

The Development of Pure vs. Co-Occurring
Externalizing and Internalizing Symptomatology in Children

by

Alyssa Oland

B.A., Emory University, 2000

M.S., University of Pittsburgh, 2004

Submitted to the Graduate Faculty of
University of Pittsburgh in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

University of Pittsburgh

2006

UNIVERSITY OF PITTSBURGH
FACULTY OF ARTS AND SCIENCES

This dissertation was presented

by

Alyssa Oland

It was defended on

March 15, 2005

and approved by

Dr. Daniel Shaw
Dissertation Director

Dr. Sue Campbell

Dr. Ron Dahl

Dr. Dan Nagin

Dr. Michael Pogue-Geile

The Development of Pure vs. Co-Occurring
Externalizing and Internalizing Symptomatology in Children

Alyssa Oland, PhD

University of Pittsburgh, 2006

The overarching goal of the present study was to test the validity of a model that proposes why some children are likely to *not* develop co-occurring problem behavior. Specifically, it was hypothesized that high and persistent levels of specific subtypes of internalizing (i.e., social anxiety, inhibition, and withdrawal) *or* externalizing symptomatology (impulsivity/hyperactivity, aggression, and anger reactivity) during middle childhood would prevent the development of co-occurring disorders during early adolescence. These issues were examined among a sample of 260 low-income boys followed from age five to twelve. Overall, the results failed to support the proposed model, that high and persistent levels of narrow-band constellations of internalizing and externalizing symptoms would prevent the development of a co-occurring disorder. Instead, the results were consistent with three prevailing theories of co-occurring disorders: 1) shared risk factors; 2) general, non-specific expression of psychopathology; and 3) heightened maladjustment.

TABLE OF CONTENTS

| | |
|-----------------|----|
| Hypotheses..... | 20 |
| Method..... | 22 |
| Procedure..... | 23 |
| Results..... | 28 |
| Discussion..... | 35 |
| References..... | 53 |

LIST OF TABLES

| | |
|----------------|----|
| Table 1 | 73 |
| Table 2 | 74 |
| Table 3 | 75 |
| Table 4 | 76 |
| Table 5 | 77 |
| Table 6 | 78 |
| Table 7 | 79 |
| Table 8 | 80 |
| Table 9 | 81 |
| Table 10 | 82 |
| Table 11 | 83 |
| Table 12 | 84 |
| Table 13 | 85 |
| Table 14 | 86 |
| Table 15 | 87 |

LIST OF FIGURES

| | |
|----------------|----|
| Figure 1 | 88 |
| Figure 2 | 89 |
| Figure 3 | 90 |
| Figure 4 | 91 |
| Figure 5 | 92 |
| Figure 6 | 93 |

The Development of Pure vs. Co-Occurring
Externalizing and Internalizing Symptomatology in Children

Alyssa Oland

Dissertation

The Development of Pure vs. Co-Occurring

Externalizing and Internalizing Symptomatology in Children

Co-occurring internalizing and externalizing disorders are moderately prevalent in children, adolescents, and adults (Anderson et al., 1987; McConaughy & Skiba, 1994; Gilliom & Shaw, in press; Zahn-Waxler et al., 2000). They are found in both clinic and non-clinic samples (Lilienfeld, 2003; McConaughy & Achenbach, 1994) at levels that far exceed chance (Caron & Rutter, 1991; Cole & Carpentieri, 1990; Lahey et al., 1999; Loeber & Keenan, 1994; Loeber et al., 2000a). In fact, research suggests rates of co-occurring internalizing and externalizing disorders are as high as 45% during late childhood and early adolescence (Capaldi & Stoolmiller, 1999; Loeber & Keenan, 1994). Research also suggests strong correlations (.73) between conduct disorder and depression during middle to late childhood (Cole & Carpentieri, 1990).

Several explanations have been proposed to account for the high frequency of co-occurring disorders in childhood. Some theories suggest that co-occurrence is an artifact of measurement overlap or merely the result of splitting one underlying construct (i.e. negative emotionality or overall child distress) into two separate disorders, whereas others propose that co-occurring disorders represent distinct, meaningful syndromes (Angold & Costello, 1992; Kovacs et al., 1988; Lilienfeld, 2003; O'Conner et al., 1998; Seligman & Ollendick, 1998). Some of the factors that have been proposed to account for the presence of co-occurring disorders in children are shared risk factors, genetic influences, and risk factors that stem from the development of an initial disorder (e.g., externalizing disorders can result in peer rejection) (Angold & Costello, 1993; Klein & Riso, 1993; Lilienfeld, 2003; O'Connor et al., 1998b; Russo & Beidel, 1994; Seligman & Ollendick, 1998). For example, many family and environmental risk factors, such as poverty (McLeod & Shanahan, 1996), interparental conflict (Katz &

Gottman, 1993), maternal depression (Angold, Costello, & Erkanli, 1999), parental hostility and harsh punishment (Keiley et al., 2003), general parental psychopathology (Kovacs & Devlin, 1998; Lahey et al., 1999), stressful life events (Costello et al., 1988; MacKinnon-Lewis et al., 1994), and peer rejection (Coie & Carpentieri, 1990; Keiley et al., 2003) have been associated with both internalizing and externalizing disorders in childhood. In addition, many child factors, such as general negative emotionality (Eisenberg et al., 2000), early temperamental traits of irritability and difficultness (Keiley et al., 2003), deficient social skills and poor problem solving skills (Patterson et al., 1989; Turner et al., 1987) have also been associated with both internalizing and externalizing disorders in children.

Based on the prevalence of co-occurrence and the similarity of risk factors associated with internalizing and externalizing disorders (Angold & Costello, 1993; Klein & Riso, 1993), the fact that some children show “pure” expressions of disorder may seem surprising. A research focus on factors precipitating the development of co-occurring disorders leaves unanswered the question of why some children do not develop co-occurring disorders. This is an important question as it is likely that children with “pure” versus co-occurring expressions of symptomatology differ in fundamental ways. An understanding of such differences would be important to inform models of developmental psychopathology and treatment of childhood disorders. The present paper proposes a model that addresses the question of co-occurrence from a novel angle, focusing on why co-occurrence sometimes does not emerge rather than why it does emerge. The present model is also novel in its focus on the potential role of socio-developmental milestones, which have not previously been considered in relation to the development of co-occurrence.

Research on developmental psychopathology tends to focus exclusively on internalizing *or* externalizing disorders, frequently either excluding participants with co-occurring symptomatology or failing to examine and/or report levels of co-occurring symptomatology within their sample (Jensen, 2003; Seligman & Ollendick, 1998). As a result, much remains to be understood regarding why some children show “pure” versus co-occurring internalizing and externalizing symptoms. One possible influence that has previously not been considered is the failure to attain socio-developmental milestones, which paradoxically may prevent the development of co-occurring symptomatology for some children. The present study will explore the potential role of socio-developmental milestones in the development of pure and co-occurring externalizing and internalizing symptomatology in children among a sample of 276 low-income boys followed from ages 5 to 11. It is proposed that specific clusters of internalizing symptoms (e.g., high social anxiety and inhibition) and externalizing symptoms (e.g., high impulsivity/hyperactivity, anger reactivity) will be associated with the failure to attain socio-developmental milestones (e.g., healthy relationships with others for highly anxious, inhibited children, self evaluation and self reflection for highly impulsive, emotionally reactive children) that, in turn, will prevent children from developing co-occurring, heterotypic symptoms.

This paper will first review relevant characteristics and developmental sequelae of internalizing and externalizing symptomatology in children. These sections will also present research that addresses cognitive and social processes, which will be discussed in relation to socio-developmental milestones. As there is a paucity of research focusing on co-occurring disorders, an understanding of such factors as relevant to internalizing and externalizing symptomatology is necessary to inform models of co-occurring symptomatology in children.

The review will highlight the relevance of existing research to the potential role of socio-developmental milestones in the development of a co-occurring disorder.

Internalizing Symptomatology

The central feature of internalizing disorders, such as depression and anxiety, is “disordered mood or emotion” (Kovacs & Devlin, 1998). Specific internalizing symptoms that may be seen in some children, such as social anxiety, inhibition, and withdrawal, are the focus of the present paper because they may be associated with a failure to form relationships with others, which will reduce the likelihood of involvement with deviant peers. Further, some research suggests that these specific internalizing symptoms may be negatively associated with some externalizing problems (Wright et al., 1999).

