research purposes during this initial phase focused on the identification of demographic and family characteristics associated with different patterns of child care use, as well as describing the variety, stability, and changes in children’s non-maternal child care
experiences over time. Phase II data collection occurred when the children were age 54 months through entering 1\textsuperscript{st} grade. During this second phase of data collection, research personnel again conducted home-visits and laboratory assessments with subjects recruited during the initial participant recruitment in 1991. The primary research goals during this second phase centered on the identification of the links between characteristics of early child-care experiences and the adaptive development of the child participants. Phase III data collection, conducted during the children’s 3\textsuperscript{rd} and 4\textsuperscript{th} grade years, involved one home visit and one laboratory visit. Child social and emotional adjustment was the primary focus of Phase III data collection, and was assessed through parental report and observational data collection by research personnel.

Finally, Phase IV data collection occurred during 2007-2008 when child participants were in the 9\textsuperscript{th} grade (approximately 15 years of age). Data collection during this final phase of the SECCYD study involved a home visit and a laboratory visit. However, the home visit during Phase IV data collection is the only time over the course of the longitudinal study at which adolescent self-report data was collected. Thus, the Phase IV home visit serves as the source of the data to be used in the proposed dissertation study.

**Purposes of the Dissertation Study**

The current dissertation study utilized Phase IV of the NICHD SECCYD and was designed to examine the relationships between maternal distress, adolescent gender, and the discrepancy between maternal report and adolescent self-report of symptoms of mental health disorder. Specific purposes of the study included: to determine the prevalence of self-reported mental health disorder symptoms among the study sample, including a differentiation between internalizing and externalizing symptoms; to determine the relationship between maternal report and adolescent self-report of symptoms among the sample participants; to examine the relationship between maternal self-reported level of distress and the discrepancy between
maternal report and adolescent self-report of symptoms; and examine the relationship between adolescent gender and discrepancy between maternal report and adolescent self-report of symptoms.

Methodology of the Dissertation Study

The current dissertation study utilized the archival dataset collected for the aforementioned study; thus the procedures for the dissertation study were be guided by the NICHD SECCYD procedures presented above.

Setting

Data collection for Phase IV of the SECCYD project was conducted in the communities surrounding each of the 10 participating research Universities involved in the original recruitment of subjects in 1991. The percentage of participants living in the surrounding areas of each University the time of Phase IV data collection were as follows: The University of Arkansas – 8.9%; The University of California Irvine – 10.8%; The University of Kansas – 9.4%; The University of Wellesley – 10.1%; The University of Pittsburgh – 10.6; Temple University – 9.7%; The University of Virginia – 10.0%; The University of Washington – 10.4%; Western Carolina University – 9.5%; and The University of Wisconsin – 10.4%. Collectively, participants in Phase IV of the SECCYD study represent a geographically diverse sample identified as 53.1% Urban, 27.2% Suburban, and 19.7% Rural. The 2010 U.S. Census data indicates that approximately 71.2% of the U.S. population lives in Urban areas (indicated by population of ≥50,000), 9.5% live in an Urban Cluster (indicated by a population of 2,500-50,000), and 19.3% live in Rural areas. Thus, the current dissertation study sample represents a larger proportion of participants living in a Suburban (Urban Cluster) area than is represented in the general U.S. population.
Participants

The current dissertation study utilized Phase IV data, representing assessment of the adolescent participants ranging in age from 14-15 years. During this most recent phase of data collection, 924 adolescents and their mothers from the original study recruitment participated in the study’s Phase IV, conducted during 2007-2008. This represents an attrition rate of 28.7% over the 15-year period of time between Phase I and Phase IV data collection. Adolescent participants in Phase IV of the SECCYD study were 50.4% female, and the mean age of adolescents at the time of data collection was 15.38 years (SD=0.30). Sixty-seven percent of the subjects were identified as White/Non-Hispanic, 16% were identified as Black/Non-Hispanic, 9% were identified as Hispanic/Latino, and the remaining 9% of subjects reported their ethnicity as “other”. At the time of Phase IV data collection, the average household income of the participating families was $104,442 (Median = $69,000; SD = $105,780.46), which is higher than the total U.S. average income of $51,777 for a family of four in 2009. A total of 6.4% of the families in the sample were currently receiving public assistance/food stamps, which is lower than the U.S. average of 11.9% of families who were receiving public assistance/food stamps in 2009. At the time of Phase IV data collection, 171 of the adolescent/mother dyads represented single-mother households, while 89 households included a step-father.

Instruments

The instruments utilized in the dissertation study included the Child Behavior Checklist and the Youth Self-Report, components of the Achenbach System of Empirically Based Assessment (Achenbach & Rescorla, 2001) for assessment of adolescent symptoms. To assess maternal distress, the Center for Epidemiological Studies Depression scale (CES-D; Radloff, 1977) as well as The State-Trait Anxiety Inventory - State (STAI-S; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) were used.
Achenbach System of Empically Based Assessment. The Achenbach System of Empically Based Assessment (ASEBA) is multiaxial diagnostic method of assessing a wide range of emotional and behavioral problems in children and adolescents (Achenbach and Rescorla, 2001). The assessment is multiaxial in that it incorporates data obtained from multiple sources (parents, adolescents, teachers, direct observations, etc). The Youth Self Report Age 11-18 Form (YSR; Achenbach & Rescorla, 2001) and the Child Behavior Checklist Age 6-18 Form (CBCL; Achenbach & Rescorla, 2001) are component measures of the ASEBA that assess adolescent self-report of symptoms (YSR) and parental report of adolescent symptoms (CBCL) across multiple domains of factor-analytically derived scales (Achenbach, McConaughy & Howell, 1987). The ASEBA is considered an empirically based class of instruments in that the derivation of scales resulted from multiple factor analytic studies with varied samples. The YSR and CBCL have been used in over 4,000 published studies with translations in 65 languages (Berube & Achenbach, 2002). Reliability and validity have been documented among numerous culturally and ethnically diverse samples (Achenbach, 2006; Achenbach, Dumenci & Rescorla, 2002).

Youth Self Report. Each adolescent’s assessment of their own symptoms of internalizing and externalizing problems was obtained using the Youth Self Report Age 11-18 Form (YSR; Achenbach & Rescorla, 2001). The YSR contains 112 items related to adolescent difficulties, which assess the same eight symptom scales and two higher-order factor scales. Adolescents are instructed to report how well each item describes them over the past six months (i.e. “I argue a lot”; “I am disobedient at home”) using a three-point Likert scale ranging from 0[“Not true”] to 2[“Very true or often true”]. These items comprise eight symptom scales and two higher-order factor scales. Symptom scales include: Withdrawn/Depressed, Anxious/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Delinquent Behavior, and

The present study utilized YSR scores from the Internalizing factor scale and the Externalizing factor scale. Scores across items loading onto each factor scale are summed to generate a raw score for each the Internalizing and Externalizing factor scales. On each scale, higher scores indicate higher symptom report. The Internalizing and Externalizing higher-order factors have demonstrated adequate internal consistency in community samples (α > .90; Achenbach & Rescorla, 2001). Test-retest reliability has been repeatedly demonstrated, with Cronbach’s alpha ranging from 0.8-0.9 in community and clinic samples (e.g. Berube & Achenbach, 20012).

Recently, researchers examining the utility of T-Scores in analyses of reporter congruence on the ASEBA have suggested that a more appropriate and valid statistical method of analysis involves the use of raw scores to capture the full degree and directionality of reporter discrepancy (e.g. Berg-Nielson et al., 2003; Thurber & Sheehan, 2012). T-scores used in the current versions of the CBCL and YSR are truncated T-scores, meaning that the standardized T-transformation results in the elimination of the lower extremity of the distribution with scores at and below the mean being assigned a T-score of 50. Thus, these truncated T-scores reduce the range of variation among the sample in any given study (Achenbach & Rescorla, 2001; DeLos Reyes & Kazdin, 2005; Thurber & Sheehan, 2012), whereas the raw scores provide a more robust and comprehensive level of analysis. Accordingly, raw scale scores were utilized for statistical analyses in the current dissertation study.

*Child Behavior Checklist.* Maternal report of adolescent distress was obtained using the Child Behavior Checklist Age 6-18 Form (CBCL; Achenbach & Rescorla, 2001). The CBCL is
an empirically-derived instrument to assess parents’ views of their child’s behavioral and emotional functioning. Parents are asked to respond to 112 items related to child difficulties (i.e. “argues a lot”, “disobedient at home”) using a three-point Likert scale ranging from 0[“Not true”] to 2[“Very true or often true”]. The CBCL contains identical items corresponding to the items on the YSR, to allow for assessment of parent/caregiver report (CBCL) and adolescent report (YSR) of the same adolescent symptoms. As with the YSR, the 112 CBCL items comprise eight symptom scales and two higher-order factor scales. Symptom scales include: Withdrawn/Depressed, Anxious/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Delinquent Behavior, and Aggressive Behavior. Withdrawn/Depressed, Anxious/Depressed and Somatic Complaints load exclusively on the Internalizing factor scale, whereas Delinquent Behavior and Aggressive Behavior load exclusively on the Externalizing factor scale.

The present study utilized CBCL scores from the Internalizing factor scale and the Externalizing factor scale. Scores across items loading onto each factor scale are summed to generate a raw score for each the Internalizing and Externalizing factor scales. On each scale, higher scores indicate higher symptom report. The Internalizing and Externalizing higher-order factors have demonstrated adequate internal consistency in community samples ($\alpha > .90$; Achenbach & Rescorla, 2001). Test-retest reliability has been repeatedly demonstrated, with Cronbach’s alpha ranging from 0.8-0.9 in community and clinic samples (e.g. Berube & Achenbach, 20012).

As previously stated, recent research examining the utility of T-Scores in analyses of reporter congruence on the ASEBA has suggested that a more appropriate and valid statistical method of analysis involves the use of raw scores to capture the full degree and directionality of reporter discrepancy (e.g. Thurber & Sheehan, 2012; Berg-Nielson, et. al 2003). T-scores used in
the current versions of the CBCL and YSR are truncated T-scores, meaning that the standardized T-transformation results in the elimination of the lower extremity of the distribution with scores at and below the mean being assigned a T-score of 50. Thus, these truncated T-scores reduce the range of variation among the sample in any given study (Achenbach & Rescorla, 2001; DeLos Reyes & Kazdin, 2005; Thurber & Sheehan, 2012), whereas the raw scores provide a more robust and comprehensive level of analysis (Thurber & Sheehan, 2012). Accordingly, raw scale scores were utilized for statistical analyses in the current dissertation study.

**YSR-CBCL Internalizing Difference Score.** For each mother/adolescent dyad, a YSR-CBCL Internalizing Difference score was calculated by subtracting the CBCL Internalizing total raw score (obtained from the mother) from the corresponding YSR Internalizing total raw score (obtained from the adolescent). The resulting YSR-CBCL Internalizing Difference score reflects the degree and directionality of the discrepancy between maternal report and adolescent self-report of adolescent internalizing symptoms. Positive value YSR-CBCL Internalizing Difference scores indicate higher adolescent self-report of internalizing symptoms relative to maternal report of adolescent internalizing symptoms. Negative value YSR-CBCL Internalizing Difference scores indicate higher maternal report adolescent internalizing symptoms relative to adolescent self-report of internalizing symptoms.

**YSR-CBCL Externalizing Difference Score.** For each mother/adolescent dyad, a YSR-CBCL Externalizing Difference score was calculated by subtracting the CBCL Externalizing total raw score (obtained from the mother) from the corresponding YSR Externalizing total raw score (obtained from the adolescent). The resulting YSR-CBCL Externalizing Difference score reflects the degree and directionality of the discrepancy between maternal report and adolescent self-report of adolescent externalizing symptoms. Positive value YSR-CBCL Externalizing Difference scores indicate higher adolescent self-report of externalizing symptoms relative to
maternal report of adolescent externalizing symptoms. Negative value YSR-CBCL Externalizing Difference scores indicate higher maternal report adolescent externalizing symptoms relative to adolescent self-report of externalizing symptoms.

**Center for Epidemiological Studies Depression scale (CES-D).** Maternal depressive symptoms were assessed using the Center for Epidemiological Studies Depression Scale (CES–D; Radloff, 1977), a self-report measure that assesses depressive symptomatology in the general population. This measure is designed to assess the main components of depressive symptomatology: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. Response categories indicate the frequency of occurrence of each item, and are scored on a 4-point scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time). On the CES-D, A summary score is calculated by summing participant responses on each item. The range of scores on the CES-D is 0-60, with a CES-D -20 cutoff score of 16 being indicative of “significant” or “mild” depressive symptomatology. On this continuous scoring scale, higher scores (both item and total scores) indicate greater experience of depressive symptoms.

**State-Trait Anxiety Inventory-State (STAI-S).** Maternal anxiety was assessed using the State-Trait Anxiety Inventory – *State* scale (STAI-S), a commonly used measure of state anxiety (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). This measure consists of 20 items for assessing state anxiety. State anxiety items include: “I am tense; I am worried” and “I feel calm; I feel secure.” On the STAI-S, participants respond to all 20 items on a 4-point Likert scale ranging from 0=“Almost Never” to 3=“Almost Always”. A total is calculated by summing responses to the 20 component items, with higher scores indicating a greater current experience of state anxiety. Internal consistency coefficients for the measure have ranged from .86 to .95;
test-retest reliability coefficients have ranged from .65 to .75 over a 2-month interval (Spielberger et al., 1983).

Procedures

For the current dissertation study, the investigator secured institutional approval from the University of Alabama Office of Research Compliance (see Appendix A), and secured approval for access and use of the SECCYD archival data through the NICHD Interagency Consortium for Political and Social Research (ICPSR; see Appendix B).

The SEECYD data relevant to the dissertation study represents a wide range of maternal factors, adolescent outcomes and contextual features that were assessed during a visit by research personnel to the adolescent’s home. Data collection procedures included maternal report of adolescent functioning, adolescent self-report of functioning, and maternal self-report of emotional functioning. Assessment measures were administered by NICHD research team personnel housed at the 10 participating Univeristies previously cited. Research participants were contacted via mailed postcard from the research lab personnel at the University where the initial subject recruitment occurred. Upon return of the research invitation, subjects were contacted by phone to schedule the research personnel’s visit to the home. Data reduction and analyses for Phase IV of the SECCYD study were conducted by the NICHD Early Child Care Research Network, and archival data is maintained by the NICHD.

Data Analysis for the Dissertation Study

Summary of Data

Participant data. The participant demographic data used in the dissertation study includes: age of the adolescent; gender of the adolescent; age of the mother; as well as ethnicity, socio-economic status and geographic residence of the family. Gender of the adolescent is used
in data analyses to test hypotheses; data for other variables as well as adolescent gender is used as demographic variables to describe the characteristics of the sample.

**Adolescent self-report of symptoms.** Adolescent self-report data used in the dissertation study includes adolescents’ responses on the 31 items of the YSR loading onto the Internalizing scale and the 30 items on the YSR loading onto the Externalizing scale. Adolescent self-report Internalizing score is represented by the Internalizing factor raw score on the YSR, and adolescent self-report Externalizing score is represented by the Externalizing factor raw score on the YSR. Scores for each individual item range from 0-2, with total scores for the Internalizing factor scale ranging from 0-62, and total scores on the Externalizing factor scale ranging from 0-60.

**Maternal report of adolescent symptoms.** Maternal report of adolescent symptoms used in the dissertation study includes maternal responses on the 31 items of the CBCL loading onto the Internalizing factor scale and the 30 items of the CBCL loading onto the Externalizing factor scale. A maternal report Internalizing score is represented by the Internalizing factor raw score on the CBCL, and a maternal report Externalizing score is represented by the Externalizing factor raw score on the CBCL. Scores for each individual item range from 0-2, with total scores for the Internalizing factor scale ranging from 0-62, and total scores on the Externalizing factor scale ranging from 0-60.

**YSR-CBCL Internalizing difference score.** The YSR-CBCL Internalizing Difference score was calculated by subtracting the mother’s CBCL Internalizing total raw score from the adolescent’s YSR Internalizing total raw score for each adolescent in the study sample. Positive value YSR-CBCL Internalizing difference scores indicate higher adolescent self-report of internalizing symptoms on the YSR relative to maternal report of adolescent internalizing symptoms on the CBCL. Negative value YSR-CBCL Internalizing difference scores indicate
higher maternal report of adolescent internalizing symptoms on the CBCL relative to adolescent report of internalizing symptoms on the YSR.

**YSR-CBCL Externalizing difference score.** The YSR-CBCL Externalizing Difference score was calculated by subtracting the mother’s CBCL Externalizing total raw score from the adolescent’s YSR Externalizing total raw score for each adolescent in the study sample. Positive value YSR-CBCL Externalizing difference scores indicate higher adolescent self-report of externalizing symptoms on the YSR relative to maternal report of adolescent externalizing symptoms on the CBCL. Negative value YSR-CBCL Externalizing difference scores indicate higher maternal report of adolescent externalizing symptoms on the CBCL relative to adolescent report of externalizing symptoms on the YSR.