Social Inhibition, Anxiety, and Withdrawal

Behavioral inhibition, which is seen in some children with internalizing symptoms, is a trait that is moderately stable over time (Kagan et al., 1987) and associated with a tendency toward avoidant behaviors (Kagan et al., 1988; Keiley et al., 2003). Shyness, withdrawal, and negative attributional biases are also associated with behavioral inhibition and anxiety disorders (Loeber & Keenan, 1994). Therefore, it is not surprising that children with high levels of social anxiety have been shown to prefer, rely on, and utilize more avoidant strategies than other children (Dadds et al., 1996; Daleiden & Vasey, 1997), particularly in the presence of perceptions of threat from the environment (Chorpita et al., 1996). At the same time, research also indicates that highly socially anxious children are more likely to perceive threat from the environment, displaying negative and hostile attributional biases in response to ambiguous social situations (Chansky & Kendall, 1997; Chorpita et al., 1996). For example, low social competence coupled with high social anxiety is associated with negative social expectations and

internal attributional biases for failure (Chansky & Kendall, 1997), such that these children show a tendency for “sensitivity to negative stimuli” (Kovacs & Devlin, 1998). Children who were anxious of social situations and who viewed themselves as inept in such situations were likely to over-perceive threat in ambiguous situations and have negative expectations regarding both the course and outcome of social interactions and the likelihood of peer acceptance (Chansky & Kendall, 1997; Chorpita et al., 1996). In addition, Chansky and Kendall (1997) found that independent of the ability to have friendships, anxiety-disordered children tended to enter new social situations with the expectation that they would be disliked and rejected by unfamiliar peers. In response to these negative and hostile attributions, anxious children tend to respond through avoidance and withdrawal (Daleiden & Vasey, 1997). Thus, highly socially anxious children are more likely to display avoidant behaviors, particularly when the environment is perceived as threatening. This suggests that avoidant behaviors, particularly in response to social situations, may be particularly frequent in children with high levels of social anxiety.

Accordingly, children with high levels of anxiety have been described as shy, less socially competent, socially anxious, and withdrawn by parents, peers, and teachers (Chansky & Kendall, 1997; Rudolph et al., 1994; Strauss et al., 1987). Children with anxiety disorders have been shown to spend more time engaged in solitary activities, have fewer friends (Turner et al., 1987), and report that their parents are less facilitating of independence. Observational studies have shown that, in discussions with their children, parents of high-anxiety children have been shown to endorse and support more socially avoidant strategies than parents of other children (Messer & Beidel, 1994), and that these parental behaviors are positively associated with child socially avoidant behavior (Dadds et al., 1996). In sum, children with high levels of anxiety, particularly social anxiety, display high levels of avoidant behaviors during middle to late

childhood, and their parents both endorse and support avoidant strategies. This suggests that children with anxiety disorders may withdraw from interactions with others and have difficulty with the socio-developmental milestone of forming social relationships. In fact, high levels of general social avoidance in children have been linked with more pervasively-impaired social functioning, lower social acceptance, and more failures in meeting social goals (Ginsburg et al., 1998; Rubin et al., 1989; Rubin, 1993; Stewart & Rubin, 1995; Wierzbicki & McCabe, 1988). It is predicted that these social problems will emerge during the school-age period and may persist through at least early adolescence.

High levels of socially withdrawn behavior are also associated with subsequent depressive symptoms and low self competence (Rubin et al., 1989), particularly during the late childhood to early adolescent period. Thus, a child's preference for and parental reinforcement of avoidant strategies may have important ramifications for later adjustment. School-aged children who are avoidant of peers may have fewer positive peer interactions and relationships, as well as restricted opportunities for social interactions, resulting in reduced opportunities to learn and further refine social skills (Daleiden & Vasey, 1998; Ginsburg et al., 1998). This may prevent the development of effective coping responses and increase the likelihood of later interpersonal failures and internalizing symptoms (Daleiden & Vasey, 1997).

Mesman and Koot (2000b) found that behavior of school-aged children with internalizing disorders (e.g., immature, dependent behaviors) may increase the probability of negative interactions with others and subsequent confirmation of initial negative expectations. Accordingly, depressed children have been found to report poorer social skills (Kennedy et al., 1989) and deficits in intra- and extra- familial relationships that did not totally abate following remission of depression (Puig-Antich et al., 1985). Nondepressed school-aged children's ratings

of filmed depressed children suggests that they may respond with greater negativity towards depressed peers, evaluating them as less likeable and attractive and as engaging in fewer positive behaviors. Rudolph and colleagues (1994) found that, in a matched- pair play situation of school-aged children, partners of depressed children reported that they liked playing with their peers less than partners of nondepressed children. Partners of depressed children were also less likely to report that they believed their partner enjoyed playing with them. Interactions in dyads with a depressed child tended to be marked by more negative affect, conflict, and friction, and decreased collaboration and joint problem solving.

Overall, these studies indicate that school-aged children with high levels of social anxiety, inhibition, and withdrawal may have general difficulties forming relationships with others. In addition to avoiding and withdrawing from social interactions, these children are also likely to behave in such a fashion that social encounters are negative and uncomfortable and, in turn, peer exclusion and rejection are more likely. These negative social outcomes are likely to confirm and reinforce original negative expectations and self perceptions (Kennedy et al., 1989; Stewart & Rubin, 1995), likely leading to poor self concept and depressive symptomatology in the late childhood to preadolescent period. It is possible that if children's negative expectations and self perceptions are disconfirmed by positive peer information that challenges their original beliefs, prior negative expectations may be attenuated, resulting in lower levels of later internalizing symptoms during middle childhood to early adolescence. For example, Gazelle and Ladd (2003) found that children with elevated social anxiety in Kindergarten, who were also excluded by peers, displayed greater stability of withdrawn and avoidant behaviors and had higher levels of later depressive symptoms during middle childhood when compared to children with comparable symptomatology at school entry who were not excluded by peers.

Social Anxiety, Behavioral Inhibition, and Externalizing Problems

Despite the *general* positive association between internalizing and externalizing symptomatology, there have been several studies which provide support for a negative association between the *specific* internalizing symptoms of behavioral inhibition, social anxiety, and social withdrawal and the *specific* externalizing symptoms of impulsivity/hyperactivity, and aggressive behaviors (Wright et al., 1999). For example, Keiley et al. (2003) found that behavioral inhibition in early childhood was associated with the development of internalizing symptoms and a reduced likelihood for the development of externalizing symptoms during early adolescence. The preventative role of behavioral inhibition has also been corroborated by Lahey and colleagues (1999), with results suggesting a negative association between behavioral inhibition during middle childhood and levels of antisocial and aggressive behavior during early adolescence. Further, French (1988) found that, when compared to aggressive children, non-aggressive school-aged children were characterized by higher rates of behavioral inhibition (French, 1988).

Anxiety also seems to moderate the severity of disruptive behavior (Russo & Beidel, 1994). For example, Moffitt and colleagues (1996) found that abstinence from externalizing behaviors in school-aged boys, a rare occurrence, was associated with higher levels of anxiety, inhibition, tenseness, shyness, and social impairment during middle to late childhood. Overall, researchers have found that the presence of anxiety is associated with a lower risk for or seriousness of conduct disorder (CD) (Loeber and Keenan, 1994), lower sensation seeking (Russo et al., 1991), lower levels of hostility (Rudolph et al., 1994), lower peer ratings of “meanness” and fighting, and fewer school suspensions and police contacts (Walker et al., 1991) during middle childhood through adolescence. Similarly, anxiety in children with attention

deficit disorder has been associated with lower levels of impulsivity, externalizing symptoms, and diagnosis of CD (Biederman et al., 1991; Jensen et al., 1997; Pliszka, 1992).

Peer Neglect as a Preventive Factor of Externalizing Problems

Research has demonstrated that peers can play an important role in the onset of antisocial behavior, particularly in regard to adolescent-onset cases (Moffitt et al., 1996). In this manner, children with a history of low rates of antisocial behavior may begin to engage in such behaviors if they form relationships with delinquent peers. The present paper posits that during middle childhood to early adolescence, children who are withdrawn from their peers are unlikely to attain the socio-developmental milestone of forming and maintaining peer relationships. Paradoxically, this lack of involvement with peers is likely to prevent involvement with deviant peers during adolescence, reducing the probability that the child will be presented with opportunities to engage in peer-initiated deviant behavior. In fact, anxiety disordered school-aged children have been found to be more likely socially neglected than both non-referred children and children with CD (Strauss et al., 1988). Neglected peer status has been associated with low or nonexistent levels of aggression in boys (Coie & Dodge, 1988).

Overall, the model suggests that early high levels of social anxiety and inhibition are expected to be associated with avoidance and withdrawal at school entry that persists into late childhood. These avoidant and withdrawn behaviors are, in turn, expected to be associated with peer neglect and rejection during middle to late childhood, leading to subsequent confirmation of original negative expectations and anxieties regarding social interactions. Reciprocal interactions between child withdrawal and peer neglect are hypothesized to lead to further child avoidance and increasing problems with anxiety and depression as the child ages into adolescence. At the same time, this failure to form social relationships with others may decrease

vulnerability to the development of externalizing problems during late childhood and early adolescence because of restricted opportunities for involvement with deviant peers and peer-initiated deviance. Further, as previously mentioned, the symptoms of social anxiety, behavioral inhibition, and social withdrawal are expected to be associated with increasing levels of overall internalizing symptomatology during middle childhood to early adolescence, particularly as these children are neglected and/or rejected from the peer group. Thus, as these specific symptoms appear to be unrelated or negatively associated with behaviors indicative of impulsivity/hyperactivity, anger, and aggressive behaviors, it is also expected that correlations between these two specific clusters of symptomatology will decrease over time as levels of social anxiety, inhibition, and withdrawal persist and escalate.

Externalizing Symptomatology

The central feature of externalizing disorders, such as conduct disorder (CD), oppositional defiant disorder (ODD), and attention deficit hyperactivity disorders (ADHD), is “dysregulated behavior” (Kovacs & Devlin, 1998), characterized by repetitive and chronic patterns of antisocial behavior (CD) (Lahey et al., 1995; Loeber et al., 2000a), recurrent and impairing negative, defiant, disobedient, and hostile behavior towards authority figures (ODD), and persistent and developmentally inappropriate dysregulation of attention, impulse control, and motor behavior (ADHD) (Hinshaw, 1992). Specific externalizing symptoms that are the focus of the present study are impulsivity/hyperactivity, anger reactivity, and aggression because they may be associated with a failure to self reflect, which is expected to reduce the likelihood of developing a poor self concept and depressive symptomatology. Further, some research suggests that these specific externalizing symptoms may be negatively associated with some internalizing problems (Lahey et al., 1984).

Impulsivity/Hyperactivity, Aggression, and Anger Reactivity

Impulsivity/hyperactivity, aggression, and emotional reactivity during middle to late childhood have been associated with behaviors aversive to peers, teachers, and parents, and have a negative impact on socialization (Calkins, Gill, & Willford, 1999; Henry et al., 1996; Patterson et al., 1989). For example, it has been proposed that, during middle to late childhood, children with high levels of impulsivity and anger reactivity (Cunningham et al., 1991; Landau & Milich, 1988; Pope et al., 1991) do not know how to effectively interact with peers, have deficient social skills and social-cognitive processes, and display poorer social problem-solving skills (Calkins et al., 1999; Campbell, 1994; Dadds et al., 1996; Lochman & Dodge, 1994; Patterson et al., 1989; Sanders et al., 1992). Additionally, school-aged impulsive children may not notice subtle responses by others to their social or antisocial behavior (e.g., aggression). In turn, they may be less influenced by negative reinforcements for discontinuation of such behavior (Calkins et al., 1999), not appropriately change their behavior as dictated by the social situation (Cunningham et al., 1991; Landau & Milich, 1988), and may not incorporate negative feedback from others into their self-concept. This lack of recognition of social feedback may impair development of the socio-developmental milestone of self reflection. In sum, children who demonstrate problems with respect to impulsivity/hyperactivity, anger reactivity, and aggression during middle to late childhood have been found to demonstrate higher levels of dysfunction in social skills, communication, and behavioral control, most notably externalizing symptoms (Pope et al., 1991). A persistent pattern of externalizing symptoms, most notably symptoms that include impulsivity and anger reactivity, has been associated with peer rejection during middle childhood through adolescence (Keiley et al., 2003; Patterson et al., 1989). This peer rejection decreases the

likelihood for improvement in social skills and incorporation of social norms from the larger peer group, which is ultimately likely to exacerbate social impairments throughout the life course.

Social Information Processing and Externalizing Problems

Some children with externalizing symptoms, such as those displaying emotional reactivity, are prone to hostile attributional biases, such that they are likely to over-interpret ambiguous cues as hostile. These hostile attributional biases are especially likely in regard to information that is specifically directed towards the child during middle childhood (Dodge & Frame, 1982; Waas, 1988). In response to these hostile attributional biases, children with externalizing symptoms are likely to respond using aggressive responses (Dodge & Frame, 1982; Waas, 1988). In fact, it has been proposed that, for school-aged children, hostile attribution biases and cognitive distortions mediate the relation between ADHD status and aggressive peer interactions (Coie & Dodge, 1988). Hostile attributions are associated with emotionally reactive, aggressive responses towards others, resulting in high levels of negative social interactions. These negative social interactions are likely to maintain and intensify original negative expectancies (Dodge & Frame, 1982; Waas, 1988). In this manner, during middle to late childhood, when children with externalizing symptomatology both interpret a social situation as hostile and respond aggressively (Milch-Reich et al., 1999), they are likely to increase the negative perceptions they have of peers and that peers hold of them. However, as previously mentioned, impulsive school-aged children with poor executive control may not notice subtle negative responses by others, thereby not incorporating such feedback into their self perception or future social behaviors.

Further, research has also found associations between externalizing symptomatology in children and positive illusory self-perceptions (Baumeister et al., 1996; Hoza et al., 2002; Owens

& Hoza, 2003; Zakriski & Coie, 1996), such that some children with externalizing symptomatology overestimate their own competence and the supportiveness of others. Positive illusory self-perceptions are associated with increased aggression (Edens et al., 1999; Hughes et al., 1997) and severe hyperactivity and impulsivity (Owens & Hoza, 2003). It is suggested that, in response to potentially threatening information to an idealized self-concept (i.e. “threatened egotism”), a child may display aggressive behavior, which serves to defend and protect this positive illusory self-concept and resist downward changes (Baumeister et al., 1996; Edens et al., 1999; Hughes et al., 1997). This research supports the notion that impulsive school-aged children may not notice subtle negative responses by others.

Peer Rejection and Externalizing Problems

Overall, research indicates that conduct problems are associated with peer rejection during middle childhood to preadolescence (Coie & Dodge, 1988; Cole & Carpentieri, 1990; Pope et al., 1991), and specifically, aggression has been identified as the largest determinant of peer rejection in childhood (Coie et al., 1990). Coie and colleagues (1990) have documented that aggressive boys are frequently the targets of aggressive behavior by peers, although their aggressive behavior towards others has been found to be at proportionately higher levels than that which they received (Coie et al., 1990). Peers relating to aggressive boys tended to expect aggressive responses from them, attributed hostile intentions to this behavior, and reported that they would respond aggressively (Dodge & Frame, 1982). The more a child was perceived as deviant by peers, the more likely that child was to be rejected by peers, especially if that child was perceived as responsible for his/her deviance (Juvonen, 1991).

Research also indicates that children with externalizing symptoms who are excluded from the larger peer group are likely to form friendships and attachments with other deviant and

aggressive peers during middle childhood to early adolescence, reinforcing and maintaining original deviant behaviors and beliefs (Cairns et al., 1988; Lahey et al., 1999; Patterson et al., 1989). Thus, elevations during middle childhood in impulsivity/ hyperactivity, aggression and anger reactivity may be associated with peer rejection and subsequent affiliation with deviant peers in middle childhood to early adolescence that, in turn, likely maintain and intensify initial social and behavioral impairments apparent in early adolescence.