**Maternal self-report of distress.** Maternal self-report of experiences of symptoms of depression and anxiety is utilized to assess maternal distress. Specific data utilized in the dissertation study includes maternal responses on the 20-item Center for Epidemiologic Studies Depression Scale (CES-D), as well as maternal responses on the 20-item State-Trait Anxiety Inventory- State scale (STAI-S). A total CES-D score, calculated by summing the responses on the 20-item CES-D was generated for each mother to determine each mother’s self-reported level of depressive symptoms. Scores on each item range from 0 to 3, with a total CES-D score range of 0 to 60. Higher scores indicate higher levels of depressive symptoms. A total STAI-S score, generated by summing the responses on the 20-item STAI-S, was calculated for each mother to determine each mother’s self-reported level of current anxiety symptoms. Scores on each item range from 0 to 3, with a total STAI-S score range of 0-60. Higher scores indicate higher levels of symptoms of anxiety.
Data Analyses by Specific Purpose

The Statistical Package for the Social Sciences – Version 21.0 (SPSS 21.0) software program was employed to conduct the analyses for the dissertation study.

Research purpose 1. The first broad research purpose of the dissertation study was to determine the relationship between maternal report and adolescent self-report of adolescent mental health symptoms within the study sample. To accomplish this purpose, a detailed analysis of the correlation of maternal-report and adolescent self-report of adolescents' internalizing and externalizing symptoms was conducted. The following sections provide detailed descriptions of the data analytic plans utilized to accomplish this research purpose.

Specific purpose 1a. Specific purpose 1a was to determine the relationship between maternal report and adolescent self-report of adolescent internalizing and externalizing symptoms.

Hypothesis 1a.i. Hypothesis 1a.i was as follows: The correlation between maternal report and adolescent self-report of adolescent internalizing symptom report will be low, with the criterion of $r < 0.3$ used to determine a low correlation (Hemphill, 2003).

Data analysis 1a.i. Total adolescent self-report of internalizing symptoms was calculated for each adolescent by summing the responses to the 31 items loading onto the YSR Internalizing factor scale. Total maternal report of adolescent internalizing symptoms for each adolescent was calculated by summing the responses to the 31 items loading onto the CBCL Internalizing factor scale. Pearson’s $r$ was calculated to determine the correlation of adolescent self-report (YSR Internalizing total raw score) and maternal report (CBCL Internalizing total raw score) of adolescent symptoms, with a criterion of $r<.3$ utilized to determine a low correlation (Hemphill, 2003).
**Hypothesis 1a.ii.** The correlation between maternal report and adolescent self-report of adolescent externalizing symptom report will be low, with the criterion of $r < .3$ used to determine a low correlation (Hemphill, 2003).

**Data analysis 1a.ii.** Total adolescent self-report of externalizing symptoms was calculated for each adolescent by summing the responses to the 30 items loading onto the YSR Externalizing factor scale. Total maternal report of adolescent externalizing symptoms for each adolescent was calculated by summing the responses to the 30 items loading onto the CBCL Externalizing factor scale. Pearson’s $r$ was calculated to determine the correlation between adolescent self-report (YSR Externalizing total raw score) and maternal report (CBCL Externalizing total raw score) of adolescent symptoms, with a criterion of $r<.3$ utilized to determine a low correlation (Hemphill, 2003).

**Specific purpose 1b.** Specific purpose 1b was to determine if a significant difference exists between the relationship of maternal report and adolescent self-report of adolescent internalizing symptoms, and the relationship of maternal report and adolescent self-report of externalizing symptoms. To accomplish this purpose, Fisher’s $r$ to Z transformation of the correlation coefficients calculated in the testing of Hypotheses 1a.i and 1a.ii was conducted.

**Hypothesis 1b.** Hypothesis 1b was as follows: the correlation between maternal report and adolescent self-report of adolescent internalizing symptoms will be lower than the correlation between maternal report and adolescent self-report of adolescent externalizing symptoms.

**Data analysis 1b.** To determine if a significant difference exists between the relationship of maternal report and adolescent self-report of internalizing symptoms and the relationship of maternal report and adolescent self-report of externalizing symptoms, Fisher’s $r$ to Z transformation of the correlation coefficients calculated in data analysis 1a.i and data analysis
First, the internalizing symptom correlation was determined by calculating the bivariate correlation between YSR Internalizing scale total raw scores and CBCL Internalizing scale total raw scores in the study sample as detailed in data analysis 1a.i. Second, the externalizing symptom correlation was determined by calculating the bivariate correlation between the YSR Externalizing scale total raw score and the CBCL Externalizing scale total raw score in the study sample as detailed in data analysis 1a.ii. Pearson’s \( r \) was reported for Internalizing correlation and Externalizing correlation, and Fisher’s \( r \) to Z transformation was utilized to compute the z-statistics for use in determining the significance of the difference between the two \( r \) values. Specifically, the following equation was utilized to calculate the Z score for each the Internalizing and the Externalizing correlations:

\[
Z_r = \frac{1}{2} \log_e(1-r), \text{ with the standard error of } Z_r \text{ calculated as: } SE_{Zr} = \frac{1}{\sqrt{n-3}}
\]

Next, the following Fisher’s Z-test was employed to determine the significance of the difference between the Internalizing and Externalizing symptom correlations:

\[
Z = \frac{Z_{\text{int}} - Z_{\text{ext}}}{SE_{ZD}} \quad \text{where } SE_{ZD} = \sqrt{\frac{1}{(n1-3)} + \frac{1}{(n2-3)}}
\]

An alpha level of \( \alpha=.05 \) was utilized to determine significance, with Z-critical = 1.96.

**Research purpose 2.** The second broad research purpose of the dissertation study was to examine the relationship between self-reported maternal level of distress, adolescent gender, and the discrepancy between adolescent self-report and maternal report of adolescents’ internalizing and externalizing symptoms. The following sections provide detailed descriptions of the data analytic plans utilized to accomplish this research purpose.

**Specific purpose 2a.** Specific purpose 2a was to determine the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of internalizing symptoms in boys and girls. To achieve this purpose, a multiple linear regression model was employed to investigate the relationship between the following variables: total
maternal CES-D score, total maternal STAI-S score, adolescent gender, and YSR-CBCL Internalizing difference score.

*Hypothesis 2a.i.* Hypothesis 2a.i was as follows: Maternal level of distress will significantly predict the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms.

*Hypothesis 2a.ii.* Hypothesis 2a.ii was as follows: The relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms in mother/son dyads will be significantly different than the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms in mother/daughter dyads.

*Data analysis 2a.* A multiple linear regression model was employed to test the significance of the relationship between CES-D total score, STAI-S total score, adolescent gender, and YSR-CBCL Internalizing Difference score. The YSR-CBCL Internalizing Difference scores were calculated by subtracting CBCL Internalizing raw score (mother report) from YSR Internalizing raw score (adolescent report), thus positive values for the YSR-CBCL Internalizing Difference score indicate that adolescent report of internalizing symptoms was higher than maternal report of adolescent internalizing symptoms. Negative values for the YSR-CBCL Internalizing Difference score indicate that adolescent report of internalizing symptoms was lower than maternal report of adolescent internalizing symptoms.

Using the SPSS linear regression command, the variable “YSR-CBCL Internalizing Difference” was entered as the dependent variable. To test the relationship between maternal level of distress and the discrepancy of internalizing symptom report (hypothesis 2a.i), the following maternal distress variables were entered into step 1 (“Block 1 of 2” in the independent variable frame in the SPSS dialog box) of the model: CES-D total score and STAI-S total score.
To test for the significance of the contribution of adolescent gender to the model, specifically to determine whether the relationship between maternal distress and discrepancy of internalizing symptom report is significantly different between mother/son and mother/daughter dyads (hypotheses 2a.ii), the variable “adolescent gender” (coded Male =0 and Female =1) was used to compute the following interaction terms: Gender*CESD and Gender*STAIS. The interaction terms Gender*CESD and Gender*STAIS were then added to step 2 of the regression model to test for significance in the differential prediction of YSR-CBCL Internalizing difference score from STAI-S and CES-D scores among mother/son and mother/daughter dyads.

The resulting B-values associated with each interaction term are summative weights, thus are added to the original model from step 1 to determine whether the addition of the interaction terms significantly contributes to a greater explanation of variance in the dependent variable. A significant β associated with either interaction term would indicate that the interaction of adolescent gender and CES-D score (Gender*CESD) and/or the interaction of adolescent gender and STAI-S score (Gender*STAI-S) significantly contributes to the prediction of YSR-CBCL Internalizing difference score, thus the relationship between maternal distress and internalizing symptom discrepancy would be determined to differ according to adolescent gender.

Both interaction terms were entered into step 2 (“Block 2 of 2” in the independent variable frame in the SPSS dialog box) of the model, and the complete multiple regression model was run utilizing an alpha level of 0.05 to test for significance.

Specific purpose 2b. Specific purpose 2b was to determine the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms. To achieve this purpose, a multiple linear regression model was employed to investigate the relationship between the following variables: total
maternal CES-D score, total maternal STAI-S score, YSR-CBCL Externalizing difference score, and adolescent gender.

_Hypothesis 2b.i._ Maternal level of distress will significantly predict the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms.

_Hypothesis 2b.ii._ Hypothesis 2b.ii was as follows: The relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms in mother/son dyads will be significantly different than the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms in mother/daughter dyads.

_Data analysis 2b._ A multiple linear regression model was employed to test the significance of the relationship between CES-D total score, STAI-S total score, adolescent gender, and YSR-CBCL Externalizing Difference score. The YSR-CBCL Externalizing Difference scores were calculated by subtracting CBCL Externalizing raw score (mother report) from YSR Externalizing raw score (adolescent report), thus positive values for the YSR-CBCL Externalizing Difference score indicate that adolescent report of internalizing symptoms was higher than maternal report of adolescent externalizing symptoms. Negative values for the YSR-CBCL Externalizing Difference score indicate that adolescent report of externalizing symptoms was lower than maternal report of adolescent externalizing symptoms.

Using the SPSS linear regression command, the variable “YSR-CBCL Externalizing Difference” was entered as the dependent variable. To test the relationship between maternal level of distress and the discrepancy of externalizing symptom report (hypothesis 2b.i), the following maternal distress variables were entered into step 1 (“Block 1 of 2” in the independent variable frame in the SPSS dialog box) of the model: CES-D total score and STAI-S total score.
To test for the significance of the contribution of adolescent gender to the model, specifically to determine whether the relationship between maternal distress and discrepancy of externalizing symptom report is significantly different between mother/son and mother/daughter dyads (hypotheses 2a.ii), the variable “adolescent gender” (coded Male =0 and Female =1) was used to compute the following interaction terms: Gender*CESD and Gender*STAIS. The interaction terms Gender*CESD and Gender*STAIS were then added to step 2 of the regression model to test for significance in the differential prediction of YSR-CBCL Externalizing difference score from STAI-S and CES-D scores among mother/son and mother/daughter dyads.

The resulting B-values associated with each interaction term are summative weights, thus are added to the original model from step 1 to determine whether the addition of the interaction terms significantly contributes to a greater explanation of variance in the dependent variable. A significant β associated with either interaction term would indicate that the interaction of adolescent gender and CES-D score (Gender*CESD) and/or the interaction of adolescent gender and STAI-S score (Gender*STAI-S) significantly contributes to the prediction of YSR-CBCL Externalizing difference score, thus the relationship between maternal distress and externalizing symptom discrepancy would be determined to differ according to adolescent gender.

Both interaction terms were entered into step 2 (“Block 2 of 2” in the independent variable frame in the SPSS dialog box) of the model, and the complete multiple regression model was run utilizing an alpha level of 0.05 to test for significance.

Assumptions for Statistical Analyses

Assumptions for statistical analyses in research purpose 1. Four primary assumptions guide the use of correlation analyses in the social sciences, and were considered in the statistical analyses for the current dissertation study (Higgins, 2005). These assumptions include: all variables are measured on either an interval or ratio scale; normality (all variables must be
normally distributed in the population); linearity (the relationship between the independent and dependent variables in linear in nature); and homoscedasticity (the variance of errors is the same across all levels of the independent variable).

The variables utilized in the correlation analyses for Research Purpose 1, including mothers’ and adolescents’ ratings of the adolescents internalizing and externalizing symptoms (mothers’ CBCL internalizing total raw score, mothers’ CBCL externalizing total raw score, adolescents’ YSR internalizing total raw score, and adolescents’ YSR externalizing total raw score) were each measured on a ratio scale, meaning that they are measured along a continuum and with an absolute 0 point. Thus, the first assumption of correlation analyses was met for the variables utilized in purpose 1 of the dissertation study.

The assumption of normality refers to the normal distribution of the errors of prediction around all levels of each variable (Tabachnick & Fidell, 2007). To test for normality, the Shapiro-Wilk $W$ test was employed to examine the correlation between each variable (CBCL internalizing total raw score, CBCL externalizing total raw score, YSR internalizing total raw score, YSR externalizing total raw score) score and the corresponding normal scores, thus to test that the sample comes from a normally distributed population (Shapiro & Wilk, 1965). Generally, a $W$ smaller than 1 suggests that the assumption of normality may not be met, and the analyses should be conducted with caution. To further examine the assumption of normality within the study sample, a visual review of the residual scatter plots for each variable was conducted. These scatter plots, generated through the command function of SPSS, depicted the standardized residuals as a function of the standardized predicted values for each variable. (Osborne & Waters, 2002). The scatter plots reflecting the sample distribution across each independent variable are found in Appendix C.

Linearity in the context of correlation analyses refers to the assumption of a linear
relationship between the two variables included in the correlation (Higgins, 2005). As with the assumption of normality, the assumption of linearity was assessed through a visual review of scatter plots of the variables in each correlation. Specifically, the following graphs were generated: a scatter plot of CBCL internalizing total raw score as a function of YSR internalizing total raw score (hypothesis 1a.i) and a scatter plot of CBCL externalizing total raw score as a function of YSR externalizing total raw score (hypothesis 1a.ii). Scatter plots reflecting the tests of linearity are presented in Appendix D.

Homoscedasticity refers to the assumption of equality among the standard deviations of the errors of prediction for all levels of each variable (Osborne and Waters, 2002). Homoscedasticity was assessed through review of the scatter plots of the standardized residuals as a function of standardized predicted values for the following variables: CBCL internalizing total raw score, CBCL externalizing total raw score, YSR internalizing total raw score, and YSR externalizing total raw score. The scatter plots demonstrating the tests of homoscedasticity are found in Appendix C.

**Assumptions for statistical analyses for research purpose 2.** Four primary assumptions guide the use of multiple linear regression analyses in the social sciences (Osborne & Walters, 2002), and were considered in the statistical analyses for the current dissertation study. These assumptions include: normality (all variables must have normal distribution); linearity (the relationship between the independent and dependent variables in linear in nature); reliability (the dependent and independent variables are measured without error); and homoscedasticity (the variance of errors is the same across all levels of the independent variable). Additionally, tests of multicollinearity were conducted to ensure independence of measurement among independent variables (Stevens, 2002).

The assumption of normality refers to the normal distribution of the errors of prediction
around all levels of each variable (Tabachnick & Fidell, 2007). To test for normality, the Shapiro-Wilk $W$ test was employed to examine the correlation between each variable (maternal total CES-D score, maternal total STAI-S score, YSR- CBCL Internalizing difference score; and YSR-CBCL Externalizing difference score) and the corresponding normal distribution for the variable, to test that the sample comes from a normally distributed population (Shapiro & Wilk, 1965). Generally, a $W$ smaller than 1 suggests that the assumption of normality may not be met, and the analyses should be conducted with caution. To further examine the assumption of normality within the study sample, a visual review of the residual scatter plots for each variable was conducted. These scatter plots, generated through the command function of SPSS, depicted the standardized residuals as a function of the standardized predicted values for each variable. (Osborne & Waters, 2002). The scatter plots used to test the assumption of normality are found in Appendix E.

Linearity refers to the assumption of a linear relationship between each predicted dependent variable and the corresponding error of prediction (Tabachnick & Fidell, 2007). As with the assumption of normality, the assumption of linearity was assessed through a visual review of scatter plots for the variables in question. Specifically, a review of the scatter plot of the standardized residuals as a function of the standardized predicted variables was conducted for the following variables: YSR-CBCL Internalizing Difference Score and YSR-CBCL Externalizing Difference Score. The scatter plots used to test the assumption of linearity are found in Appendix E.

In addition to the four primary assumptions of multiple regression, muticolinearity should be assessed before proceeding with multiple regression analyses (Stevens, 2002). Multicolinearity refers to a strong correlation between predictor variables utilized in multiple regression analyses. Strong correlation between predictor variables (e.g. $r=0.50$ or higher)
suggests that variables are likely measuring similar constructs and may better contribute to the analytical model through consolidation into a composite variable (Leech et al., 2011). To examine the assumption of colinearity, the “colinearity diagnostics” command was utilized in the SPSS Regression dialog command screen. The Variance Inflation Factors (VIF) were determined for CES-D total score and STAI-S total score, with a VIF of 5 or greater for any variable indicating colinearity associated with this variable.