Impulsivity/Hyperactivity, Aggression, Anger Reactivity and Internalizing

As previously mentioned, despite the *general* association between internalizing and externalizing symptomatology, evidence suggests that the *specific* externalizing symptoms of impulsivity/hyperactivity, aggression, and anger reactivity are modestly or even negatively correlated with the *specific* internalizing symptoms of high social anxiety, withdrawal, and inhibition during middle childhood to early adolescence. For example, some research has found that school-aged children with ADHD have lower rates of anxiety disorders and social withdrawal and higher levels of impulsivity and conduct disorder than children with attention deficit disorder without hyperactivity (Lahey & Carlson, 1991; Lahey et al., 1984; Lahey et al., 1985; Lahey et al., 1987; Pliska, 1989; Pliska, 1992) This suggests that for some children, the presence of hyperactivity may be associated with an increased likelihood of further externalizing symptoms and a decreased likelihood or severity of internalizing symptoms. The present paper will examine whether this negative or modest association between the specific aforementioned internalizing and externalizing symptoms may result from lesser capacities for self-reflection that is associated with extreme impulsivity/hyperactivity, aggression, and anger. Specifically, as previously discussed, it is hypothesized that extremely impulsive, emotionally reactive, hyperactive children do not “slow down” and reflect on feedback from others during middle to

late childhood, often missing subtle responses from others regarding their behavior. Without this self-reflection, these children are posited to be unlikely to incorporate negative feedback, such as peer rejection, into their self concept. This failure, in turn, is expected to be preventive against depressive and anxiety disorders during late childhood to early adolescence.

Summary

Overall, high levels of impulsivity/hyperactivity, aggression, and anger reactivity are expected to be associated with poor self reflection and self evaluation in school-age children. In other words, school-age children with high levels of this specific cluster of externalizing symptoms are hypothesized to be less likely to notice negative responses by others to their behavior during middle to late childhood, not incorporating this feedback into their self-concepts. Failure to attain the socio-developmental milestones of self-reflection and self-evaluation may attenuate, or even eliminate, the negative impact that social and academic difficulties can have on the child's self-concept, resulting in a decreased likelihood for the emergence of an internalizing disorder during late childhood and early adolescence. Although school-aged children with externalizing symptoms are likely to be faced with adverse social and academic consequences for their impulsive, deviant, and aggressive behaviors, without attaining the socio-developmental milestone of self-evaluation and self-reflection, these children are unlikely to "slow down" enough to incorporate environmental feedback into their sense of self and overall feelings of esteem. Therefore, without attaining these milestones, a child's self concept and overall mood is unlikely to be affected by potential negative consequences of externalizing symptomatology, resulting in a decreased likelihood of internalizing symptomatology during late childhood and early adolescence. Further, as previously mentioned, the externalizing symptoms

of impulsivity/hyperactivity, anger reactivity, and aggression are posited to be negatively correlated, if related at all, with social anxiety, inhibition, and withdrawal.

“Pure” versus Co-occurring Internalizing and Externalizing Symptomatology

As informed by the prior reviews, a specific cluster of elevated internalizing symptoms is postulated to be preventive against the development of externalizing symptoms insofar as they are associated with the failure to form healthy social relationships with others. Similarly, it is also suggested that a specific cluster of elevated externalizing symptoms may be preventive against the development of internalizing symptoms insofar as they are associated with the failure to self-reflect. Based on these theoretical premises, it is expected that children with “pure” internalizing would show heightened internalizing symptomatology and that children with “pure” externalizing would show heightened externalizing symptomatology when compared to children with both internalizing and externalizing symptomatology. Although there is a relative paucity of research to date to inform this hypothetical model, there is some research that supports such a contention. For example, Simic and Fombone (2001) found elevated severity of anxiety and overall depression in a group of children with depressive disorder when compared to children with “depressive conduct disorder.” Similarly, the same authors found a higher severity of overt aggression, destructiveness, and violence in a group of conduct disordered children when compared to the children with “depressive conduct disorder.” In addition, research suggests that children with co-occurring CD and anxiety disorder are less deviant and perceived by peers as less aggressive than children with CD in the absence of high levels of anxiety (Frick & Ellis, 1999; Walker et al., 1991).

Overall Summary

In sum, the present paper aims to elucidate the potential role of failure to attain socio-developmental milestones as a preventive factor in the development of a heterotypic co-occurring disorder for children with persistent types of internalizing and externalizing symptomatology. Although these children are posited to not develop co-occurring symptomatology, because they are posited to have severe forms of internalizing or externalizing pathology, their degree of impairment is still anticipated to be high. The present paper will explore the stability of these specific patterns of internalizing and externalizing symptomatology, the degree of association between these specific clusters of internalizing and externalizing symptoms over time, their relation to markers of social development during middle childhood (e.g., peer rejection), and relation to internalizing and externalizing disorders during early adolescence.

Statement of Purpose

Research suggests that co-occurrence between internalizing and externalizing disorders occurs at considerable levels during middle childhood to early adolescence, and risk factors tend to be similar for these two different classes of disorder. The current study seeks to test the validity of a model that proposes why some children are likely to *not* develop co-occurring problem behavior because of high and persistent levels of specific subtypes of internalizing *or* externalizing symptomatology during middle childhood to early adolescence, which paradoxically are hypothesized to prevent the development of co-occurring disorders. For example, heightened social anxiety and behavioral inhibition are internalizing symptoms that have been associated with decreased levels of externalizing symptomatology. Similarly, impulsivity/hyperactivity, aggression, and anger reactivity are externalizing symptoms that have

been associated with decreased levels of internalizing symptomatology. To date, there has been a dearth of longitudinal research examining the trajectories of such internalizing and externalizing symptoms and their potential preventive role against the development of co-occurring disorders. Accordingly, the present paper proposes to study whether chronic high trajectories of social anxiety, inhibition, and withdrawal during middle childhood are associated with high rates of internalizing disorders and low rates of externalizing disorders in early adolescence compared to children with less persistently high rates of internalizing symptoms and persistently high rates of externalizing symptoms. Trajectories of internalizing and externalizing symptoms will be used instead of individual assessment points because the former provide a more reliable measure of the stability of symptomatology. As the present paper focuses on risk factors associated with later diagnostic status, using multiple time points to assess specific types of internalizing and externalizing symptoms should provide a more accurate gauge of the persistence of such symptoms and predict failure to develop heterotypic co-occurring problems.

It is proposed that chronic high levels of impulsivity/hyperactivity, aggression, and anger reactivity during middle childhood will be associated with high rates of externalizing disorders and low rates of internalizing disorders during early adolescence compared to children with less persistently high rates of internalizing symptoms and persistently high trajectories of externalizing symptoms. No known studies to date have examined and compared the trajectories of these specific clusters of internalizing and externalizing symptoms in terms of their stabilities, types of developmental patterning (i.e., trajectories), and relation to co-occurring heterotypic symptomatology.

Specifically, the present study aims to extend previous research by examining the stability of these narrow-band clusters and their potential relation to the development, or lack

thereof, of internalizing and externalizing disorders. The sample includes data on 276 boys from the Pitt Mother & Child Project followed from ages 5 to 12. Trajectories of narrowly-defined constellations of internalizing, externalizing, and co-occurring problems will be identified using a semi-parametric group-based analysis procedure (Nagin & Tremblay, 2001).

Hypotheses

Based on the preceding review, the following hypotheses are proposed.

1. Based on research demonstrating that specific subtypes of internalizing and externalizing problems may be negatively associated, particularly as children age, it is proposed that narrow-band factors of specific internalizing symptoms of social anxiety, inhibition, and withdrawal (I-AIW) and specific externalizing symptoms of impulsivity/hyperactivity, anger reactivity, and aggression (E-AAI) will be negatively correlated with each other, and that the magnitude of this association will become more negatively correlated as the child ages. Thus, it is expected that the magnitude of the correlations between I-AIW and E-AAI will remain modest to negative from ages 5 to 11.

2A. Based on the model proposed that stipulates that high levels of social anxiety, inhibition, and withdrawal are associated with a failure to form social relationships with peers, it is expected that children in the persistent high I-AIW trajectory group will be more likely to be neglected by peers than children in the low and middle I-AIW trajectory groups. Further, children in the persistent high I-AIW trajectory group are expected to be more likely to interpret ambiguous social situations as negative and hostile and endorse avoidant social responses than children in the low and middle I-AIW trajectory groups (see Figure 1).

2B. Based on research suggesting a relationship between high levels of social anxiety, inhibition, and withdrawal, and internalizing disorders in late childhood and early adolescence, it

is expected that children in the persistent high I-AIW trajectory group will demonstrate significantly higher rates of diagnoses and symptoms of depression and anxiety in early adolescence than children in the low and middle I-AIW trajectory groups (see Figure 2).

2C. Based on the model proposed that stipulates that high levels of social anxiety, inhibition, and withdrawal may be preventive against the development of a co-occurring externalizing disorder, it is expected that, when compared to children in the low and middle I-AIW trajectory groups with at least one diagnosis of MDD, dysthymia, or GAD at age 11 or 12, children in the persistent high I-AIW trajectory group will demonstrate significantly lower rates of co-occurring diagnoses (see Figure 2).

3A. Based on the model proposed that stipulates that high levels of impulsivity/hyperactivity, aggression, and anger reactivity are associated with a failure to self reflect and self evaluate, it is expected that children in the persistent high E-AAI trajectory group will be more likely to interpret ambiguous social situations as hostile and select more aggressive response strategies than children in the low and middle E-AAI trajectory groups (see Figure 3).

3B. Based on research suggesting a relationship between high levels of impulsivity/hyperactivity, aggression, and anger reactivity and externalizing disorders in late childhood and early adolescence, it is expected that children in the persistent high E-AAI trajectory group will demonstrate significantly higher rates of diagnoses and symptoms of ODD and CD in early adolescence than children in the low and middle E-AAI trajectory groups (see Figure 4).

3C. Based on the model proposed that stipulates that high levels of impulsivity/hyperactivity, aggression, and anger reactivity may be preventative against the development of a co-occurring internalizing disorder, it is expected that, when compared to

children in the low and middle E-AAI trajectory groups with at least one diagnosis of ODD or CD at age 11 or 12, children in the persistent high E-AAI trajectory group will demonstrate significantly lower rates of co-occurring diagnoses (see Figure 4).

4. It is expected that there will also be significant differences for children demonstrating persistent high trajectories of I-AIW versus persistent high trajectories of E-AAI in relation to the prevalence of specific types of psychiatric disorders during early adolescence. Specifically, it is predicted that:

(4A) Children with persistent high trajectories of I-AIW will show significantly higher rates of diagnoses and symptoms of Depression and Anxiety and lower rates of Conduct Disorder and Oppositional Defiant Disorder during early adolescence than children with persistent high trajectories of E-AAI.

(4B) Children demonstrating persistent high trajectories of E-AAI will show significantly higher rates of diagnoses and symptoms of Conduct Disorder and Oppositional Disorder and lower rates of Depression and Anxiety than persistent high trajectories of I-AIW.

(4C) It is expected that children with persistent high trajectories of I-AIW and children with persistent high trajectories of E-AAI will not significantly differ in terms of rates of heterotypic co-occurring disorders in early adolescence.

Method

Participants

The present study uses data from the Pitt Mother and Child Project (PMCP), a longitudinal study of the early antecedents of antisocial behavior in boys. For the PMCP, low SES mothers with male, 6-17 month old infants were recruited from Women, Infants, and Children (WIC) Nutritional Supplement Program clinics throughout the metropolitan Pittsburgh area over a 2-year period. WIC is a federally funded program administered in Pittsburgh by

Allegheny County's Department of Health, and provides nutritional support to income-eligible families. The original sample of the PMCP was comprised of 310 families (54% European American, 40% African American, 6% other). When families were initially assessed at the child's 18-month visit, mother's ages ranged from 17-43, mean educational level was 12.5 years, and mean per capita income was \$2,892 per year (approximately \$11,568 per year for a family of four). At ages 10, 11, and 12, data were available on 261, 256, and 252 families, respectively, with data available for at least one of these time points for 279 families (90% of original sample). For purposes of the present study, the sample includes 276 participants, based on the number of children with at least two data points from ages 5 to 11. Participating children ($N = 310$) were compared with those with one or fewer data points between ages 5 and 11 ($N = 34$) on indicators of maternal education, annual family income, or child educational behavior when children were recruited at age 1.5 years of age. No significant differences were found between the two groups on any of the three measures.

Procedure

For assessments to be used in the present study, mother-son dyads were assessed when the boys were 5 (home assessment), 6 (lab assessment), 8 (home assessment), 10 (home assessment), 11 (lab assessment), and 12 (home assessment) years of age. Visits lasted between 2 - 3 hours and included parent report on questionnaires at all assessments, observations of parent-child interactive tasks, child report on questionnaires at the age 8, 10, 11, and 12 assessments, and administration of standardized psychiatric interviews of child symptomatology completed by both mothers and children about children's status at ages 11 and 12¹. Of interest in the present study are the standardized psychiatric interviews and questionnaires that examined boys' internalizing and externalizing symptomatology.

¹ For child internalizing disorders at age 12, only the child completed the K-SADS

Measures

Narrow-Band Factors

Child Behavior Checklist for ages 4-16 (CBCL; Achenbach, 1991, 1992). The CBCL is a widely used, well-validated checklist of child behavior problems, which are normalized within gender and age groups, and was administered to mothers at all assessments. For the present study, to assess impulsivity/hyperactivity, aggression, and anger reactivity, a narrow-band factor of these specific externalizing symptoms (i.e., E-AAI) was generated from 11 items of the CBCL from assessments conducted between ages 5 and 11. Specifically, items deemed to be indicative of impulsivity/hyperactivity, aggression, and anger reactivity were subjected to factor analysis using a principal components method at each of the five assessment points. Those items with significant factor loadings above .30 at all ages were retained for the E-AAI factor (see Table 1 for list of items and their factor loading). Similarly, to assess social anxiety, inhibition, and withdrawal, a narrow-band factor of these specific internalizing symptoms (i.e., I-AIW) was generated initially from 10 items of the CBCL. Items deemed to be indicative of social anxiety, inhibition, and withdrawal were also subjected to factor analyses and those with loadings above .30 at all data points were retained for the factor of I-AIW (see Table 1 for list of items and loadings). For both factors, loadings for all items were above the .30 criterion at all ages and thus all items were retained for the three factors. Chronbach's alphas were used to evaluate the internal consistency of the factors; they ranged from .612 to .722 for the I-AIW factor and from .812 to .861 for the E-AAI factor.

Child Internalizing and Externalizing Problems

Psychiatric interview (K-SADS) and questionnaire data will be used as measures of child outcome (i.e. internalizing and externalizing symptomatology and diagnoses). To minimize

missing data, when only one of the two assessments was completed, data from that assessment were used. When data were present from both assessments, for questionnaire data, an average of the two scores will be used.

Child Depression Inventory (CDI; Kovacs, 1992). The short form of the CDI is a 10-item measure of depressive symptoms for children, and was administered at the age 11 and 12 assessments. For each item reflecting symptoms of depression, children are presented with three statements that indicate their level of agreement with the statement during the past two weeks. These items are totaled to generate a sum of depressive symptomatology. This measure has been shown to have adequate reliability and validity (Kazdin, French, Unis, Esveldt-Dawson, & Sherick, 1983).

Elliott Delinquency Questionnaire (SRD; Elliott, Huizinga, & Ageton, 1985). The SRD is a 33-item self-report semi-structured interview that assesses the frequency with which an individual has engaged in delinquent behavior (Elliott et al., 1985) that was administered at the age 11 and 12 assessments. Using a 3-point rating scale (1 = “never”, 2 = “once/twice”, 3 = “more often”), boys rated the extent to which they engaged in different types of antisocial behaviors (e.g., stealing, throwing rocks at people, being sent home from school for misbehavior). As this measure was intended for youths aged 11 to 17 and children in the present study were age 11 to 12 when completing the SRD, certain substance-use items that would have an extremely low base rate at this age (e.g., intravenous drug use) were removed, reducing the number of items to 10. This 10-item factor was found to have adequate internal consistency ($\alpha = .71$).

Schedule for Affective Disorders and Schizophrenia for School-Age Children-Epidemiologic Version (K-SADS-E, Orvaschel and Puig-Antich, 1987). For the present study,

diagnoses of DSM-IV internalizing and externalizing disorders were determined based on administration of the K-SADS-E when children were ages 11 and 12. Advanced graduate students administered the K-SADS-E internalizing and externalizing disorder modules to mothers and boys in separate interviews, from which symptoms and functional impairment relevant to diagnostic criteria for the presence of DSM-IV diagnoses were evaluated. Specifically, symptoms relevant to Major Depressive, Dysthymic, Generalized Anxiety (Internalizing), Conduct Disorder, and Oppositional Defiant Disorder (Externalizing) were evaluated. To establish reliability, clinical interviewers participated in an intensive training program at the Western Psychiatric Institute and Clinic regarding administration of the interview. Further, every case in which a participant approached or met diagnostic criteria was discussed by other interviewers and Dr. Shaw before reaching a final decision on diagnosis. The SRD was used to inform diagnoses for CD at both ages. Diagnoses were based on symptoms meeting criterion for one or more DSM-IV disorders at one or more time points.