Reliability of measurement refers to the assumption that predictor variables utilized in regression analyses are assessed with acceptable validity and reliability. The assumption of reliability of measurement is considered to have been met for the standardized measures utilized in the dissertation study given the established validity and reliability of these measures (CES-D, STAI, YSR and CBCL). Specifically, the CES-D has documented internal consistency, with Cronbach’s alpha coefficients ranging from \( \alpha = 0.85-0.9 \) (Knight, Willliams & McGee, 1997). Convergent validity with standardized assessments of depressive symptoms has demonstrated acceptable validity, with correlations ranging from 0.73-0.82 (Thombs, Hudson, Schieir, Taillefer & Baron, 2008). For the STAI-S, internal consistency coefficients have ranged from .86 to .95; and test-retest reliability coefficients have ranged from .65 to .75 over a 2-month interval (Spielberger et al., 1983).

Both the CBCL and YSR have shown Internal Consistency Coefficients ranging from 0.63-0.79 \((p<0.01)\), as well as criterion-related validity significant at the \( p<0.01 \) level of analysis. The Internalizing and Externalizing higher-order factors have demonstrated adequate internal consistency in community samples \((\alpha > .90)\) for both the Child Behavior Checklist and Youth Self Report; (Achenbach & Rescorla, 2001), and test-retest reliability has been repeatedly demonstrated, with Cronbach’s alpha ranging from 0.8-0.9 in community and clinic samples (e.g. Berube & Achenbach, 20012).
It is important to note that there is no established data documenting the reliability of the YSR-CBCL Internalizing and YSR-CBCL Externalizing variables calculated for the current dissertation study to examine discrepancy between adolescent self-report and maternal report of adolescent symptoms. Measurement theory suggests that the reliability of raw score difference scores is generally lower than the reliability of the individual raw scores (Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Thus, the assumption of reliability of measurement could not be concluded for the YSR-CBCL Difference scores utilized in the current dissertation study. However, the use of raw discrepancy (difference) scores is widely accepted in analyses involving component measures of the ASEBA, including the YSR and CBCL/6-18 utilized in the current study, as it provides information regarding the degree and directionality of reporter discrepancy (Achenbach & Rescorla, 2001; Thurber & Sheehan, 2012).

Homoscedasticity refers to the assumption of equality among the standard deviations of the errors of prediction for all levels of dependent variables (Osborne & Waters, 2002). Homoscedasticity was assessed through review of the scatter plots of the standardized residuals as a function of standardized predicted values for the following variables: YSR-CBCL Internalizing Difference score and YSR-CBCL Externalizing Difference score. Scatter plots utilized to determine the assumption of homoscedasticity are found in Appendix E.
CHAPTER 4 – RESULTS

This chapter offers detailed information about descriptive statistics for the variables utilized in the dissertation study, as well as the results of the data analyses performed to test each specific hypothesis. The Statistical Package for the Social Sciences, Version 21 (SPSS-21; IBM Corporation, 2012) was used for all analyses.

Brief Summary of Overall Study Purpose and Method

The purpose of this dissertation study was to examine the relationship between maternal report and adolescent self-report of adolescent symptoms of mental health problems. Utilizing data collected in 2007-2008 as part of the phase IV of The National Institute of Child Health & Human Development Study of Early Child Care and Youth Development (SECCYD), the dissertation study was designed to investigate the relationship between maternal report and adolescent self-report of internalizing and externalizing symptoms, as well as to identify potential factors influencing the relationship between maternal report and adolescent self-report of adolescent symptoms. Specifically, the following variables were examined with respect to the relationship between maternal report and adolescent self-report of adolescents’ symptoms: maternal self-reported levels of distress, and adolescent gender.

Descriptive Statistics for Variables Used in Analyses

The following tables present the descriptive statistics for each variable utilized in the dissertation study. The Youth Self-Report (YSR; Achenbach & Rescorla, 2001) was completed by adolescents to obtain a measure of the adolescent’s report of internalizing and externalizing symptoms. The Child Behavior Checklist/6-18 (CBCL/6-18; Achenbach & Rescorla, 2001) was completed by mothers to obtain a measure of mothers’ report of their adolescent’s current
demonstration of internalizing and externalizing symptoms. Adolescents and mothers provided responses to the 31 items loading onto the YSR and CBCL Internalizing factor scales, respectfully, and to the 30 items loading onto the YSR and CBCL Externalizing factor scales, respectfully. The component items of the Internalizing and Externalizing factor scales are consistent between the YSR and CBCL, allowing for comparison between youth report and parental report of youth symptoms.

Total raw scores for the YSR Internalizing and Externalizing factor scales completed by adolescents, and total raw scores for the CBCL Internalizing and Externalizing factor scales completed by mothers were utilized for statistical analyses in Research Purpose 1, according to the theoretical and empirical rationale detailed earlier in Chapters 2 and 3. Though not used in the statistical analyses for the dissertation study, the standardized T-Scores for the CBCL and the YSR Internalizing and Externalizing factor scales are also detailed below to provide context, relative to the normative samples for the instruments.

To examine discrepancy between maternal report and adolescent self-report of adolescents’ internalizing symptoms, a YSR-CBCL Internalizing Difference Score was calculated for each adolescent/mother dyad by subtracting maternal report of adolescent internalizing symptoms (CBCL Internalizing Total Raw Score) from adolescent self-report of internalizing symptoms (YSR Internalizing Total Raw Score). The resulting YSR-CBCL Internalizing Difference Score reflects both the degree and direction of report discrepancy, with positive values indicating that adolescent self-report of internalizing symptoms is higher than maternal report of adolescent internalizing symptoms, and negative values indicating that maternal report of adolescent internalizing symptoms is higher than adolescent self-report of internalizing symptoms.
To examine discrepancy between maternal report and adolescent self-report of adolescents’ externalizing symptoms, a YSR-CBCL Externalizing Difference Score was calculated for each adolescent/mother dyad by subtracting maternal report of adolescent externalizing symptoms (CBCL Externalizing Total Raw Score) from adolescent self-report of externalizing symptoms (YSR Externalizing Total Raw Score). The resulting YSR-CBCL Externalizing Difference Score reflects both the degree and direction of report discrepancy, with positive values indicating that adolescent self-report of externalizing symptoms is higher than maternal report of adolescent externalizing symptoms, and negative values indicating that maternal report of adolescent externalizing symptoms is higher than adolescent self-report of externalizing symptoms.

The State-Trait Anxiety Inventory – State (STAI-S; Spielberger et al., 1983) and the Center for Epidemiological Studies – Depression Scale (CES-D; Radloff, 1977) were completed by mothers to obtain a measure of mothers’ subjective level of distress.

**Descriptive Statistics for Youth Self Report (YSR) Total Raw Scores**

Adolescents provided responses to the 31 items loading onto the Internalizing factor scale and to the 30 items loading onto the Externalizing factor scale of the Youth Self Report (YSR). For the total adolescent sample (N = 924), the mean YSR Internalizing total raw score was 17.17 (SD = 7.24) and the mean YSR Externalizing total raw score was 15.25 (SD = 6.38). For male adolescents (N=458), the mean YSR Internalizing total raw score was 16.37 (SD = 7.03) and the mean YSR Externalizing total raw score was 14.82 (SD = 5.96). For female adolescents (N = 466), the mean YSR Internalizing total raw score was 17.94 (SD = 7.59) and the mean YSR Externalizing total raw score was 15.63 (SD = 6.80). There was a significant gender difference with regards to adolescent self-report of total number of internalizing symptoms (t=3.263, p=.001), with females endorsing more symptoms than males. There was no gender difference in
adolescent self-report of total externalizing symptoms (t=1.926, p=.054). Table 1 provides the descriptive statistics for YSR total raw scores.

Table 1

Descriptive Statistics: Total Raw Scores for Youth Self-Report (YSR) Completed by Adolescents

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total YSR Internalizing</td>
<td>924</td>
<td>17.17</td>
<td>7.24</td>
<td>17</td>
<td>3 to 60</td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>16.37</td>
<td>7.03</td>
<td>16</td>
<td>3 to 59</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>17.94</td>
<td>7.59</td>
<td>17</td>
<td>4 to 60</td>
</tr>
<tr>
<td>Total YSR Externalizing</td>
<td>924</td>
<td>15.25</td>
<td>6.38</td>
<td>15</td>
<td>4 to 60</td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>14.82</td>
<td>5.96</td>
<td>14</td>
<td>4 to 58</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>15.63</td>
<td>6.80</td>
<td>15</td>
<td>5 to 60</td>
</tr>
</tbody>
</table>

Descriptive Statistics for Youth Self Report (YSR) T-Scores

Although not used in data analyses for the present study’s research questions, norm-referenced T-scores were determined to provide a normative context for understanding the sample’s adolescent self-report on the YSR. On the YSR, higher scores on the Internalizing and Externalizing factor scales reflect higher adolescent self-report of symptoms. Higher T-scores indicate that the adolescent is endorsing more symptoms in comparison to the standardization sample of youth the same gender and chronological age. A T-score of 65-69 is considered to be in the Borderline range of clinical significance, with T-scores at or above 70 considered to indicate Clinically Significant levels of symptoms.

T-scores are based on the YSR standardization sample and are scaled scores with a normative mean of 50 and standard deviation of 10. However, T-scores used in the current versions of the CBCL and YSR are truncated T-scores, meaning that the standardized T-transformation results in the elimination of the lower extremity of the distribution with all scores at and below the mean being assigned a T-score of 50. Thus, the sample’s mean and standard
deviations for T-scores cannot be calculated, due to the YSR’s truncated T-score distributions. However, T scores obtained by the sample are described in general in the following paragraphs.

For male adolescents (N = 458), the range of Internalizing standardized T-Scores was 50 to 82, and the range of Externalizing standardized T-scores was 50 to 79. Of the male adolescents in the current sample, 93.2% endorsed levels of symptoms falling within the Average range (T-scores lower than 65), 4.8% endorsed levels of internalizing symptoms falling within the Borderline range of clinical significance (T-scores of 65-69), while 2.0% endorsed Clinically Significant levels of internalizing symptoms (T-score at or above 70). With regards to externalizing symptoms, 96.8% of male adolescents endorsed levels of symptoms falling within the Average range (T-scores lower than 65), 1.9% of the male adolescents endorsed levels falling within the borderline range of clinical significance (T-scores of 65-69), while 1.3% endorsed clinically significant levels of symptoms (T-scores at or above 70).

For female adolescents (N=466), the range of Internalizing standardized T-Scores was 50 to 89, and the range of Externalizing standardized T-scores was 50 to 87. With regards to internalizing symptoms, 92.6% endorsed levels falling within the Average range (T-scores below 65), 5.6% of the female adolescents endorsed levels falling within the Borderline range of clinical significance (T-scores of 65-69), while 1.8% endorsed Clinically Significant levels of symptoms (T-scores at or above 70). Of the female adolescents in the current sample, 95.4% endorsed levels of symptoms falling within the Average range (T-scores below 65), 3.6% endorsed levels of externalizing symptoms falling within the Borderline range of clinical significance (T-scores of 65-69), while 1.0% endorsed Clinically Significant levels of externalizing symptoms (T-score at or above 70). Table 2 presents information about the YSR Standardized T-scores.
Table 2

*Standardized T-Scores for Youth Self-Report (YSR) Completed by Adolescents*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>T-Score Range</th>
<th>Average Range (T-score &lt;65)</th>
<th>Borderline Range (T-score 65-69)</th>
<th>Clinically Significant Range (T-score ≥70)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YSR Internalizing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>50-82</td>
<td>93.2%</td>
<td>4.8%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>50-87</td>
<td>92.6%</td>
<td>5.6%</td>
<td>1.8%</td>
</tr>
<tr>
<td>YSR Externalizing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>50-79</td>
<td>96.8%</td>
<td>1.9%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>50-89</td>
<td>95.4%</td>
<td>3.6%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

**Descriptive Statistics for Child Behavior Checklist (CBCL) Total Raw Scores**

Mothers provided responses to the 31 items loading onto the Internalizing factor scale and to the 30 items loading onto the Externalizing factor scale of the CBCL. For the total study sample (N = 924), the mean CBCL Internalizing total raw score was 16.57 (SD = 7.79) and the mean CBCL Externalizing total raw score was 19.10 (SD = 6.86). For mothers of male adolescents (N = 458), the mean CBCL Internalizing total raw score was 16.24 (SD = 7.94), and the mean CBCL Externalizing total raw score was 18.34 (SD = 6.68). For mothers of female adolescents (N = 466), the mean CBCL Internalizing total raw score was 16.77 (SD = 7.64), and the mean CBCL Externalizing total score was 19.83 (SD = 6.96). There was no significant difference in maternal report of adolescent total number of internalizing symptoms between mothers of sons and mothers of daughters (t=1.034, p=.151), however there was a gender difference in maternal report of adolescent total number of externalizing symptoms, with mothers of females endorsing more symptoms than mothers of males (t=3.32, p=.001). Table 3 provides the descriptive statistics about CBCL total raw scores.
Table 3

*Descriptive Statistics: Total Raw Scores for the Child Behavior Checklist (CBCL) Completed by Mothers*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total CBCL Internalizing</strong></td>
<td>924</td>
<td>16.57</td>
<td>7.79</td>
<td>16</td>
<td>4 to 60</td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>16.24</td>
<td>7.94</td>
<td>16</td>
<td>4 to 50</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>16.77</td>
<td>7.64</td>
<td>16</td>
<td>5 to 59</td>
</tr>
<tr>
<td><strong>Total CBCL Externalizing</strong></td>
<td>924</td>
<td>19.10</td>
<td>6.86</td>
<td>19</td>
<td>5 to 60</td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>18.34</td>
<td>6.68</td>
<td>18</td>
<td>5 to 59</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>19.83</td>
<td>6.96</td>
<td>19</td>
<td>5 to 60</td>
</tr>
</tbody>
</table>

**Descriptive Statistics for Child Behavior Checklist (CBCL) T-Scores**

To provide context for understanding the relative normal distribution of the CBCL total raw scores among the study sample, the standardized T-Scores for the CBCL Internalizing and CBCL Externalizing factor scales are presented below in Table 4. Although not used in data analyses for the present study’s research questions, norm-referenced T-scores were determined to provide a normative context for understanding the sample’s maternal report of adolescent symptoms on the CBCL. On the CBCL, higher scores on the Internalizing and Externalizing factor scales reflect higher maternal report of adolescent symptoms. Higher T-scores indicate that the mother is endorsing more symptoms in comparison to the standardization sample of mothers rating youth the same chronological age. A T-score of 65-69 is considered to be in the Borderline range of clinical significance, with T-scores at or above 70 considered to indicate Clinically Significant levels of symptoms.

T-scores are based on the CBCL standardization sample and are scaled scores with a normative mean of 50 and standard deviation of 10. However, T-scores used in the current versions of the CBCL and YSR are truncated T-scores, meaning that the standardized T-transformation results in the elimination of the lower extremity of the distribution with all scores at and below the mean being assigned a T-score of 50. Thus, the sample’s mean and standard
deviations for T-scores cannot be calculated, due to the CBCL’s truncated T-score distributions. However, T scores obtained by the sample are described in general in the following paragraphs.

For mothers of male adolescents (N = 458), the range of Internalizing standardized T-Scores was 50 to 82, and the range of Externalizing standardized T-scores was 50-84. Of the mothers of male adolescents, 95.2% endorsed levels of Internalizing symptoms falling within the Average range (T-scores <65), 4.1% endorsed levels of internalizing symptoms for their son falling within the Borderline range of clinical significance (T-scores of 65-69), while 0.7% endorsed Clinically Significant levels of internalizing symptoms (T-score at or above 70). With regards to externalizing symptoms, 89.7% endorsed levels of symptoms falling within the Average range (T-scores lower than 65), 8.3% of the mothers of male adolescents endorsed levels of symptoms for their sons falling within the Borderline range of clinical significance (T-scores of 65-69), while 2.0% endorsed Clinically Significant levels of symptoms (T-scores at or above 70).

For mothers of female adolescents (N=466), the range of Internalizing standardized T-Scores was 50 to 78, and the range of Externalizing standardized T-scores was 50 to 83. Of the mothers of female adolescents, 95.1% endorsed levels of Internalizing symptoms falling within the Average range (T-scores lower than 65), 3.4% endorsed levels of internalizing symptoms for their daughter falling within the Borderline range of clinical significance (T-scores of 65-69), while 1.5% endorsed Clinically Significant levels of internalizing symptoms for their daughter (T-score at or above 70). With regards to externalizing symptoms, 88.6% endorsed levels of symptoms falling within the Average range (T-scores lower than 65), 8.5% of the mothers of female adolescents endorsed levels of symptoms for their daughter falling within the Borderline range of clinical significance (T-scores of 65-69), while 2.9% endorsed Clinically Significant
levels of symptoms (T-scores at or above 70). Table 4 presents information about the CBCL standardized T-scores.

Table 4

**Standardized T-Scores for the Child Behavior Checklist (CBCL) Completed by Mothers**

<table>
<thead>
<tr>
<th>T-Score Range</th>
<th>Average Range</th>
<th>Borderline Range</th>
<th>Clinically Significant Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>N%</td>
<td>N%</td>
<td>N%</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>T-Score</td>
<td>(T-score &lt;65)</td>
<td>(T-score 65-69)</td>
</tr>
<tr>
<td>CBCL Internalizing T-Score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>50-82</td>
<td>95.2%</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>50-78</td>
<td>95.1%</td>
</tr>
<tr>
<td>CBCL Externalizing T-Score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>50-84</td>
<td>89.7%</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>50-83</td>
<td>88.6%</td>
</tr>
</tbody>
</table>

**Descriptive Statistics for YSR-CBCL Difference Scores**

For each mother/adolescent dyad, difference scores were calculated by subtracting the CBCL total raw score (obtained from the mother) from the corresponding YSR total raw score (obtained from the adolescent). Thus, the YSR-CBCL Internalizing Difference score was calculated by subtracting the mother’s CBCL Internalizing total raw score from the adolescent’s YSR Internalizing total raw score for each adolescent in the study sample. The YSR-CBCL Externalizing Difference score was calculated by subtracting the mother’s CBCL Externalizing total raw score from the adolescent’s YSR Externalizing total raw score for each adolescent in the study sample. The resulting difference scores reflect the degree and directionality of the discrepancy between maternal report and adolescent self-report of adolescent internalizing and externalizing symptoms, respectfully.
Positive value YSR-CBCL difference scores indicate higher adolescent self-report raw scores on the YSR relative to maternal-report raw scores on the CBCL. Negative value YSR-CBCL difference scores indicate higher maternal-report raw scores on the CBCL relative to adolescent raw scores on the YSR. For the total study sample (N = 924), the mean YSR-CBCL Internalizing Difference score was 0.60 (SD = 12.11), and the mean YSR-CBCL Externalizing difference score was -3.86 (SD = 11.57). Thus, on average, adolescents’ YSR total internalizing raw scores were only slightly higher than mothers’ CBCL total internalizing raw scores. However, on average, adolescents’ YSR total externalizing raw scores were lower by almost 4 points compared to mothers’ CBCL total externalizing raw scores.

For mother/son dyads, the mean YSR-CBCL Internalizing Difference score was .13 (SD = 12.37) and the mean YSR-CBCL Externalizing Difference score was -3.51 (SD = 11.58). For mother/daughter dyads, the mean YSR-CBCL Internalizing Difference score was 1.16 (SD = 11.83) and the mean YSR-CBCL Externalizing Difference score was -4.19 (SD = 12.10). Table 5 provides descriptive statistics about the YSR-CBCL difference scores. There were no significant gender difference with regards to YSR-CBCL Internalizing Difference score (t=1.294, p=.196), or YSR-CBCL Externalizing Difference score (t=0.873, p=.383).

Table 5

Descriptive Statistics: YSR – CBCL Total Raw Score Difference Scores

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YSR – CBCL Internalizing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>0.13</td>
<td>12.37</td>
<td>0.50</td>
<td>-45 to 28</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>1.16</td>
<td>11.83</td>
<td>1.00</td>
<td>-33 to 39</td>
</tr>
<tr>
<td>Male</td>
<td>458</td>
<td>-3.51</td>
<td>11.58</td>
<td>-3.00</td>
<td>-38 to 32</td>
</tr>
<tr>
<td>Female</td>
<td>466</td>
<td>-4.19</td>
<td>12.12</td>
<td>-3.00</td>
<td>-43 to 42</td>
</tr>
</tbody>
</table>
Mothers provided responses to the 20 items on the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), which is a measure of the mothers’ self-reported depressive symptoms. This measure was scored by summing a mother’s responses to each item and calculating a total raw score, which can range from 0-60, with higher scores indicating higher levels of depressive symptoms. Though no standardized scoring is used for the CES-D, a raw score of 16 is generally utilized as a cut-off score indicating a significant level of depressive symptoms (Radloff, 1977). For the total study sample, the mean CES-D score was 11.10 (SD = 10.11). For mothers of male adolescents, the mean CES-D score was 11.02 (SD = 10.29). For mothers of female adolescents, the mean CES-D score was 11.16 (SD = 9.96).

There was no significant difference between the mean CES-D score of mothers of females and the mean CES-D score of mothers of males among the study sample (t= 0.210, p=.834). Among mothers in the current study sample, 23.8% (N = 219) endorsed symptoms of depression on the CES-D that fell at or above the generally accepted cut-off score of 16, indicating significant levels of depressive symptoms. Table 6 provides the descriptive statistics about the CES-D scores.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>924</td>
<td>11.10</td>
<td>10.12</td>
<td>8.00</td>
<td>0 to 54</td>
</tr>
<tr>
<td>Mothers of Males</td>
<td>458</td>
<td>11.02</td>
<td>10.29</td>
<td>8.00</td>
<td>0 to 49</td>
</tr>
<tr>
<td>Mothers of Females</td>
<td>466</td>
<td>11.16</td>
<td>9.96</td>
<td>8.21</td>
<td>1 to 54</td>
</tr>
</tbody>
</table>
Mothers provided responses to the 20 items loading onto the state anxiety scale of the State-Trait Anxiety Inventory (STAI-S; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) as a measure of mothers’ symptoms of anxiety. Total scores were calculated by summing the responses to these 20 items, with possible scores ranging from 0-60 and higher scores indicating greater symptoms of anxiety. For the total study sample, the mean STAI-S score was (M = 27.89, SD = 5.78). For mothers of male adolescents, the mean STAI-S score was (M = 27.47, SD = 5.78). For mothers of female adolescents, the mean STAI-S score was (M = 27.79, SD = 5.79). There was no significant difference between the mean STAI-S score of mothers of females and the mean STAI-S score of mothers of males among the study sample (t= 0.841, p=.401).

Though the STAI-S provides an indicator of a current level of an individual’s experience of symptoms of anxiety, it is not a clinical diagnostic measure used independently to diagnose anxiety disorders. Thus, there is not a clinical cut-off score to indicate clinically significant levels of anxiety symptoms. However, numerous studies investigating the general distribution of STAI-S scores among non-clinical and clinical adult populations suggest that a general criterion of STAI-S score of > 30 is an acceptable indicator of an individual experiencing significant levels of symptoms of anxiety (e.g. Spielberger, Gorsuch, Lushene, & Jacobs, 1983; Dennis, Boddington & Funnell, 2007; Van der Bruggen et al., 2010). According to this established criterion, the mothers participating in the current dissertation study endorsed, on average, a level of symptoms slightly lower than that which would indicate significant levels of anxiety (STAI-S M = 27.89). Twenty-nine percent of mothers in the current sample (N = 268) endorsed symptoms of anxiety at a rate which resulted in an STAI-S score higher than 30, indicating a significant experience of current symptoms of anxiety according to the aforementioned criterion. Table 7 provides the descriptive statistics about the STAI-S scores.
Table 7

Descriptive Statistics: Mothers’ Scores on the State/Trait Anxiety Inventory – State (STAI-S)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>924</td>
<td>27.89</td>
<td>5.78</td>
<td>27.00</td>
<td>19 to 50</td>
</tr>
<tr>
<td>Mothers of Males</td>
<td>458</td>
<td>27.99</td>
<td>5.78</td>
<td>27.00</td>
<td>19 to 49</td>
</tr>
<tr>
<td>Mothers of Females</td>
<td>466</td>
<td>27.79</td>
<td>5.79</td>
<td>26.50</td>
<td>20 to 50</td>
</tr>
</tbody>
</table>

Intercorrelations Among All Variables

Pearson’s correlations were computed to determine the relationships among predictor and criterion variables utilized in the correlational and multiple regression analyses in the dissertation study. According to criterion regularly utilized in the social sciences to determine statistical significance for correlations between variables (e.g. Wilcox, 2005; Hemphill, 2003), many of the variables utilized in the current dissertation study were found to be highly correlated with one another as indicated by correlation coefficients of $r > 0.5$. Table 8 presents the resulting correlation coefficients.

Measures of maternal self-report of symptoms of distress (total CES-D score and total STAI-S score) were highly correlated ($r=0.758$, $p=0.01$) suggesting that as mothers reported higher levels of symptoms of anxiety, they also endorsed higher levels of symptoms of depression. Measures of adolescents’ self-report of internalizing symptoms (YSR Internalizing Total Raw) and externalizing symptoms were highly correlated, indicating that adolescents reporting higher levels of internalizing symptoms also reported higher levels of externalizing symptoms. Similarly, maternal reports of adolescents’ internalizing symptoms (CBCL Internalizing Total Raw) and externalizing symptoms (CBCL Externalizing Total Raw) were highly correlated.

Maternal self-report of level of anxiety symptoms (STAI-S total score) showed a significant, though quantitatively low, negative correlation with YSR-CBCL Internalizing
Difference score, indicating that higher levels of self-reported symptoms of anxiety were slightly related to lower adolescent self-report of internalizing symptoms in relation to maternal report of adolescent internalizing symptoms. In contrast, maternal self-report of level of anxiety symptoms (STAI-S total score) showed a significant, though quantitatively low, positive correlation with YSR-CBCL Externalizing Difference score.

Correlation coefficients between YSR and CBCL Total Raw Scores and YSR-CBCL Difference scores are not reported, as the YSR-CBCL Difference scores are calculated from the total raw scores, thus the correlation between these scores is not interpretively meaningful. Correlation coefficients between variables are presented in Table 8.
### Table 8

*Intercorrelations Between All Variables*

<table>
<thead>
<tr>
<th></th>
<th>CES-D</th>
<th>STAI-S</th>
<th>YSR Total Raw Internalizing</th>
<th>YSR Total Raw Externalizing</th>
<th>CBCL Total Raw Internalizing</th>
<th>CBCL Total Raw Externalizing</th>
<th>YSR – CBCL Internalizing Difference</th>
<th>YSR – CBCL Externalizing Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CES-D</td>
<td>1.00</td>
<td>.758**</td>
<td>.230**</td>
<td>.186**</td>
<td>.265**</td>
<td>.244**</td>
<td>.015</td>
<td>-.062</td>
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<tr>
<td>STAI-S</td>
<td>1.00</td>
<td>.165**</td>
<td>.148**</td>
<td>.266**</td>
<td>.237**</td>
<td>-.077*</td>
<td>.088**</td>
<td></td>
</tr>
<tr>
<td>YSR Total Raw Internalizing</td>
<td>1.00</td>
<td>.514**</td>
<td>.288**</td>
<td>.169**</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>YSR Total Raw Externalizing</td>
<td>1.00</td>
<td>.210**</td>
<td>.322**</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>CBCL Total Raw Internalizing</td>
<td>1.00</td>
<td>.600**</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>CBCL Total Raw Externalizing</td>
<td>1.00</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>YSR – CBCL Internalizing Difference</td>
<td>1.00</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>-.537**</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>YSR – CBCL Externalizing Difference</td>
<td>1.00</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

**p=.01    *p=.05
Research Purpose 1

Overview of Research Purpose 1

The first broad research purpose of the dissertation study was to determine the relationship between maternal report and adolescent self-report of adolescent mental health symptoms within the study sample. To accomplish this purpose, a detailed analysis of the correlation of maternal-report and adolescent self-report of adolescents' internalizing and externalizing symptoms was conducted. The following sections provide detailed descriptions of the data analytic plans utilized to accomplish this research purpose.

Assumptions for Statistical Analyses in Research Purpose 1

Four primary assumptions guide the use of correlation analyses in the social sciences, and were considered in the statistical analyses for the current dissertation study (Higgins, 2005). These assumptions include: all variables are measured on either an interval or ratio scale; normality (all variables must be normally distributed in the population); linearity (the relationship between the independent and dependent variables in linear in nature); and homoscedasticity (the variance of errors is the same across all levels of the independent variable).

The variables utilized in the correlation analyses for Research Purpose 1, including mothers’ and adolescents’ ratings of the adolescents internalizing and externalizing symptoms (mothers’ CBCL internalizing total raw score, mothers’ CBCL externalizing total raw score, adolescents’ YSR internalizing total raw score, and adolescents’ YSR externalizing total raw score) were each measured on a ratio scale, meaning that they are measured along a continuum and with an absolute 0 point. Thus, the first assumption of correlation analyses was met for the variables utilized in purpose 1 of the dissertation study.

The assumption of normality refers to the normal distribution of the errors of prediction
around all levels of each variable (Tabachnick & Fidell, 2007). To test for normality, the
Shapiro-Wilk \(W\) test was employed to examine the correlation between each variable (CBCL
internalizing total raw score, CBCL externalizing total raw score, YSR internalizing total raw
score, YSR externalizing total raw score) score and the corresponding normal scores, thus to test
that the sample comes from a normally distributed population (Shapiro & Wilk, 1965).
Generally, a \(W\) smaller than 1 suggests that the assumption of normality may not be met, and the
analyses should be conducted with caution. The Shapiro-Wilk \(W\) for each variable are as follows:
CBCL internalizing total raw score \((W = 0.983)\); CBCL externalizing total raw score \((W =
0.991)\); YSR internalizing total raw score \((W = 0.990)\); and YSR externalizing total raw score \((W =
0.905)\). Given that the \(W\) values for each variable were determined to be smaller than 1, further
analyses of the sample distribution across each variable is warranted.

To further examine the assumption of normality within the study sample, a visual review
of the residual scatter plots for each variable was conducted. These scatter plots, generated
through the command function of SPSS, depicted the standardized residuals as a function of the
standardized predicted values for each variable. (Osborne & Waters, 2002). Each scatter plot
showed slight violations of normality as indicated by scatter distribution about the normalized
regression line. However, given the large sample size \((N = 924)\) and the close approximation of
each \(W\) value to \(W=1\), it was acceptable to continue with multiple regression analyses using a
more conservative alpha level of .01 to test for significance (Osborne & Waters, 2002). The
scatter plots reflecting the sample distribution across each independent variable are found in
Appendix C.

Linearity in the context of correlation analyses refers to the assumption of a linear
relationship between the two variables included in the correlation (Higgins, 2005). As with the
assumption of normality, the assumption of linearity was assessed through a visual review of
scatter plots of the variables in each correlation. Specifically, the following graphs were
generated: a scatter plot of CBCL internalizing total raw score as a function of YSR
internalizing total raw score (hypothesis 1a.i) and a scatter plot of CBCL externalizing total raw
score as a function of YSR externalizing total raw score (hypothesis 1a.ii). No patterns or
clustering on the scatter plots were observed, as the points appeared to be randomly distributed
around the horizontal line without severe patterns or clustering (Stevens, 2009). Thus, linearity is
assumed for both correlation analyses. Scatter plots reflecting the tests of linearity are presented
in Appendix D.

Homoscedasticity refers to the assumption of equality among the standard deviations of
the errors of prediction for all levels of each variable (Osborne and Waters, 2002). Homoscedasticity
was assessed through review of the scatter plots of the standardized residuals as a function of
standardized predicted values for the following variables: CBCL internalizing total raw score,
CBCL externalizing total raw score, YSR internalizing total raw score, and YSR
externalizing total raw score. No violations of homoscedasticity were observed, as the amount of
scatter was roughly the same around the horizontal line. Thus, the assumption of
homoscedasticity was met for the variables included in the correlation analyses. The scatter plots
demonstrating the tests of homoscedasticity are found in Appendix C.

After conducting the aforementioned tests of assumptions and determining that no
violations existed, the researcher proceeded with statistical tests of the hypotheses in research
purpose 1, each of which is detailed in the following sections.

**Specific Purpose 1a**

Specific Purpose 1a was to determine the relationship between maternal report and
adolescent self-report of adolescent internalizing and externalizing symptoms.
Hypothesis 1a.i. Hypothesis 1a.i was as follows: The correlation between maternal report and adolescent self-report of adolescent internalizing symptom report will be low, with the criteria of $r < 0.3$ used to determine a low correlation (Hemphill, 2003).

Results for Hypothesis 1a.i. Total adolescent self-report of internalizing symptoms for each adolescent was calculated by summing the responses to the 31 items loading onto the YSR Internalizing factor scale. Total maternal report of adolescent internalizing symptoms for each adolescent was calculated by summing the responses to the 31 items loading onto the CBCL Internalizing factor scale. Pearson’s product moment correlation was conducted to determine the correlation between adolescent self-report (total YSR Internalizing score) and maternal report (total CBCL Internalizing score) among the mother-adolescent dyads in the study sample, with the correlation determined to be $r = 0.288$ ($p = .01$). Thus, the correlation between maternal report and adolescent self-report of internalizing symptoms was determined to be a low correlation, and hypothesis 1a.i was supported.

Hypothesis 1a.ii. Hypothesis 1a.ii was as follows: The correlation between maternal report and adolescent self-report of adolescent externalizing symptom report will be low, with the criteria of $r < .3$ used to determine a low correlation (Hemphill, 2003).

Results for Hypothesis 1a.ii. Total adolescent self-report of externalizing symptoms for each adolescent was calculated by summing the responses to the 31 items loading onto the YSR Externalizing factor scale. Total maternal report of adolescent externalizing symptoms for each adolescent was calculated by summing the responses to the 31 items loading onto the CBCL Externalizing factor scale. Pearson’s product moment correlation was conducted to determine the correlation between adolescent self-report (total YSR Externalizing score) and maternal report (total CBCL Externalizing score) among the maternal-adolescent dyads in the study sample, with the correlation determined to be $r = 0.322$ ($p = .01$). Thus, the correlation between maternal report...
report and adolescent self-report of externalizing symptoms was determined to be a moderate correlation, and hypothesis 1a.ii was not supported.