Children's Evaluations and Responses to Social Situations

Dodge Social Information Processing Scale (Dodge et al., 1990; Dodge & Somberg, 1987). The Dodge Social Information Processing Scale is a semi-structured interview that was administered to children at the age-10 assessment. During administration of this scale, the target child was asked to respond to a set of questions after viewing of a series of 8 vignettes (e.g., child hit in the back with ball, child bumped by peer) that were presented orally and with accompanying pictures. In each vignette the ambiguous behavior of one boy leads to some type of negative outcome for a second boy. The target child assesses the intent of the first boy and his hypothetical response(s) to the boy's behavior after watching each vignette through free response. These responses were then rated by the interviewer as "hostile," "non-hostile," or

“don’t know.” The target child next indicates how he would respond if in the hypothetical social situation. Again, responses were rated by the interviewer (Interrater reliability: $\kappa = .92$) using a 4-point scale ranging from “don’t know, nothing, or ask again/ask why” (0) to “retaliate” (3). Because the present study is interested in endorsement of withdrawn and avoidant social strategies, the second variable will be used to examine response strategies of retaliation and avoidance.

Child Peer Status

Peer Neglect. Measures were employed to measure peer neglect at a study-only, two-week day camp. This camp occurred in the summer preceding or following each child’s age 10 assessment (on average, 6.5 months before or after the assessment). The 146 children from the study who attended the camp were divided into three sessions, each of which was subdivided into units of nine to ten children. Efforts were made to subdivide and group together children from different neighborhoods and schools to minimize the likelihood that children would be familiar with each other before the start of camp. At the end of each week, children were asked to complete a series of questionnaires about how they felt about the other 9-10 children in their group. For one of these measures, based on recommendations made by Coie and colleagues (1982), the campers were asked to nominate the children in their group who they (1) liked and (2) disliked the most. Campers were allowed to nominate up to three children for each. To correct for unequal group sizes, the number of nominations that children received was divided by their group size. Children’s scores on these measures were standardized and composited to create a peer neglect score based on an absence of nominations.

Results

Descriptive statistics for the independent and dependent variables are presented in Table 2. As the factors of E-AAI and I-AIW were created for the present study, no normative data are available for them. However, when the CBCL Internalizing and Externalizing factors were compared to CBCL mean scale scores for non-referred boys, averages from the present sample were consistent with normative data. For example, at age 10, the boys in the present sample had an average CBCL Internalizing score of 48.82 ± 10.27 *sds* (compared to the CBCL mean scale score for non-referred boys of 50.2 ± 9.6 *sds*) and an average CBCL Externalizing score of 49.94 ± 11.20 (compared to the CBCL mean scale score for non-referred boys of 49.9 ± 9.8 *sds*). Mean scores from the CDI and SRD were based on a subset of items deemed appropriate for children of this age; thus, no normative data on the adaptations of these original measures are available for comparison.

Correlations Between I-AIW and E-AAI

To address the study's first hypothesis, that associations between I-AIW and E-AAI factors would demonstrate an increasingly more negative correlation over time, a series of Pearson correlation coefficients were computed between I-AIW and E-AAI at ages 5, 6, 8, 10, and 11. Unexpectedly, factors of I-AIW and E-AAI were significantly *positively* correlated at all ages: age 5 ($r = .42, p < .001$), age 6 ($r = .53, p < .001$), age 8 ($r = .39, p < .001$), age 10 ($r = .42, p < .001$), and age 11 ($r = .59, p < .001$). Further, the magnitude of these correlations did not generally decrease over time (see Table 3).

Trajectory Analyses

The first step in the data analytic plan was to identify child trajectories of I-AIW and E-AAI from ages 5 to 11. A semi-parametric, group-based method, described in Jones, Nagin, and

Roeder (2001) and Nagin (1999), was used to identify developmental trajectories of the following clusters of behaviors: (1) I-AIW: social anxiety, inhibition, and withdrawal and (2) E-AAI: impulsivity/hyperactivity, aggression, and anger reactivity. Using finite mixtures of suitably-defined probability distributions, the group-based approach for modeling trajectories uses a multinomial modeling strategy and identifies distinct clusters of individual trajectories within the population under study. This method can further be used to assess relevant characteristics of individuals within these trajectories. The parameters of this model were estimated by Maximum Likelihood.

To determine the optimal number of trajectories for factors of I-AIW and E-AAI from ages 5 to 11, models were estimated with two, three, and four groups. This range coincides with the number of groups posited by trajectory theories of antisocial behavior and found in a prior application of the semiparametric, group-based approach (Nagin & Tremblay, 1999). For I-AIW, the BIC score was -1572.81 for two groups; -1528.31 for three groups, and -1532.12 for four groups. For E-AAI, the BIC score was -1511.81 for two groups; -1472.97 for three groups, and -1476.98 for four groups. Based on the selection rule provided by D'Unger and colleagues (1998), the three group model fit the data best (i.e., least negative BIC score) for both I-AIW and E-AAI. These three groups will heretofore be referred to as low, middle, and high trajectories for each factor (I-AIW and E-AAI). A relatively high proportion ($n = 9$) of children fell in the high trajectories of both I-AIW and E-AAI. For exploratory purposes, children who were in both high groups were placed into a fourth group (high I-AIW *and* high E-AAI), for which ANOVA and Chi Square analyses were used to compare trajectory group differences.

Figure 5 plots the trajectories by group for I-AIW and Figure 6 plots the trajectories by group for E-AAI. The actual trajectories reflect factor scores for participants assigned to each

group based on their posterior probabilities. Although measures of goodness of fit between predicted and actual trajectories are not available presently, the degree of correspondence evident in Figures 5 and 6 suggests that the model approximates the data reasonably well.

Overall, the trajectories reveal consistency, with some mild increases in I-AIW and E-AAI factors for most boys between ages 5 and 11. Within I-AIW, boys in the “low trajectory” group include 61.3% of the sample. Such children exhibited consistently low levels of social anxiety, inhibition, and withdrawal. The “middle trajectory” group, comprised of 31.1% of the sample, demonstrated moderate levels of I-AIW symptoms. “High trajectory” boys accounted for approximately 7.5% of the sample and showed relatively high and persistent levels of I-AIW across the observation period. Of note, there were no significant differences among I-AIW trajectory groups or among E-AAI trajectory groups on ethnicity. Table 4 shows the overlap between I-AIW groups and E-AAI groups and Table 5 shows the percentage of boys in each trajectory group that met criteria for a DSM-IV internalizing or externalizing disorder at age 11 or 12.

For E-AAI, “low trajectory” boys accounted for 60.8% of the sample and exhibited consistently low levels of impulsivity/hyperactivity, aggression, and anger reactivity. “Middle trajectory” boys comprised 31.3% of the sample and demonstrated moderate levels of E-AAI throughout the study period. Finally, boys in the “high trajectory” accounted for approximately 7.9% of the sample and demonstrated consistently low levels of E-AAI.

I-AIW Within Trajectory Group Analyses

To examine whether children in low I-AIW, middle I-AIW, and high I-AIW would differ in terms of internalizing symptomatology, externalizing symptomatology, DSM-IV diagnoses, peer neglect, and interpretations of and responses to ambiguous social situations, a series of

ANOVAs and Chi-square analyses were computed. Children high on both I-AIW and E-AAI trajectory groups were also included in these comparisons for exploratory purposes. In these analyses, the trajectory groups served as the independent variables. The dependent variables consisted of levels of child self-report internalizing and externalizing symptomatology, DSM-IV diagnoses, ratings of peer neglect, hostile interpretations of ambiguous social situations, and endorsement of avoidant social responses to ambiguous social situations. In cases where the dependent variable was a dichotomous variable (e.g., internalizing disorder), Chi Square analyses were used in lieu of ANOVAs.