**Specific Purpose 1b**

Specific purpose 1b was to determine if a significant difference exists between the relationship of maternal report and adolescent self-report of adolescent internalizing symptoms, and the relationship of maternal report and adolescent self-report of externalizing symptoms. To accomplish this purpose, Fisher’s r to Z transformation of the correlation coefficients calculated in the testing of Hypotheses 1a.i and 1a.ii were conducted.

**Hypothesis 1b.** Hypothesis 1b was as follows: the correlation between maternal report and adolescent self-report of adolescent internalizing symptoms will be lower than the correlation between maternal report and adolescent self-report of adolescent externalizing symptoms.

**Results for Hypothesis 1b.** Fisher’s r to Z transformation was employed to determine if a significant difference exists between the relationship of maternal report and adolescent self-report of internalizing symptoms ($r = .288$) and the relationship of maternal report and adolescent self-report of externalizing symptoms ($r = .322$). The following equation was utilized to calculate the Z score for each the internalizing and the externalizing correlations determined in sections 1a.i and 1a.ii:

$$Z_r = \frac{1}{2} \log_e(1-r),$$

with the standard error of $Z_r$ calculated as: $\text{SE}_{Zr} = 1/\sqrt{n-3}$

The determined Z value for the Internalizing correlation was 0.296 (SE= .025), and the determined Z value for the Externalizing correlation was 0.334 (SE=.025).

Next, the following Fisher’s Z-test was employed to determine the significance of the difference between the internalizing and externalizing symptom correlations:

$$Z = \frac{Z_{int} - Z_{ext}}{SE_{ZD}} \quad \text{where } SE_{ZD} = \sqrt{\frac{1}{n1-3} + \frac{1}{n2-3}}.$$  Thus, $Z = (.296-.334)/.047.$
This calculation resulted in Z = -0.8 (p = .212), and the Z_{critical}(p=.05) = -1.645. Thus, hypothesis 1b was not supported, and there was no significant difference between the correlation of (maternal report and adolescent self-report of) adolescent internalizing symptoms and the correlation of (maternal report and adolescent self-report of) adolescent externalizing symptoms.

**Summary of Results for Research Purpose 1**

Results of the correlation analyses conducted suggest that the relationship between maternal report and adolescent self-report of adolescent internalizing symptoms among the study sample is considered to be within the low range (r=.288) according to criterion generally utilized in the social sciences (Hemphill, 2003), thus hypothesis 1a.i was supported. The strength of the relationship between maternal report and adolescent self-report of adolescent externalizing symptoms is considered to be within the moderate range (r=.322) according to this same criterion, thus hypothesis 1a.ii was not supported. No statistically significant difference was detected between the strength of the relationship of maternal report and adolescent self-report of internalizing symptoms and the relationship of maternal report and adolescent self-report of externalizing symptoms, thus hypothesis 1b was not supported.

**Research Purpose 2**

**Overview of Research Purpose 2**

The second broad research purpose of the dissertation study was to examine the relationship between self-reported maternal level of distress, adolescent gender, and the discrepancy between adolescent self-report and maternal report of adolescents’ internalizing and externalizing symptoms. The following sections provide detailed descriptions of the data analytic plans utilized to accomplish this research purpose.
Assumptions for Statistical Analyses in Research Purpose 2

Four primary assumptions guide the use of multiple linear regression analyses in the social sciences (Osborne & Walters, 2002), and were considered in the statistical analyses for the current dissertation study. These assumptions include: normality (all variables must have normal distribution); linearity (the relationship between the independent and dependent variables in linear in nature); reliability (the dependent and independent variables are measured without error); and homoscedasticity (the variance of errors is the same across all levels of the independent variable). Additionally, tests of multicolinearity were conducted to ensure independence of measurement among independent variables (Stevens, 2002).

The assumption of normality refers to the normal distribution of the errors of prediction around all levels of each variable (Tabachnick & Fidell, 2007). To test for normality, the Shapiro-Wilk $W$ test was employed to examine the correlation between each variable (maternal total CES-D score, maternal total STAI-S score, YSR-CBCL Internalizing difference score; and YSR-CBCL Externalizing difference score) and the corresponding normal distribution for the variable, to test that the sample comes from a normally distributed population (Shapiro & Wilk, 1965). Generally, a $W$ smaller than 1 suggests that the assumption of normality may not be met, and the analyses should be conducted with caution. The Shapiro-Wilk $W$ for each variable are as follows: CES-D ($W = 0.901$); STAI-S ($W = 0.939$); YSR-CBCL Internalizing difference score ($W = 0.998$); and YSR-CBCL Externalizing difference score ($W = 0.997$). Given that the $W$ values for each variable were determined to be smaller than 1, further analyses of the sample distribution across each variable is warranted.

To further examine the assumption of normality within the study sample, a visual review of the residual scatter plots for each variable was conducted. These scatter plots, generated through the command function of SPSS, depicted the standardized residuals as a function of the
standardized predicted values for each variable. (Osborne & Waters, 2002). Each scatter plot showed slight violations of normality as indicated by scatter distribution about the normalized regression line. However, given the large sample size (N = 924) and the close approximation of each \( W \) value to \( W=1 \), it was acceptable to continue with multiple regression analyses (Osborne & Waters, 2002). The scatter plots used to test the assumption of normality are found in Appendix E.

Linearity refers to the assumption of a linear relationship between each predicted dependent variable and the corresponding error of prediction (Tabachnick & Fidell, 2007). As with the assumption of normality, the assumption of linearity was assessed through a visual review of scatter plots for the variables in question. Specifically, a review of the scatter plot of the standardized residuals as a function of the standardized predicted variables was conducted for the following variables: YSR-CBCL Internalizing Difference Score and YSR-CBCL Externalizing Difference Score. No patterns or clustering on the scatter plots were observed, as the points appeared to be randomly distributed around the horizontal line without severe patterns or clustering (Stevens, 2009). Thus, linearity is assumed for the multiple regression analyses involving YSR-CBCL Internalizing Symptom Difference Score and YSR-CBCL Externalizing Symptom Difference Score. The scatter plots used to test the assumption of linearity are found in Appendix E.

In addition to the four primary assumptions of multiple regression, multicolinearity should be assessed before proceeding with multiple regression analyses (Stevens, 2002). Multicolinearity refers to a strong correlation between predictor variables utilized in multiple regression analyses. Strong correlation between predictor variables (e.g. \( r=0.50 \) or higher) suggests that variables are likely measuring similar constructs and may better contribute to the analytical model through consolidation into a composite variable (Leech et al., 2011). To
examine the assumption of colinearity, the “colinearity diagnostics” command was utilized in the SPSS Regression dialog command screen. The Variance Inflation Factors (VIF) were determined for CES-D total score and STAI-S total score, with a VIF of 5 or greater for any variable indicating colinearity associated with this variable.

For the first multiple regression model to test hypothesis 2a (YSR-CBCL Internalizing difference) the VIF values for each variable were as follows: CES-D total score (VIF = 2.353) and STAI-S total score (VIF = 2.353). Thus, it was determined that multicolinearity between predictor variables does not exist, and all variables are acceptable for inclusion in the multiple regression model for hypothesis 2a. For the second multiple regression model to test hypothesis 2b (YSR-CBCL Externalizing difference), the VIF values for each variable were as follows: CES-D (VIF = 2.353) and STAI-S (VIF = 2.353). Thus, it was determined that multicolinearity between predictor variables does not exist, and all variables are acceptable for inclusion in the multiple regression model for hypothesis 2b.

Reliability of measurement refers to the assumption that predictor variables utilized in regression analyses are assessed with acceptable validity and reliability. The assumption of reliability of measurement is considered to have been met for the standardized measures utilized in the dissertation study given the established validity and reliability of these measures (CES-D, STAI, YSR and CBCL). Specifically, the CES-D has documented internal consistency, with Cronbach’s alpha coefficients ranging from $\alpha= 0.85-0.9$ (Knight, Williams & McGee, 1997). Convergent validity with standardized assessments of depressive symptoms has demonstrated acceptable validity, with correlations ranging from 0.73-0.82 (Thombs, Hudson, Schieir, Taillefer & Baron, 2008). For the STAI-S, internal consistency coefficients have ranged from .86 to .95; and test-retest reliability coefficients have ranged from .65 to .75 over a 2-month interval (Spielberger et al., 1983).
Both the CBCL and YSR have shown Internal Consistency Coefficients ranging from 0.63-0.79 (p<0.01), as well as criterion-related validity significant at the p<0.01 level of analysis. The Internalizing and Externalizing higher-order factors have demonstrated adequate internal consistency in community samples (α > .90) for both the Child Behavior Checklist and Youth Self Report; (Achenbach & Rescorla, 2001), and test-retest reliability has been repeatedly demonstrated, with Cronbach’s alpha ranging from 0.8-0.9 in community and clinic samples (e.g. Berube & Achenbach, 20012).

It is important to note that there is no established data documenting the reliability of the YSR-CBCL Internalizing and YSR-CBCL Externalizing variables calculated for the current dissertation study to examine discrepancy between adolescent self-report and maternal report of adolescent symptoms. Measurement theory suggests that the reliability of raw score difference scores is generally lower than the reliability of the individual raw scores (Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Thus, the assumption of reliability of measurement could not be concluded for the YSR-CBCL Difference scores utilized in the current dissertation study. However, the use of raw discrepancy (difference) scores is widely accepted in analyses involving component measures of the ASEBA, including the YSR and CBCL/6-18 utilized in the current study, as it provides information regarding the degree and directionality of reporter discrepancy (Achenbach & Rescorla, 2001; Thurber & Sheehan, 2012).

Homoscedasticity refers to the assumption of equality among the standard deviations of the errors of prediction for all levels of dependent variables (Osborne & Waters, 2002). Homoscedasticity was assessed through review of the scatter plots of the standardized residuals as a function of standardized predicted values for the following variables: YSR-CBCL Internalizing Difference score and YSR-CBCL Externalizing Difference score. No violations of homoscedasticity were observed, as the amount of scatter was roughly the same around the
horizontal line. Thus, the assumption of homoscedasticity was met for the multiple regression analyses. Scatter plots utilized to determine the assumption of homoscedasticity are found in Appendix E.

**Specific Purpose 2a**

Specific purpose 2a was to determine the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of internalizing symptoms in boys and girls. To achieve this purpose, a multiple linear regression model was employed to investigate the relationship between the following variables: total maternal CES-D score, total maternal STAI-S score, adolescent gender, and YSR-CBCL Internalizing difference score.

**Hypothesis 2a.i.** Hypothesis 2a.i was as follows: Maternal level of distress will significantly predict the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms.

**Hypothesis 2a.ii.** Hypothesis 2a.ii was as follows: The relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms in mother/son dyads will be significantly different than the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms in mother/daughter dyads.

**Multiple linear regression for hypotheses 2a.i and 2a.ii.** A multiple linear regression model was employed to test the significance of the relationship between CES-D total score, STAI-S total score, adolescent gender, and YSR-CBCL Internalizing Difference score. The YSR-CBCL Internalizing Difference scores were calculated by subtracting CBCL Internalizing raw score (mother report) from YSR Internalizing raw score (adolescent report), thus positive values for the YSR-CBCL Internalizing Difference score indicate that adolescent report of
internalizing symptoms was higher than maternal report of adolescent internalizing symptoms. Negative values for the YSR-CBCL Internalizing Difference score indicate that adolescent report of internalizing symptoms was lower than maternal report of adolescent internalizing symptoms.

Using the SPSS linear regression command, the variable “YSR-CBCL Internalizing Difference” was entered as the dependent variable. To test the relationship between maternal level of distress and the discrepancy of internalizing symptom report (hypothesis 2a.i), the following maternal distress variables were entered into step 1 (“Block 1 of 2” in the independent variable frame in the SPSS dialog box) of the model: CES-D total score and STAI-S total score.

To test for the significance of the contribution of adolescent gender to the model, specifically to determine whether the relationship between maternal distress and discrepancy of internalizing symptom report is significantly different between mother/son and mother/daughter dyads (hypotheses 2a.ii), the variable “adolescent gender” (coded Male =0 and Female =1) was used to compute the following interaction terms: Gender*CESD and Gender*STAI-S.

Both interaction terms were entered into step 2 (“Block 2 of 2” in the independent variable frame in the SPSS dialog box) of the model, to determine if maternal self-report of depressive symptoms (Gender*CESD) and anxiety symptoms (Gender*STAI-S) differentially predicts YSR-CBCL Internalizing Difference scores according to adolescent gender. The resulting B-values associated with each interaction term are summative weights, thus are added to the original model from step 1 to determine whether the addition of the interaction terms significantly contributes to a greater explanation of variance in the dependent variable. A significant β associated with either interaction term would indicate that the interaction of adolescent gender and CES-D score (Gender*CESD) and/or the interaction of adolescent gender and STAI-S score (Gender*STAI-S) significantly contributes to the prediction of YSR-CBCL
Internalizing difference score. The complete multiple regression model was run utilizing an alpha level of 0.05 to test for significance.

**Results for Hypothesis 2a.i.** The combined model of total CES-D score and total STAI-S score significantly predicted YSR-CBCL Internalizing Difference score ($R^2 = .010$, $F(2, 923) = 4.838$, $p = .008$). The adjusted $R^2$ value was .008, indicating that only 0.8% of the variance in YSR-CBCL Internalizing difference scores was explained by the model. Ranging from 0 to 1, higher $R^2$ values indicate a higher magnitude of the strength of the relationship between the variables included in a regression model (Cohen, 1998; Wilcox, 2005). As the sample size utilized in a regression analysis increases, the $R^2$ value necessary to determine significance decreases. Thus, for the current dissertation study sample of $N = 924$, the $R^2$ value of .008, while statistically significant, is very low in magnitude.

It was determined that maternal self-report of depressive symptoms, as indicated by CES-D total score, significantly contributed to the prediction of YSR-CBCL Internalizing Difference Score ($\beta = .103$, $p = .042$), as did maternal self-report of anxiety symptoms, as indicated by STAI-S total score ($\beta = -.155$, $p = .002$). Interestingly, maternal total CES-D score was determined to have a significant positive relationship with YSR-CBCL Internalizing Difference score, whereas maternal total STAI-S score was determined to have a significant negative relationship with YSR-CBCL Internalizing Difference score.

Thus, in the total model examining the relationship between maternal distress and YSR-CBCL Internalizing Difference scores, higher self-reported levels of maternal depressive symptoms (CES-D total score) predicted greater YSR-CBCL Internalizing Difference scores, with adolescents reporting more internalizing symptoms than were endorsed by their mothers. In contrast, higher levels of self-reported maternal symptoms of anxiety (STAI-S total score)
predicted lower YSR-CBCL Internalizing Difference scores, with adolescents reporting fewer internalizing symptoms than were endorsed by their mothers.

Regression results are presented in Table 9, with specific regression coefficients for each independent variable presented in Table 10.

**Results for Hypothesis 2a.ii.** With the addition of adolescent gender to the aforementioned regression model, the combined model of total CES-D score, total STAI-S score, the interaction term Gender*CESD and the interaction term Gender*STAIS significantly predicted YSR-CBCL Internalizing Difference Score ($R^2 = .014$, $F(4, 923) = 3.212$, $p = .012$). The adjusted $R^2$ value was .009, indicating that 0.9% of the variance in YSR-CBCL Internalizing difference scores was explained by the model. As the sample size utilized in a regression analysis increases, the $R^2$ value necessary to determine significance decreases. Thus, for the current dissertation study sample of $N = 924$, the $R^2$ value of .009, while statistically significant, is very low in magnitude.

However, utilizing Cohen’s $f^2$ test for significance, the incorporation of adolescent gender was not found to significantly contribute to the prediction of the relationship between maternal distress and YSR-CBCL Internalizing difference score above and beyond the prediction from maternal distress ($R^2_{\text{change}} = .003$, $F_{\text{change}} = 1.580$, $p = .207$). Furthermore, neither the interaction term Gender*CESD ($\beta = .081$, $p = .245$) nor the interaction term Gender*STAIS ($\beta = -.012$, $p = .836$) significantly predicted YSR-CBCL Internalizing difference scores. Thus, it was determined that no significant difference exists in the relationship between maternal level of distress and discrepancy of internalizing symptom report among mother/son and mother/daughter dyads.

Regression results are presented in Table 9, with specific regression coefficients for each independent variable presented in Table 10.
Table 9

Summary of Regression Analyses for Total CES-D, Total STAI-S, Gender*CESD and Gender*STAIS Predicting YSR-CBCL Internalizing Difference Score

<table>
<thead>
<tr>
<th>Model 1: CES-D and STAI-S</th>
<th>Model 2: CES-D, STAI-S, Gender<em>CESD, Gender</em>STAIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>.102</td>
</tr>
<tr>
<td>R²</td>
<td>.010</td>
</tr>
<tr>
<td>Adj. R²</td>
<td>.008</td>
</tr>
<tr>
<td>SE of Est.</td>
<td>12.063</td>
</tr>
<tr>
<td>Df</td>
<td>2</td>
</tr>
<tr>
<td>F</td>
<td>4.838</td>
</tr>
<tr>
<td>Sig. (p)</td>
<td>.008</td>
</tr>
</tbody>
</table>

Table 10

Regression Coefficients Between CES-D, STAI-S, Gender*CESD, Gender*STAIS, and YSR-CBCL Internalizing Difference Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th></th>
<th></th>
<th>Model 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE (B)</td>
<td>β</td>
<td>Sig. (p)</td>
<td>B</td>
<td>SE (B)</td>
</tr>
<tr>
<td>CES-D</td>
<td>.123</td>
<td>.060</td>
<td>.103*</td>
<td>.042</td>
<td>.066</td>
<td>.077</td>
</tr>
<tr>
<td>STAI-S</td>
<td>-.324</td>
<td>.105</td>
<td>-.155**</td>
<td>.002</td>
<td>-.312</td>
<td>.108</td>
</tr>
<tr>
<td>Gender*CESD</td>
<td></td>
<td></td>
<td></td>
<td>.109</td>
<td>.094</td>
<td>.081</td>
</tr>
<tr>
<td>Gender*STAIS</td>
<td></td>
<td></td>
<td></td>
<td>-.010</td>
<td>.050</td>
<td>-.012</td>
</tr>
</tbody>
</table>

*p=.05   **p=.01

Specific Purpose 2b

Specific purpose 2b was to determine the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms. To achieve this purpose, a multiple linear regression model was employed to investigate the relationship between the following variables: total maternal CES-D
score, total maternal STAI-S score, YSR-CBCL Externalizing difference score, and adolescent gender.

**Hypothesis 2b.i.** Hypothesis 2b.i was as follows: Maternal level of distress will significantly predict the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms.

**Hypothesis 2b.ii.** Hypothesis 2b.ii was as follows: The relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms in mother/son dyads will be significantly different than the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms in mother/daughter dyads.

**Multiple linear regression for hypotheses 2b.i and 2b.ii.** A multiple linear regression model was employed to test the significance of the relationship between CES-D total score, STAI-S total score, adolescent gender, and YSR-CBCL Externalizing Difference score. The YSR-CBCL Externalizing Difference scores were calculated by subtracting CBCL Externalizing raw score (mother report) from YSR Externalizing raw score (adolescent report), thus positive values for the YSR-CBCL Externalizing Difference score indicate that adolescent report of internalizing symptoms was higher than maternal report of adolescent externalizing symptoms. Negative values for the YSR-CBCL Externalizing Difference score indicate that adolescent report of externalizing symptoms was lower than maternal report of adolescent externalizing symptoms.

Using the SPSS linear regression command, the variable “YSR-CBCL Externalizing Difference” was entered as the dependent variable. To test the relationship between maternal level of distress and the discrepancy of externalizing symptom report (hypothesis 2b.i), the
following maternal distress variables were entered into step 1 (“Block 1 of 2” in the independent variable frame in the SPSS dialog box) of the model: CES-D total score and STAI-S total score.

To test for the significance of the contribution of adolescent gender to the model, specifically to determine whether the relationship between maternal distress and discrepancy of externalizing symptom report is significantly different between mother/son and mother/daughter dyads (hypotheses 2b.ii), the variable “adolescent gender” (coded Male =0 and Female =1) was used to compute the following interaction terms: Gender*CESD and Gender*STAIS.

Both interaction terms were entered into step 2 (“Block 2 of 2” in the independent variable frame in the SPSS dialog box) of the model, to determine if maternal self-report of depressive symptoms (Gender*CESD) and anxiety symptoms (Gender*STAIS) differentially predict YSR-CBCL Externalizing difference score according to adolescent gender. The resulting B-values associated with each interaction term are summative weights, thus are added to the original model from step 1 to determine whether the addition of the interaction terms significantly contributes to a greater explanation of variance in the dependent variable. A significant β associated with either interaction term would indicate that the interaction of adolescent gender and CES-D score (Gender*CESD) and/or the interaction of adolescent gender and STAI-S score (Gender*STAI-S) significantly contributes to the prediction of YSR-CBCL Externalizing difference scores. The complete multiple regression model was run utilizing an alpha level of 0.05 to test for significance.

**Results for Hypothesis 2b.i.** The combined model of total CES-D score and total STAI-S score variables significantly predicted YSR-CBCL Externalizing Difference score ($R^2 = .008$, $F(2,923) = 3.657$, $p = .027$). The adjusted $R^2$ value was .006, suggesting that only 0.6% of the variance in YSR-CBCL Externalizing Difference scores was explained by the model. As the sample size utilized in a regression analysis increases, the $R^2$ value necessary to determine
significance decreases (Cohen, 1998; Wilcox, 2005). Thus, for the current dissertation study sample of N = 924, the $R^2$ value of .006, while statistically significant, is actually quite low in magnitude.

It was determined that maternal self-report of anxiety symptoms, as indicated by STAI-S total score, significantly contributed to the prediction of YSR-CBCL Externalizing Difference score ($\beta = .099$, $p = .049$). Maternal report of anxiety symptoms, as indicated by STAI-S total score, was determined to have a significant positive relationship with YSR-CBCL Externalizing Difference scores, thus higher self-reported levels of maternal anxiety symptoms (STAI-S total score) significantly predicted higher YSR-CBCL Externalizing Difference scores.

In contrast, maternal report of depressive symptoms, as indicated by CES-D total score, did not significantly contribute to the prediction of YSR-CBCL Externalizing difference score ($\beta = -.012$, $p = .806$). Thus, although the complete model accounted for a statistically significant portion of the variance in YSR-CBCL Externalizing difference scores, the individual variable CES-D total score was not determined to significantly predict YSR-CBCL Externalizing difference score.

**Results for Hypothesis 2b.ii.** With the addition of adolescent gender to the aforementioned regression model, the combination of total CES-D score, total STAI-S score, the interaction term Gender*CESD and the interaction term Gender*STAIS did not explain a significant portion of the variance in YSR-CBCL Externalizing difference scores ($R^2 = .009$, $F(4,923) = 2.029$, $p = .088$). The adjusted $R^2$ value was .004, indicating that only 0.4% of the variance in YSR-CBCL Externalizing difference scores was explained by the model. Neither the interaction term Gender*CESD ($\beta = -.045$, $p = .518$) nor the interaction term Gender*STAIS ($\beta = -.009$, $p = .875$) significantly predicted YSR-CBCL Externalizing difference score. Thus, hypothesis 2b.ii was rejected, and there was no significant difference in the relationship between
maternal level of distress and the discrepancy of adolescent self-report and maternal report of adolescent externalizing symptoms between mother/son and mother daughter dyads.

Regression results are presented in Table 11, with specific regression coefficients for each independent variable presented in Table 12.

Table 11

Summary of Regression Analyses for Total CES-D, Total STAI-S, Gender*CESD and Gender*STAIS Predicting YSR-CBCL Externalizing Difference Score

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>R²</th>
<th>Adj. R²</th>
<th>SE of Est.</th>
<th>Df</th>
<th>F</th>
<th>Sig. (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: CESD and STAI-S</td>
<td>.088</td>
<td>.008</td>
<td>.006</td>
<td>11.810</td>
<td>2</td>
<td>3.627</td>
<td>.027</td>
</tr>
<tr>
<td>Model 2: CESD, STAI-S, Gender<em>CESD, Gender</em>STAIS</td>
<td>.094</td>
<td>.009</td>
<td>.004</td>
<td>11.812</td>
<td>4</td>
<td>2.029</td>
<td>.088</td>
</tr>
</tbody>
</table>

Table 12

Regression Coefficients Between CES-D, STAI-S, Gender*CESD, Gender*STAIS and YSR-CBCL Externalizing Difference Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE (B)</td>
<td>β</td>
<td>Sig. (p)</td>
</tr>
<tr>
<td>CESD</td>
<td>-.014</td>
<td>.059</td>
<td>-.012</td>
<td>.806</td>
</tr>
<tr>
<td>STAI-S</td>
<td>.199</td>
<td>.103</td>
<td>.099*</td>
<td>.049</td>
</tr>
<tr>
<td>Gender*CESD</td>
<td>-.060</td>
<td>.092</td>
<td>-.045</td>
<td>.518</td>
</tr>
<tr>
<td>Gender*STAIS</td>
<td>.008</td>
<td>.049</td>
<td>.009</td>
<td>.875</td>
</tr>
</tbody>
</table>

*p=.05
Summary of Results for Research Purpose 2

The second broad research purpose of the current dissertation study was to examine the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescents’ internalizing and externalizing symptoms. Results of multiple linear regression analyses revealed that the combined model of total maternal distress, as measured by CES-D total score and STAI-S total score, significantly predicted both YSR-CBCL Internalizing Difference scores and YSR-CBCL Externalizing difference scores. Thus, the amount of variance in YSR-CBCL Internalizing Difference scores (.8%) explained by the combined model of CES-D and STAI-S scores, though small, is statistically significantly different from 0. Similarly, the amount of variance in YSR-CBCL Externalizing Difference scores (1%) explained by the combined model of CES-D and STAI-S scores, though small, is statistically significantly different from 0.

Interestingly, total CES-D score was determined to have a significant positive relationship with YSR-CBCL Internalizing Difference score, thus higher levels of maternal self-reported depressive symptoms predicted that adolescent self-report of internalizing symptoms would be higher than maternal report of adolescent internalizing symptoms. In contrast, total STAI-S score was determined to have a significant negative relationship with YSR-CBCL Internalizing Difference score, thus higher levels of maternal self-reported anxiety symptoms predicted that adolescent self-report of internalizing symptoms would be lower than maternal report of adolescent internalizing symptoms.

With regards to externalizing symptom discrepancy, total STAI-S score was determined to have a significant negative relationship with YSR-CBCL Externalizing Difference score, thus higher levels of maternal self-reported anxiety symptoms predicted that adolescent self-report of externalizing symptoms would be lower than maternal report of adolescent externalizing
symptoms. Total CES-D score was not found to significantly predict YSR-CBCL Externalizing Difference score.

Neither the interaction term Gender*CESD nor the interaction term Gender*STAIS significantly contributed to the prediction of discrepancy in internalizing or externalizing symptom report. Thus, there was no significant difference in the relationship between maternal level of distress and the discrepancy of adolescent self-report and maternal report of adolescent symptoms between mother/son and mother/daughter dyads.
Epidemiological estimates suggest that 46.3% of American adolescents will experience significant symptoms of mental health disorders before the age of 18 (SAMHSA, 2009), yet as many as 43% of those with clinically significant levels of symptoms will not receive treatment (Kessler et al., 2010; Merikangas et al., 2010). One-half of all chronic mental illness begins by the age of 14, yet many individuals experience delays of as much as a decade before receiving treatment (National Institute of Mental Health, 2005). Left untreated, symptoms of mental health disorders can cause significant impairments in current and future functioning. Declines in academic achievement (Gilman & Anderman, 2006), increased suicide risk (Keyes, 2006), impaired social skill development (Heinrich & Gullon, 2006), and increased risk for severe mental health problems in adulthood (Burke, Hipwell & Lober, 2010) are all shown to be associated with persistent untreated symptoms of mental health disorders in adolescence. Adolescents are significantly less likely to self-refer to mental health treatment than are adults in need of services (DeLos Reyes et al., 2008), and most referrals for services are dependent upon symptom detection by adults in close proximity to the adolescent.

Unfortunately, research suggests that adults (e.g. parents and teachers) are not always accurate reporters of symptoms of mental health disorders in adolescence, particularly when adolescents are experiencing significant internalizing distress (e.g. Kessler et al., 2010; Pearcy, Clopton & Pope, 2010). Adolescents exhibiting externalizing behavioral symptoms are consistently referred to school-based mental health services by teachers at significantly higher rates than are adolescents exhibiting internalizing mental health symptoms (Evans, Foa, Gur & Hendin, 2005; Fergusson, Horwood, Ridder & Beautris, 2005). Researchers have suggested that
the symptomatic expression of adolescents with mood disorders and internalizing mental health symptoms is not easily identifiable to outside observers, and that the quiet nature of this symptom expression does not prove disruptive to the classroom as do externalizing behavioral problems, thus these adolescents often are not perceived by teachers as needing mental health treatment (Percy, Clopton & Pope, 2010).

**Maternal Detection of Adolescent Distress**

Mothers serve as potentially rich informants regarding the mental health symptoms of their adolescents, as they have unique information of the adolescent’s developmental history and typical behavior and emotional expression, and are familiar with adolescents’ functioning across time and situation (De Los Reyes, Goodman & Kleiwer, 2010). Thus, mothers may be the first to note changes in adolescent behavior and mood which may indicate the presence of mental health symptoms or distress. However, research into the relationship of maternal report of adolescent mental health symptoms and adolescent self-report of mental health symptoms consistently documents low inter-rater reliability with regards to internalizing symptoms (Baldwin & Dadds, 2007). This suggests that mothers appear to be more reliable in identifying externalizing symptom expression than internalizing symptom expression in adolescents (Collishaw, Goodman & Ford, 2009). These findings indicate that parents and teachers may not be effectively detecting symptoms of adolescent internalizing distress which might warrant the need for mental health services. Given that most adolescent referrals for services are dependent upon an adult’s detection of the adolescents’ needs, these findings are particularly concerning.

The current dissertation study was designed to examine the relationship between maternal report and adolescent self-report of adolescent internalizing and externalizing symptoms of mental health problems. In contrast to previous research into the “accuracy” of maternal report of adolescent symptoms when evaluated by comparison to a third-party rater (e.g. Berg-Nielson,
Vika & Dahl, 2003; Ford et al., 2005; Silberg, Maes & Eaves, 2010), the current study aimed to examine the relationship between maternal report of adolescent symptoms and adolescents’ self-report of their own subjective experience of internalizing and externalizing symptoms. This is an empirically valid distinction, as even sub-clinical levels of symptoms of mental health problems have been shown to detrimentally impact adolescents’ current and future functioning (Evans et al., 2005; Fergusson et al., 2005).

**Maternal Distress and the Discrepancy Between Maternal Report and Adolescent Self-Report of Symptoms**

In addition to examining the relationship between maternal report and adolescent self-report of internalizing and externalizing symptoms in a community-based sample, the dissertation study was designed to investigate potential factors which may relate to discrepancies between maternal report and adolescent self-report of symptoms. Specifically, mothers’ subjective level of personal distress was examined with relation to mothers’ detection of adolescent symptoms that were endorsed by adolescents’ self-reports. Previous research has suggested a relationship between maternal distress and the discrepancy between maternal report and child report of children’s mental health problems (Briggs-Gowan, Carter, & Schwab-Stone, 1996; Collishaw et al., 2009; Rubio-Stipec et al., 2003; Youngstrom et al., 2000), with maternal distress associated with mothers reporting fewer internalizing symptoms than were endorsed on children’s self-report, yet more externalizing symptoms in compared to children’s self-report.

With regards to adolescent mental health symptoms, Schmidst and colleagues (2006) found that distressed mothers reported normative adolescent behaviors as clinically significant externalizing behavior problems, whereas non-distressed mothers reported these same behaviors as normative. In addition to clinically significant distress, mothers with mildly depressed mood (Bettles, 1998) and those with subjective experiences of psychological distress (e.g. Lovejoy,
Graczyk, O’Hare & Neuman, 2000) have been found to be less attentive to signs of their children’s emotional distress. As subclinical levels of depressed mood and subjective distress are much more prevalent in the general population than are clinically significant Depression and Anxiety disorders, it is important that we begin to examine the relationship between mothers’ subjective experiences of distress and the discrepancy between maternal report and adolescent self-report of symptoms of mental health problems. Thus, the current dissertation study employed a community-based sample in which to examine the relationship between maternal distress and the discrepancy in maternal report and adolescent self-report of symptoms.

**Adolescent Gender as a Factor in the Discrepancy Between Maternal Report and Adolescent Self-Report of Symptoms**

Although there is a small existing body of evidence (e.g. De Los Reyes, Goodman & Kleiwer, 2010; Tan & Rey, 2005) suggesting a relationship between maternal distress and discrepancy between maternal report and adolescent self-report of symptoms, there currently does not exist any evidence of a potential differential relationship among mother-daughter and mother-son dyads. Thus, does adolescent gender impact the relationship between maternal distress and the discrepancy between maternal report and adolescent self-report of internalizing and externalizing symptoms? The current dissertation study was designed to include an examination of the potential interaction of maternal distress and adolescent gender with relation to the discrepancy between maternal report and adolescent self-report of internalizing and externalizing symptoms.

Research consistently shows that females experiencing mental health problems are more likely to develop internalizing symptomology during adolescence, whereas males are more likely to manifest externalizing symptoms (Cohen, Cohen, Kasen & Velez, 1993; Costello et al., 2006; Kuperman, Schlosser, Lidral & Reich, 1999; Ohannessian et al., 2010). The theory of “gender-
role intensification” during adolescence (Hill & Lynch, 1983) proposes that adolescence is a crucial period of saliency of social gender roles during which modeling of same-sex parent increases, including a modeling of coping skills and emotional regulation. However, mothers experiencing distress have been found to be less emotionally available to their adolescents to help the adolescents mitigate stressful life events or effectively cope with negative experiences or trauma (Klimes-Dougan, 2002), two skills which are necessary components for healthy resilient development and protective factors from development of affective disorders (Nolen-Hoeksema, 1991).