Peer Neglect and Social Information Processing

To examine whether children from different I-AIW trajectory groups differed in terms of interpretations of ambiguous social situations or responses to ambiguous social situations, a series of ANOVAs were computed in which trajectory groups (low, middle, and high) for I-AIW factors served as the independent variables. Contrary to expectations, results indicated that there were no significant differences between children in the low I-AIW, middle I-AIW, high I-AIW, or high on both I-AIW and E-AAI trajectory groups for interpretations of ambiguous social situations ($F = .58, p = .63$) or responses to ambiguous social situations ($F = 1.69, p = .17$) (see Table 6). To examine whether children from different I-AIW trajectory groups differed in terms of peer neglect, a Chi-square analysis was computed. Again contrary to expectations, results indicated that there were no significant differences among groups ($\chi = 3.52, p = .32$) (see Table 7).

Depressive Symptomatology and DSM-IV Internalizing Diagnoses

A similar set of ANOVAs and Chi Square analyses were conducted to determine if children in different I-AIW trajectory groups varied in levels of depressive symptomatology or

rates of internalizing diagnoses. ANOVA analyses comparing these trajectory groups on child-report of depressive symptomatology (CDI) at ages 11 and 12 revealed no significant trajectory group differences ($F = 1.37, p = .25$). Chi square analyses comparing children on rates of internalizing diagnoses at ages 11 and/or 12 revealed significant group differences ($\chi = 28.24, p < .001$). The significant chi square appeared to be generated from differences between children in the high I-AIW group (66.7%) and the high I-AIW and E-AAI group (50%) as compared to children in the low (6.1%) and middle (22%) trajectory groups (see Table 8).

Co-occurring DSM-IV Diagnoses

To address the issue if those meeting criteria for an internalizing disorder would be less likely to meet criteria for an *externalizing* disorder as a function of their internalizing group trajectory (i.e., higher rates expected among those with diagnoses in the low internalizing versus high internalizing trajectory group), a series of Chi square analyses were computed using only those children who met criteria for internalizing diagnoses at ages 11 and/or 12. These chi-square analyses revealed significant group differences ($\chi = 9.52, p = .023$), but not in the hypothesized direction. Of children in the low I-AIW trajectory group who met criteria for a DSM-IV internalizing diagnosis ($n = 7$), 0% met criteria for a co-occurring DSM-IV externalizing diagnosis. In contrast, for children with an internalizing disorder in the middle I-AIW group ($n = 13$), 38.5% met criteria for an externalizing diagnosis. Further, 50% of those in the high I-AIW trajectory met criteria for an externalizing diagnosis (2 of 4), and 100% of those in the high I-AIW and E-AAI met criteria for an Externalizing disorder ($n = 3$) (see Table 9).

E-AAI Trajectory Group Analyses

To examine whether children in low E-AAI, middle E-AAI, high E-AAI, and high on both I-AIW and E-AAI trajectory groups would differ in terms of internalizing symptomatology,

externalizing symptomatology, DSM-IV diagnoses, and interpretations of and responses to ambiguous social situations, a series of ANOVAs and Chi-square analyses were computed. In these analyses, the trajectory groups served as the independent variables. The dependent variables consisted of levels of child self-report internalizing and externalizing symptomatology, DSM-IV diagnoses, hostile interpretations of ambiguous social situations, and endorsement of retaliatory social responses to ambiguous social situations. In cases where the dependent variable was a dichotomous variable (e.g., internalizing disorder), Chi Square analyses were used in lieu of ANOVAs.

Social Information Processing

To examine whether children in the E-AAI trajectory groups differed in terms of interpretations of ambiguous social situations or responses to ambiguous social situations, a series of ANOVAs were conducted. Contrary to expectations, results indicated that there were no significant differences among groups for interpretations of ambiguous social situations ($F = .32, p = .81$) or responses to ambiguous social situations ($F = .14, p = .94$) (see Table 10).

Antisocial Symptomatology and DSM-IV Externalizing Diagnoses

To examine whether children in the E-AAI trajectory groups differed in levels of antisocial symptomatology and externalizing diagnoses, a series of ANOVAs and Chi Square analyses were computed. ANOVAs comparing externalizing trajectory groups on child report of antisocial symptomatology (SRD) at ages 11 and 12 revealed significant trajectory group differences ($F = 7.62, p < .001$). When Tukey post hoc analyses were computed, children in the high E-AAI trajectory group ($n = 11$) were found to demonstrate significantly higher levels of antisocial symptomatology than children in the low E-AAI trajectory group ($x = 5.95$ vs. $x = 2.93$ on SRD, $d = 1.14$ *sds*, $p < .05$). Further, children in the high I-AIW and E-AAI trajectory

group ($n = 9$) also reported significantly higher levels of antisocial symptomatology than those in the low E-AAI trajectory group ($x = 8.25$ vs. $x = 2.93$ on SRD, $d = 1.46$ *sds*, $p < .005$) and children in the middle E-AAI trajectory group ($x = 8.25$ vs. $x = 4.21$ on SRD, $d = 1.48$ *sds*, $p < .05$).

Chi square analyses comparing children in various E-AAI groups on frequencies of DSM externalizing diagnoses at ages 11 and/or 12 revealed significant group differences ($\chi = 27.07$, $p < .001$). The significant chi square appeared to be generated from differences between children in the high E-AAI group (62.5%) and the high I-AIW and E-AAI group (83.3%) as compared to children in the low (13.5%) and middle (32.3%) trajectory groups. Of the children in the low E-AAI trajectory, 13.5% met criteria for a DSM-IV externalizing diagnosis, compared to 32.3% of children in the middle group, 62.5% of children in the high E-AAI trajectory group, and 83.3% in the high I-AIW and E-AAI group (see Table 11).

Co-occurring DSM-IV Diagnoses

To address the issue if those meeting criteria for an externalizing disorder would be less likely to meet criteria for an *internalizing* disorder as a function of their externalizing group trajectory (i.e., higher rates of internalizing disorders expected among those with diagnoses in the low externalizing versus high externalizing trajectory group), a series of Chi square analyses were computed using only those children who met criteria for externalizing diagnoses at ages 11 and/or 12. Chi square analyses revealed significant group differences ($\chi = 14.39$, $p < .005$), but again not in the expected manner. Of the children in the low E-AAI trajectory who met criteria for a DSM-IV externalizing diagnosis ($n = 21$), 0% met criteria for a co-occurring DSM-IV internalizing diagnosis, versus 33.3% of those in the middle E-AAI trajectory group ($n = 15$),

66.7% of those in the high E-AAI group ($n = 3$), and 60% in the high I-AIW and E-AAI ($n = 5$), see Table 12).

Analyses Between High I-AIW, High E-AAI, and High Co-Occurring Trajectories on Depression and Antisocial Behavior

To examine whether children in the persistent high I-AIW, persistent high E-AAI, and persistent high I-AIW and E-AAI trajectory groups differed in levels of depressive and antisocial symptomatology and diagnoses, a series of ANOVAs and Chi Squares were computed. ANOVA analyses comparing these trajectory groups on child report of depressive symptomatology (CDI) at ages 11 and 12 revealed no significant trajectory group differences ($F = .33, p = .72$). Similarly, ANOVA analyses comparing these trajectory groups on child report of antisocial behavior (SRD) at ages 11 and 12 also revealed no significant trajectory group differences ($F = 1.12, p = .35$).

Chi square analyses were then conducted comparing the same three high persistent groups on rates of externalizing diagnoses at ages 11 and/or 12. No significant group differences were evident ($\chi = 1.50, p = .47$, see Table 13). Similarly, there were no significant group differences between persistent high groups on DSM-IV internalizing diagnoses ($\chi = 1.17, p = .58$, see Table 14) or on DSM-IV co-occurring diagnoses ($\chi = .95, p = .62$, see Table 15).

Discussion

The overarching goal of the present study was to test the validity of a model that proposes why some children are likely to *not* develop co-occurring problem behavior. Specifically, it was hypothesized that high and persistent levels of specific subtypes of internalizing (i.e., social anxiety, inhibition, and withdrawal) *or* externalizing symptomatology (impulsivity/hyperactivity,

aggression, and anger reactivity) during middle childhood to early adolescence would prevent the development of co-occurring disorders.