Furthermore, estimates contend that children of depressed mothers are six times more likely to be diagnosed with Major Depressive Disorder as adults than are children of non-depressed mothers (Downey & Coyne, 1990). The genetic risk factor may place female adolescents of depressed mothers at increased risk of pathological emotional development (Jacobson & Rowe, 1999). Thus, adolescent females of distressed mothers may be at increased risk for developing negative coping, poor resilience and subsequent psychological distress due to the “perfect storm” of genetic, behavioral, and attachment risk factors associated with maternal distress. Furthermore, the primary internalizing nature of symptom expression common among adolescent females may not be readily detected by mothers experiencing distress.

Whereas gender difference theories of symptom expression may support the hypothesis that symptoms of mental health disorders in adolescent females may be less likely to be detected by mothers experiencing personal distress, gender identification theories may contradict this hypothesis. Specifically, psychoanalytic theories of gender identification (e.g. Freud, 1987; Gabbard, 2010; Semeonoff, 1987) may provide support for a competing hypothesis in which distressed mothers will be more likely to endorse symptoms of mental health disorders in their daughters than in their sons due to the increased identification with same-gendered offspring and
potential projection of maternal distress symptoms onto the same-gendered offspring. In this conceptualization, one can hypothesize that distressed mothers may indeed endorse more symptoms in their daughters than in their sons due to projection of the mother’s own symptoms of distress onto same-gendered offspring. Though an empirical test of these theoretical constructs was beyond the scope of the dissertation study, the current dissertation study included an examination of potential differences in the relationship between maternal distress and the discrepancy of adolescent self-report and maternal report of internalizing and externalizing symptoms among mother/son and mother/daughter dyads.

**Summary of Study Purpose**

Utilizing data collected during phase IV of The National Institute of Child Health & Human Development Study of Early Child Care and Youth Development (SECCYD), a sample of 924 mother-adolescent dyads was employed to examine the relationship between maternal report and adolescent self-report of adolescent internalizing and externalizing symptoms. Additionally, maternal self-reported level of distress and adolescent gender were examined with respect to the discrepancy between maternal report and adolescent self-report of symptoms.

Adolescent self-report of internalizing and externalizing symptoms was assessed using the Youth Self Report/6-18 (YSR). Maternal report of adolescent internalizing and externalizing symptoms was assessed using the Child Behavior Checklist (CBCL). Maternal self-reported level of distress was ascertained by scores on the Centers for Epidemiological Studies Depression Scale (CES-D) and on the State-Trait Anxiety Inventory State Scale (STAI-S).

**Summary of Results**

Research Purpose 1: Determine the Relationship Between Maternal Report and Adolescent Self-Report of Adolescents’ Internalizing and Externalizing Symptoms
The first broad research purpose of the dissertation study was to determine the relationship between maternal report and adolescent self-report of adolescent mental health symptoms within the study sample. To accomplish this purpose, a detailed analysis of the correlations of maternal-report and adolescent self-report of adolescents’ internalizing and externalizing symptoms was conducted.

**Specific purpose 1a.** Specific Purpose 1a was to determine the relationship between maternal report and adolescent self-report of adolescent internalizing and externalizing symptoms.

**Hypothesis 1a.i.** Hypothesis 1a.i was as follows: The correlation between maternal report and adolescent self-report of adolescent internalizing symptom report will be low, with the criteria of $r < 0.3$ used to determine a low correlation (Hemphill, 2003).

**Results for Hypothesis 1a.i.** According to established criterion to qualify the magnitude of correlation coefficients (Hemphill, 2003), the relationship between maternal report and adolescent self-report of internalizing symptoms was determined to be a low relationship, and hypothesis 1a.i was supported.

**Hypothesis 1a.ii.** Hypothesis 1a.ii was as follows: The correlation between maternal report and adolescent self-report of adolescent externalizing symptoms will be low, with the criteria of $r < .3$ used to determine a low correlation (Hemphill, 2003).

**Results for Hypothesis 1a.ii.** According to established criterion to qualify the magnitude of correlation coefficients (Hemphill, 2003), the relationship between maternal report and adolescent self-report of externalizing symptoms was determined to be a moderate relationship, and hypothesis 1a.ii was not supported.

**Specific purpose 1b.** Specific purpose 1b was to determine if a significant difference exists between the relationship of maternal report and adolescent self-report of adolescent
internalizing symptoms, and the relationship of maternal report and adolescent self-report of externalizing symptoms. To accomplish this purpose, Fisher’s r to Z transformation of the correlation coefficients calculated in the testing of Hypotheses 1a.i and 1a.ii was conducted.

**Hypothesis 1b.** Hypothesis 1b was as follows: the correlation between maternal report and adolescent self-report of adolescent internalizing symptoms will be lower than the correlation between maternal report and adolescent self-report of adolescent externalizing symptoms.

*Results for hypothesis 1b.* There was no statistical significance in the difference between the correlation of (maternal report and adolescent self-report of) adolescent internalizing symptoms and the correlation of (maternal report and adolescent self-report of) adolescent externalizing symptoms, thus hypothesis 1b was not supported.

**Research Purpose 2: Examination of Factors Related to Discrepancy**

The second broad research purpose of the dissertation study was to examine relationship between self-reported maternal level of distress, adolescent gender, and the discrepancy between adolescent self-report and maternal report of adolescents’ internalizing and externalizing symptoms.

**Specific purpose 2a.** Specific purpose 2a was to determine the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of internalizing symptoms in boys and girls. To achieve this purpose, a multiple linear regression model was employed to investigate the relationship between the following variables: total maternal CES-D score, total maternal STAI-S score, adolescent gender, and YSR-CBCL Internalizing difference score.
**Hypothesis 2a.i.** Hypothesis 2a.i was as follows: Maternal level of distress will significantly predict the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms.

**Results for Hypothesis 2a.i.** The combined model of total CES-D score and total STAI-S score variables significantly predicted YSR-CBCL Internalizing difference score, thus hypothesis 2a.i was supported. However, though significant given the large sample size, the model only explained .9% of the total variance in YSR-CBCL Internalizing difference scores. It was determined that maternal self-report of depressive symptoms, as indicated by CES-D total score, significantly contributed to the prediction of YSR-CBCL Internalizing Difference score, as did maternal self-report of anxiety symptoms, as indicated by STAI-S total score.

Maternal total CES-D score was determined to have a significant positive relationship with YSR-CBCL Internalizing difference score, whereas maternal total STAI-S score was determined to have a significant negative relationship with YSR-CBCL Internalizing difference score. Thus, in the total model examining the relationship between maternal distress and discrepancy of internalizing symptom reports, higher self-reported levels of maternal depressive symptoms (CES-D total score) predicted higher YSR-CBCL Internalizing difference scores, with adolescents reporting more internalizing symptoms in comparison to maternal report of adolescent symptoms. In contrast, higher levels of self-reported maternal symptoms of anxiety (STAI-S total score) predicted lower YSR-CBCL Internalizing Difference scores, with adolescents reporting fewer internalizing symptoms in comparison to maternal report of adolescent symptoms.

**Hypothesis 2a.ii.** Hypothesis 2a.ii was as follows: The relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms in mother/son dyads will be significantly different than the
relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent internalizing symptoms in mother/daughter dyads.

Results for hypothesis 2a.ii. With the addition of adolescent gender to the aforementioned regression model by computing the interaction terms Gender*CESD and Gender*STAIS, the combined model of total CES-D score, total STAI-S score, Gender*CESD and Gender*STAIS significantly predicted YSR-CBCL Internalizing Difference score. However, utilizing Cohen’s $f^2$ test for significance, the addition of the interaction terms was not found to significantly contribute to the prediction of discrepancy in internalizing symptom report above and beyond the prediction by maternal distress. Furthermore, neither the interaction term Gender*CESD nor the interaction term Gender*STAIS was significantly related to the prediction of YSR-CBCL Internalizing difference scores. Thus, it was determined that no significant difference exists in the relationship between maternal level of distress and discrepancy of internalizing symptom report among mother/son and mother/daughter dyads. Hypothesis 2a.ii was not supported.

Specific purpose 2b. Specific purpose 2b was to determine the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms. To achieve this purpose, a multiple linear regression model was employed to investigate the relationship between the following variables: total maternal CES-D score, total maternal STAI-S score, YSR-CBCL Externalizing difference score, and adolescent gender.

Hypothesis 2b.i. Hypothesis 2b.i was as follows: Maternal level of distress will significantly predict the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms.

Results for hypothesis 2b.i. The combined model of total CES-D score and total STAI-S score variables significantly predicted YSR-CBCL Externalizing difference score, thus
hypothesis 2b.i was supported. Though significant given the large sample size, the model only explained .6% of the total variance in YSR-CBCL Externalizing difference scores. Maternal self-report of anxiety symptoms, as indicated by STAI-S total score, was determined to have a significant positive relationship with YSR-CBCL Externalizing difference scores, thus higher self-reported levels of maternal anxiety symptoms (STAI-S total score) was related to higher adolescent self report of externalizing symptoms in comparison to maternal report of adolescent externalizing symptoms. Maternal report of depressive symptoms, as indicated by CES-D total score, was not determined to significantly contribute to the prediction of YSR-CBCL Externalizing Difference score.

**Hypothesis 2b.ii.** Hypothesis 2b.ii was as follows: The relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms in mother/son dyads will be significantly different than the relationship between maternal level of distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms in mother/daughter dyads.

**Results for hypothesis 2b.ii.** With the addition of adolescent gender to the aforementioned regression model by computing the interaction terms Gender*CESD and Gender*STAIS, the combined model of total CES-D score, total STAI-S score, Gender*CESD and Gender*STAIS did not significantly predicted YSR-CBCL Externalizing Difference score. Furthermore, neither the interaction term Gender*CESD nor the interaction term Gender*STAIS was significantly related to YSR-CBCL Externalizing difference scores. Thus, it was determined that no significant difference exists in the relationship between maternal level of distress and discrepancy of externalizing symptom report among mother/son and mother/daughter dyads. Hypothesis 2b.ii was not supported.
Discussion of the Results

Prevalence of Adolescent Symptoms of Mental Health Problems

To ascertain prevalence rates of self-reported internalizing and externalizing symptoms among the adolescent population in the dissertation study, thus providing a context for comparison to rates established in previous research studies, descriptive statistics were calculated for the Internalizing and Externalizing factor scales of the Youth Self Report. For the current dissertation study, adolescent self-report of internalizing and externalizing symptoms of mental health problems was assessed in a diverse community-based sample of 924 youth. Results indicate that the majority of adolescent participants (92.6% of females and 93.2% of males) reported levels of internalizing symptoms that fell within the Average (not at-risk) range of T-scores according to the YSR normative sample (Achenbach & Rescorla, 2001). Similarly, the majority of adolescent participants (95.4% of females and 96.8% of males) reported levels of externalizing symptoms that fell within the Average (not at-risk) range of T-scores according to the YSR normative sample (Achenbach & Rescorla, 2001).

In contrast, 7.4% of the female adolescents and 6.8% of the male adolescents in the current study endorsed internalizing symptoms at a rate which fell within either the Borderline/At-risk or Clinically Significant range. A total of 3.2% of the male adolescents and 4.6% of the female adolescents in the current study endorsed externalizing symptoms at a rate that fell within the Borderline/At-risk or Clinically Significant range. Thus, the percentages of adolescents in the current sample endorsing significant levels of internalizing and externalizing symptoms are much lower than those documented in previous epidemiological studies (Substance Abuse and Mental Health Services Administration, 2009). Furthermore, there was no significant difference between the percentage of adolescents endorsing Clinically Significant levels of internalizing symptoms (2.0% of males, 1.8% of females) and the percentage of
adolescents endorsing Clinically Significant levels of externalizing symptoms (1.3% of males, 1.0% of females).

This is inconsistent with numerous reports documenting higher levels of self-reported internalizing symptoms than of self-reported externalizing symptoms among adolescents (e.g. DeLos Reyes & Kazdin, 2005; Kessler, et al., 2010). However, given the overall sub-clinical level of symptomology endorsed by the large majority of adolescents in the current study, the relatively similar rate of internalizing and externalizing symptom report may be interpreted as a reflection of adolescents’ endorsement of mild and fleeting experiences of distress in daily life. In this interpretation, it is not surprising that there was no significant difference in the overall levels of internalizing and externalizing symptom report, as one may expect relatively equivalent experiences of internalized and externalized reactions to daily stressors.

**Relationship Between Maternal Report and Adolescent Self-Report of Symptoms of Mental Health Problems**

One of the primary research goals of the dissertation study was to examine the relationship between maternal report and adolescent self-report of adolescent internalizing and externalizing symptoms, given the previously documented low correlation between maternal-report and adolescent self-report of adolescent emotional and behavioral symptoms. In their original ASEBA standardization and meta-analytic study, Achenbach and colleagues determined an overall correlation of $r=0.25$ between CBCL and YSR total problem scores (Achenbach et al., 1987; Achenbach & Rescorla, 2006). Subsequent studies examining the relationship between maternal report and adolescent self-report of symptoms often indicate that the relationship is lower when reporting on internalizing symptoms than when reporting on externalizing symptoms (Collishaw et al., 2009; Rubio-Stipec, Fitzmaurice, Murphy & Walker, 2003).
In a seminal study examining the relationship between maternal report and adolescent self-report among a large sample of clinically-referred youth and their mothers, Edelbrock and colleagues (1986) determined a correlation of $r = 0.27$ between maternal report and adolescent self-report of internalizing symptoms, with mothers reporting significantly fewer internalizing symptoms for their youth in comparison to youth self-report. More recent studies have ascertained this relationship among various parent/adolescent dyads samples, and results consistently reveal low correlations among parent report and adolescent self-report of internalizing symptoms (e.g. Berg-Nielson, Vika & Dahl, 2003; Ford, Sayal, Meltzer & Goodman, 2005; Seiffge-Krenke & Kollmar, 1998; Silberg, Maes & Eaves, 2010; Tan & Rey, 2005). In the current dissertation study, the determined correlations between maternal report and adolescent self-report of adolescent internalizing ($r = .288$) and externalizing ($r = .322$) symptoms are consistent with the low to moderate correlations between maternal report and adolescent self-report documented in the aforementioned studies.

Given prior research documenting lower correlation between maternal report and adolescent self-report of adolescent internalizing symptoms than of adolescent externalizing symptoms, it is surprising that there was no significant difference between the relationship of maternal report and adolescent self-report of internalizing symptoms and the relationship of maternal report and adolescent self-report of externalizing symptoms among the participants in the current study. Whereas previous studies documenting differences in the correlations of internalizing and externalizing symptom report have largely involved clinically-referred adolescents (e.g. Berg-Nielson et al., 2003; Collishaw et al., 2009; De Los Reyes, Goodman & Kleiwer, 2010) and/or adolescents identified by parents or teachers as experiencing significant problems (e.g. Collishaw, Goodman & Ford, 2009; Verhulst & Van der Ende, 1997; Zwaanswik et al., 2003), the current study employed a large, diverse, community-based sample of adolescent
participants in order to examine the relationship between maternal report and adolescent self-report among a non-clinical sample. Thus, one possible factor contributing to the similar relationships between maternal report and adolescent self-report of internalizing and externalizing symptoms in the current sample is that the majority of the adolescent participants in the current study endorsed levels of both internalizing and externalizing symptoms that fell within the Average (e.g. not at-risk for clinical problems) range with respect to the standardization norms of the YSR.

**Maternal Distress Related to Discrepancy Between Adolescent Self-Report and Maternal Report of Adolescent Internalizing and Externalizing Symptoms**

Given repeated documentation of discrepancy between adolescent self-report and maternal report of adolescent symptoms of mental health problems, one goal of the current dissertation study was to further examine a previously documented relationship between maternal distress and the discrepancy between adolescent self-report and maternal report of adolescent symptoms. Though there is some evidence in the literature of a relationship between maternal distress and discrepancy between adolescent self-report and maternal report of adolescent symptoms (e.g. Collishaw et al., 2009; Rubio-Stipec et al., 2003; Youngstrom et al., 2000), there is little evidence of sound theoretical conceptualizations within which to interpret this relationship. Thus, one goal of the current dissertation study was to discuss results of analyses testing the relationship between maternal distress and discrepancy between maternal report and adolescent self-report of symptoms within the tenets of signal detection theory.

An integral concept of signal-detection theory is the idea that “internal noise” (cognitive distraction) interferes with one’s ability to appropriately attend to stimuli. An individual’s cognitive capacity is not infinite, therefore any cognitive activity unrelated to the detection of the target stimulus is believed to reduce cognitive capacity and hinder performance in detection
tasks. Specifically, one is predicted to “miss” subtle signals due to impaired detection, and to have lower cognitive tolerance for abrasive signals (Balakrishnan & Ratcliff, 1996; Gold, Sekuler & Bennett, 2004; Green & Swets, 1966). In this conceptualization, one would predict that the cognitive sequeala of maternal distress such as decreased emotional energy, distractibility, perceived helplessness, and negative rumination (Donovan et al., 1998) may impede mothers’ ability to detect subtle adolescent internalizing symptoms, yet may decrease mothers’ tolerance threshold for adolescent externalizing behavioral symptoms. As such, it would reason that mothers experiencing distress may report fewer adolescent internalizing symptoms in comparison to adolescent self-report of symptoms, yet may endorse more externalizing symptoms in comparison to adolescent self-report of symptoms.

This relationship has previously been documented in the infant literature, with distressed mothers showing decreased tolerance for mild infant agitation and fussiness yet an impaired ability to detect subtle changes in infants’ cries which indicate differential infant needs (e.g. Bettes, 1998; Donovan, Leavitt & Walsh, 1998). Furthermore, among mothers of young children, higher levels of self-reported distress has been shown to predict mothers’ reporting of normal childhood behaviors to be deviant and problematic (e.g. Chi & Hinshaw, 2002; Youngstrom, Loeber & Stouthamer-Lober, 2000).

**Maternal distress and discrepancy of internalizing symptom reports.** Of particular interest in the current study were mother/adolescent dyads in which the adolescent reported more internalizing symptoms than were endorsed on the mother’s report of adolescent internalizing symptoms, as indicated by higher YSR-CBCL Internalizing Difference scores. Research has repeatedly shown that adolescents rarely self-refer to mental health services, and that mothers are potentially valuable referral sources, as they are often familiar with their adolescent’s functioning across time and situations (Achenbach, 1991; De Los Reyes, Goodman & Kleiwer,
In the current dissertation study, total maternal level of distress, as measured by maternal report of depressive symptoms on the Center for Epidemiological Studies Depression Scale (CES-D) and report of symptoms of anxiety on the State-Trait Anxiety Inventory –State scale (STAI-S) study, was found to account for a significant portion of the variance in YSR-CBCL Internalizing difference scores. Though significant given the large sample size, the actual proportion of the variance explained by the model (0.9%) is quite low in magnitude.

Consistent with the tenets of signal detection theory, higher self-reported levels of depressive symptoms predicted higher YSR-CBCL Internalizing difference scores, with adolescents endorsing more internalizing symptoms in comparison to maternal report of adolescent internalizing symptoms. This is consistent with the conceptualization of adolescent internalizing symptoms as a “weak” signal, which is blurred by the cognitive sequela of maternal depressive symptoms, resulting in mothers endorsing fewer internalizing symptoms for their adolescents compared to the adolescent’s self-report. In contrast, however, higher levels of self-reported maternal symptoms of anxiety predicted lower YSR-CBCL Internalizing difference scores with adolescents reporting fewer internalizing symptoms in comparison to maternal report of adolescent internalizing symptoms.

Thus, the complete model of maternal level of distress as indicated by total report of depressive symptoms (CES-D total score) and anxiety symptoms (STAI-S total score) explained a statistically significant portion of the variance in YSR-CBCL Internalizing Difference scores. However, maternal self-report of depressive symptoms was determined to have a significant positive relationship with discrepancy between adolescent self-report and maternal report of
adolescent internalizing symptoms, whereas maternal self-report of anxiety symptoms was
determined to have a significant negative relationship with discrepancy between adolescent self-
report and maternal report of adolescents’ internalizing symptoms.

**Maternal distress and discrepancy in externalizing symptom report.** In the current
dissertation study, total maternal level of distress, as measured by maternal report of depressive
symptoms on the Center for Epidemiological Studies Depression Scale (CES-D) and report of
symptoms of anxiety on the State-Trait Anxiety Inventory –*State* scale (STAI-*S*) study, was
found to account for a statistically significant portion of the variance in YSR-CBCL
Externalizing difference scores. However, the actual proportion of the variance explained by the
model (.6%) is quite low in magnitude.

Maternal self-report of symptoms of anxiety significantly contributed to the prediction of
discrepancy in externalizing symptom report, however maternal self-report of symptoms of
depression was not determined to significantly contribute to the prediction of discrepancy.
Higher levels of maternal anxiety predicted lower YSR-CBCL Externalizing difference scores,
with mothers reporting fewer symptoms in comparison to adolescents’ self report of
externalizing symptoms. This is in contrast to what would be expected given the tenets of Signal
Detection Theory, which suggests that maternal symptoms of anxiety would lower the threshold
for tolerance of adolescent externalizing behavioral symptoms, thus predicting higher maternal
report of adolescent externalizing symptoms.

**Gender Differences in the Relationship Between Maternal Distress and Report Discrepancy**

Among the participants in the current study sample, the relationship between maternal
distress and the discrepancy between adolescent self-report and maternal report of adolescent
internalizing symptoms was not statistically different in mother/son dyads than in
mother/daughter dyads. Similarly, among the participants in the current study sample, the
relationship between maternal distress and the discrepancy between adolescent self-report and maternal report of adolescent externalizing symptoms was not statistically different in mother/son dyads than in mother/daughter dyads. Thus, in the current study, adolescent gender was not found to relate to the prediction of discrepancy from maternal self-reported level of distress.

This finding is in contrast to what one might expect according to the tenets of gender identification theory (e.g. Freud, 1987; Gabbard, 2010; Semeonoff, 1987), which would suggest that distressed mothers would be more likely to endorse internalizing symptoms in daughters than in sons due to maternal projection of symptoms of distress onto same-gendered offspring. Nor are the current findings consistent when conceptualized within the tenets of gender difference theories of symptom expression, which may suggest that differential symptom expression of mental health disorders among adolescent males and females would contribute to differential discrepancy in internalizing and externalizing symptom reports among mother/son and mother/daughter dyads.

However, given the relatively low levels of both internalizing and externalizing symptoms endorsed by the adolescents in the study sample, it is possible that the lack of difference in discrepancy of reports between mother/son and mother/daughter dyads may be attributed to the lack of significant symptoms of mental health problems among the majority of the participants. Thus, further investigation of potential differences in the relationship between maternal distress and discrepancy between maternal report and adolescent self-report of symptoms in mother/son and mother/daughter dyads may be warranted, employing a clinically-referred adolescent sample with higher levels of internalizing and externalizing symptoms of mental health problems.
Limitations of the Study

It is important to consider the results of this dissertation study within the context of the study limitations. One potential limitation is that the study utilized an archival dataset of participant data collected in 2007-2008 as part of the NICHD-SECCYD longitudinal study. Thus, analyses reflect prevalence of adolescent mental health symptoms assessed four years prior. The majority of adolescents in the current study sample reported levels of internalizing and externalizing symptoms that fell within the average/non-clinical range of significance, thus interpretations about the discrepancy between maternal report and adolescent self-report of symptoms may be limited with respect to generalization to samples of adolescent/mother dyads in which adolescents are experiencing significant clinical distress. Furthermore, there was a limited age range of adolescent participants in the current study (M=15.38, SD=0.30), thus interpretation of results should be made with consideration of the potentially limited generalization to the full range of ages in the period of adolescence. Furthermore, the participants constituted a larger proportion families living in suburban areas in comparison to the proportion of the U.S. population living in suburban areas.

Another limitation of the dissertation study with respect to interpretive validity is that an entirely community-based sample of adolescent and maternal participants were recruited for the study. Thus, interpretations about the degree of congruence between mothers and adolescents with regards to adolescent symptom report should be made with caution given the relatively low levels of internalizing and externalizing symptoms endorsed in the study sample. Specifically, it is possible that discrepancies in maternal report and adolescent self-report of adolescent symptoms are due to the mild and fleeting symptoms experienced in response to normative day-to-day stressors. Thus, adolescents’ relatively low level of symptoms of distress could contribute to reporter congruence, as mothers may not detect symptoms of relatively mild agitation and
distress in response to day-to-day frustrations. However, although most adolescents in the current study sample did not endorse clinically-significant levels of symptomology, the author proposes that it is nonetheless important to examine the question of maternal detection of adolescent distress within such community-based samples, as it is this very population of adolescents (e.g. non-clinical) who may be at risk for suffering from undetected symptoms of mental health disorders.

For the current dissertation study, adolescent symptoms of internalizing and externalizing problems were assessed through adolescents’ self-report on the YSR standardized rating scale and through maternal report of adolescent symptoms on the CBCL standardized rating scale. Maternal level of distress was ascertained through mothers’ responses on the CES-D and STAI-S standardized rating scales. Though the rating scales used in the current study are empirically-based measures with demonstrated reliability and validity, the use of informant rating scales in empirical research has inherent limitations. Specifically, informants’ responses may not reflect the true level of symptom presentation due to response biases. In addition to informant ratings, it is often recommended to obtain data from individuals trained to observe adolescent symptom expression across settings (Podsakoff, Mackenzie, Lee & Podsakoff, 2003). The use of trained observers was not feasible with the archival data used in the dissertation study. However, the primary research purposes in the current dissertation study involved assessments of mothers’ subjective level of distress, and of mothers’ and adolescents’ perceptions of symptoms of adolescent mental health problems, as opposed to assessing the accuracy of different reporters. Thus, it is believed that the use of informant ratings on standardized rating scales is an appropriate method of assessing symptom report.

Finally, a potential limitation of the dissertation study is that there was no data collected from fathers (or other caregivers) in the examination of parental report of adolescent symptoms.
Thus, conclusions as to the rate at which adolescents’ self-reported symptoms were detected by an adult caregiver were drawn exclusively from data collected from mothers. It is possible that the mothers participating in the study were not always the primary caregivers, thus the adolescent’s symptoms may have been better detected by an alternate caregiver.

Implications for Future Research

For the current dissertation study, Signal Detection Theory was presented as a conceptual framework within which to interpret the detected relationships between maternal distress and discrepancies between adolescent self-report and maternal report of adolescents’ internalizing and externalizing symptoms. However, tenets of this theory were not directly empirically tested. Future researchers may wish to design empirical tests of the sensitivity and specificity of maternal symptom detection to further examine this relationship within the context of Signal Detection Theory.

Similarly, gender theories including gender role intensification, gender differences in symptom expression, and gender identification/projection theories were offered as potential theoretical frameworks within which to conceptualize a potential differential relationship between maternal distress and reporter discrepancy among mother/daughter and mother/son dyads. To fully ascertain specific factors which may relate to discrepancy in mother/son and mother/daughter dyads, future researchers may wish to employ direct empirical methods guided by the tenets of the aforementioned gender theories.

Furthermore, maternal distress as ascertained in the current study accounted for only a small portion of the total variance in discrepancies between maternal report and adolescent self-report of symptoms. Thus, a significant portion of the variance may be better explained through assessment of differential maternal, adolescent, family dynamic, and environmental factors which was beyond the scope of the current study. Future research should aim to identify
additional factors related to the discrepancy between maternal report and adolescent self-report of symptoms of mental health problems.

To further examine the relationship between maternal distress and the discrepancy between maternal report and adolescent self-report of symptoms of mental health disorders, future researchers may wish to employ a sample of clinically-referred adolescents, as more significant experiences of adolescent distress may differentially relate to discrepancies between adolescent self-report and maternal report of adolescent symptoms. It would be particularly interesting to examine the relationship between maternal report and adolescent self-report of symptoms within a sample of adolescents who were referred for mental health treatment by someone other than their mother, to investigate the particular symptoms experienced by adolescents (and detected by someone else as warranting treatment) that are detected or not detected by their mothers.

To ascertain better the research question as to whether maternal distress significantly contributes to discrepancy between maternal report and adolescent self-report of symptoms, it may be beneficial for future researchers to identify a participant sample by recruiting mothers who are presenting for mental health treatment themselves. Do these mothers experiencing significant distress report symptoms of internalizing and externalizing problems for their adolescent offspring? Do their adolescents self-report symptoms of internalizing and externalizing problems that are not endorsed on maternal reports of adolescent symptoms?

**Implications for the Practice of School Psychology**

The results of the dissertation study may provide important findings to inform the practice of school psychology. First, information about the prevalence rates of, and symptomatic presentation of, mental health problems among the adolescent general population is useful for school psychologists in designing in-service educational programming for teachers and parents.
to increase awareness of mental health problems of adolescence. This information may also be useful for school psychologists to educate teachers and school personnel to better detect specific symptom expressions so that adolescents in distress may be more readily identified and referred for treatment through the school-based mental health services. Research consistently shows that adolescents are more frequently referred to school-based mental health services for demonstration of externalizing behavior problems than for internalizing problems (e.g. Evans, Foa, Gur & Hendin, 2005), and that even adolescents experiencing clinically significant levels of internalizing symptoms are commonly not identified by teachers as needing services (Pearcy, Clopton, & Pope, 2010). School psychologists can play an integral role in educating school personell as to the signs and symptoms of adolescent mental health problems, thus improving detection and intervention through school-based services.

Findings of discrepancy between maternal report and adolescent self-report of adolescent symptoms highlights the importance of educating parents as to adolescent symptoms of mental health problems. School psychologists can be instrumental in designing high-quality parent education materials and home-school collaboration programs to increase parental awareness of the signs of mental illness as well as to inform parents on how to access services for their adolescents in need. Efforts to increase parental awareness of internalizing problems may aid to improve parents’ ability to detect these symptoms in their distressed adolescents. In 1998, similar efforts were made to increase parental awareness of signs of adolescent drug use. The “Parents: the Anti-Drug” campaign was launched by the White House Council on National Drug Control Policy as part of the National Youth Anti-Drug Media Campaign. Now part of a larger campaign, “The Partnership at Drugfree.org”, which is a collaborative effort of the Department of Justice and The United States Department of Health and Human Services, empirical and epidemiological studies suggest that this campaign has demonstrated efficacy in aiding in early

To address the growing problem of physical and relational aggression, as well as the increased prevalence of cyberbullying, a collaborative effort by the United States Department of Health and Human Services, the Department of Justice, and the Department of Education launched the “Stop Bullying Now” campaign. One primary goal of this campaign was to increase awareness among parents and educators of the signs of bully victimization and perpetration. School psychologists at the local level can play an integral role in this effort, as they are uniquely trained in data-based decision making and research, program design and evaluation, positive behavior supports, crisis response and intervention, and family-school collaboration, all components crucial in designing effective system-wide prevention efforts to increase parental awareness of the signs of bully victimization and perpetration (National Association of School Psychologists, 2012). As with these campaigns to increase parental awareness of the problems of drug use and bullying, school psychologists can play an active role in educating parents about the symptoms and prevalence of mental health problems in adolescence.

Finally, results suggesting a relationship between maternal distress and discrepancies in adolescent self-report and maternal report of adolescent symptoms may prove useful for school psychologists in collaborating with other mental health professionals in providing comprehensive family services for the families of mothers in significant distress through monitoring for adolescent symptoms of mental health which may otherwise not be detect by their mothers.
REFERENCES


sensitivity to infant cries. *Infant Behavior and Development, 21*, 505–517. doi:10.009-3920/97/6805-0008801.00


Appendix A
IRB APPROVAL

January 7, 2013

Heather Britnell
ESPRMC
College of Education
Box 870231

Re: IRB # 13-OR-007, “The Impact of Maternal Distress on the Congruence of Mothers’ and Adolescents’ Reporting of Adolescent Mental Health Disorder Symptoms in Boys and Girls”

Dear Ms. Britnell:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on January 6, 2014. If the study continues beyond that date, you must complete the IRB Renewal Application. If you modify the application, please complete the Modification of an Approved Protocol form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure form.

Should you need to submit any further correspondence regarding this application, please include the assigned IRB application number.

Good luck with your research.

Sincerely,

Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama
January 23, 2013

Mr. Heather Britnell
University of Alabama
Educational Studies in Psychology
306 Carmichael Hall
Tuscaloosa, AL 35487-0231

Dear Mr. Britnell:

Thank you for your application and restricted data use agreement for the restricted-use version of the Wave IV NICHD Study of Early Child Care and Youth Development. Accordingly, we are enclosing a DVD containing the restricted-use data and accompanying documentation. The CD is password protected -- please email me at arun@umich.edu to receive the password.

As you know, conditions for receiving these data include your agreement not to redistribute them, to protect the confidentiality of the data respondents, and to use the data for research purposes only. The agreements are in effect until the research project is completed or until January 23, 2016 whichever comes first.

If you have further questions or if we can be of additional assistance, please let us know.
Appendix C
Scatter Plots of the Standardized Residuals as a Function of the Standardized Predicted Values for Variables Used in Research Purpose 1

Adolescent Self-Report of Internalizing Symptoms: YSR Internalizing Total Raw Score

Adolescent Self-Report of Externalizing Symptoms: YSR Externalizing Total Raw Score
Maternal Report of Adolescent Internalizing Symptoms: CBCL Internalizing Raw Score

Maternal Report of Adolescent Externalizing Symptoms: CBCL Externalizing Raw Score
Appendix D
Scatter Plots Used to Determine Tests of Linearity for Variables in Research Purpose 1

Internalizing Report: Adolescent (YSR) and Maternal (CBCL) Report of Adolescent Symptoms

![Internalizing Scatter Plot]

Externalizing Report: Adolescent (YSR) and Maternal (CBCL) Report of Adolescent Symptoms

![Externalizing Scatter Plot]
Appendix E

Scatter Plots Used to Determine Tests of Assumptions for Variables in Research Purpose 2

YSR-CBCL Externalizing Difference Score

![Normal Q-Q Plot of YSR-CBCL_Externalizing](image1)

YSR-CBCL Internalizing Difference Score

![Normal Q-Q Plot of YSR-CBCL_Internalizing](image2)

Maternal Self-Report of Distress: STAI-S Total Score