It was hypothesized that the narrow-band factors of I-AIW and E-AAI would be negatively correlated with each other, and that the magnitude of this association would become more negatively correlated as a function of the increasing child's age. Unexpectedly, factors of I-AIW and E-AAI were significantly *positively* correlated at all ages and the magnitude of these correlations did not generally increase or decrease over time. It was also hypothesized that boys in the persistent high I-AIW trajectory group would be more likely to be neglected by peers, be more likely to interpret ambiguous social situations as negative and hostile, endorse more avoidant social responses, and have higher levels of depressive symptomatology than boys in the low and middle I-AIW trajectory groups. However, results revealed no significant differences between groups on any of these measures. It was further expected that boys in the persistent high I-AIW trajectory group would demonstrate significantly higher rates of diagnoses of depression and anxiety, and lower levels of a co-occurring externalizing disorder in early adolescence than boys in the low and middle I-AIW trajectory groups. Consistent with the hypotheses, boys in the high I-AIW trajectory group tended to have higher rates of internalizing diagnoses. However, contrary to expectations, boys in the high I-AIW trajectory group also tended to have higher rates of co-occurring externalizing disorders than children in the other I-AIW groups.

Similarly, it was hypothesized that boys in the persistent high E-AAI trajectory group would be more likely to interpret ambiguous social situations as hostile and endorse more aggressive social responses than children in the low and middle E-AAI trajectory groups. However, results revealed no significant differences among groups. Boys in the persistent high

E-AAI trajectory group were also hypothesized to have higher levels of symptomatology and diagnoses of ODD and CD, and lower levels of co-occurring internalizing diagnoses, than children in the low or middle E-AAI trajectory groups. Consistent with these hypotheses, children in the persistent high E-AAI had significantly higher symptomatology and diagnoses of ODD and CD. However, contrary to hypotheses, children the high E-AAI trajectory group tended to have higher rates of co-occurring internalizing diagnoses than those in other groups. Lastly, it was expected that boys with persistent high trajectories of I-AIW would show significantly higher rates of internalizing, and lower rates of externalizing symptomatology and diagnoses than children with persistent high trajectories of E-AAI and vice versa. However, analyses did not reveal any significant differences among groups on these measures.

Overall, the present study failed to support the study's proposed model, that high and persistent levels of narrow-band constellations of internalizing and externalizing symptoms would prevent the development of a co-occurring disorder. Instead, the present results seem to support three prevailing theories regarding the development of co-occurring disorders: 1) shared risk factors; 2) general, non-specific expression of psychopathology; and 3) heightened maladjustment. The first theory of co-occurrence is that shared risk factors may influence child disorder in a more general manner, such that co-occurrence might represent overlapping etiological processes or alternate expressions of the same disorder (Klein & Riso, 1993). The high-risk nature of the present sample and family's greater-than-average likelihood of multiple risk factors may partly explain the preponderance of co-occurring symptomatology among those children with persistent high trajectories of narrow-band internalizing or externalizing symptoms. For example, many risk factors with high prevalence in this sample, including poverty and stressful life events, are associated with both internalizing and externalizing

symptomatology (Costello et al., 1988; Keiley et al., 2000; Keiley et al., 2003; McLeod & Shanahan, 1996).

A second theory of co-occurrence is that it may reflect nonspecific expressions of psychopathology in young children, with clearer presentation of psychopathology emerging as the child ages (Nottelman & Jensen, 1995). Thus, it has been proposed that prior to the developmental stage for the typical emergence of a disorder, it may be represented by symptoms that are atypical for that disorder, such that antisocial behaviors in children may actually represent “masked depression” (Kovacs et al., 1988; Kovacs, 1990). It is also possible that externalizing behavioral problems in children may overshadow more subtle depression and anxiety symptoms (Hammen & Compas, 1994). The findings in the present study support such a general, non-specific pattern of psychopathology.

Third, some research suggests that children with co-occurring disorders have heightened maladjustment, such that co-occurrence is simply a reflection of more risk factors and/or more severe psychopathology (Jensen et al., 1993, Kovacs et al, 1997). As the current sample was recruited based on their low-income status, a factor that is associated with exposure to more stressful life events than for middle-class families (e.g., higher rates of maternal depression and parental conflict and transitions, more dangerous neighborhoods), the association between externalizing and internalizing symptomatology may have been stronger than it would be in less high-risk contexts.

Further, as the trajectory groups were based on persistent high levels of symptomatology beginning in early childhood (age 5), the trajectory groups represented children with early levels of symptomatology. Research tends to associate symptomatology in early childhood with poorer outcome, more severe course of psychopathology, and higher levels of co-occurring

symptomatology. Thus, by following children from early to late childhood, boys in the persistent high trajectory groups may represent a distinct subset of children that have an increased likelihood of co-occurring symptomatology. In sum, the present study seems to support these three prior theories of co-occurrence within a high-risk community sample. However, because of the number of null results, the current findings offer little insight into the processes underlying why some children develop co-occurring disorders and others do not. Further, despite these caveats, the strong positive correlations between I-IAW and E-AAI suggest that the present model might benefit from some re-conceptualization as the hypothesized negative relationships were not supported.

Correlations Between I-AIW and E-AAI

It was proposed that the narrow-band factors of specific internalizing symptoms of social anxiety, inhibition, and withdrawal (I-AIW) and specific externalizing symptoms of impulsivity/hyperactivity, anger reactivity, and aggression (E-AAI) would be negatively correlated with each other, and that the magnitude of this association would decrease (i.e., more negatively correlated) as the child ages. However, correlations revealed significant positive correlations between I-AIW and E-AAI at all ages. Further, these correlations generally did not decrease over time. Although it was expected that specific symptoms of internalizing and externalizing (i.e., I-AIW, E-AAI) would be inversely related, the present findings are consistent with research finding associations between general internalizing and externalizing symptomatology and disorders in childhood (Cole & Carpentieri, 1990; Verhulst & van der Ende, 1993). It is possible that with children and young adolescents, psychopathology is manifest in a general manner, such that internalizing and externalizing symptoms are likely to

both be present. Further, it is also possible that, within a relatively high-risk sample, there is less differentiation in expression of psychopathology (Weiss & Catron, 1994).

Social Information Processing and Peer Neglect

The present paper also hypothesized that high levels of social anxiety, inhibition, and withdrawal would be associated with a failure to form social relationships with peers (and thus higher levels of peer neglect), negative and hostile interpretations of ambiguous social situations, and endorsement of avoidant social responses to ambiguous social situations, particularly in comparison to children with lower levels of social anxiety, inhibition, and withdrawal. However, results revealed no significant group differences on these measures, suggesting that boys with varying levels of social anxiety, inhibition, and withdrawal do not significantly differ in terms of peer neglect, hostile interpretations of ambiguous social situations, and endorsement of avoidant social responses. Similarly, it was also hypothesized that high levels of impulsivity/hyperactivity, aggression, and anger reactivity would be associated with negative and hostile interpretations of ambiguous social situations and endorsement of retaliatory social responses to ambiguous social situations, particularly in comparison to children with lower levels of impulsivity/hyperactivity, aggression, and anger reactivity. However, similar to results for I-AIW trajectory groups, results revealed no significant group differences on these measures, suggesting that children with varying levels of impulsivity/hyperactivity, aggression, and anger reactivity do not significantly differ in terms of hostile interpretations of ambiguous social situations and endorsement of retaliatory social responses.

Many of these results are inconsistent with prior research. For example, other studies have indicated that children with internalizing diagnoses, high levels of social anxiety, and/or high levels of social inhibition are more likely to be neglected by peers, interpret ambiguous

social situations in a negative and hostile manner, and utilize avoidant social strategies (Chansky & Kendall, 1997; Chorpita et al., 1996; Dadds et al., 1996; Daleiden & Vasey, 1997; Rudolph et al., 1994). Additionally, research has indicated that children with externalizing diagnoses and/or high levels of antisocial symptomatology are more likely to interpret social situations in a negative and hostile manner and utilize retaliatory, aggressive social strategies (Coie & Dodge, 1988; Dodge & Frame, 1982; Milch-Reich et al., 1999; Waas, 1988). This discrepancy may be attributable to the measures used in the present study. For example, observations of children in their natural school or neighborhood environments may have offered more insight in regards to their social status (e.g., neglected) and utilization of various social strategies (e.g., avoidance). Further, it is possible that the Dodge measure of social information processing was not the strongest instrument for the present endeavor, such as interpretations and responses to social situations. However, more specific and observationally-based measurements of these social variables were not collected during the course of the overarching longitudinal study.

Internalizing and Externalizing Symptomatology and DSM-IV Diagnoses

It was hypothesized that boys in the persistent high I-AIW trajectory group would demonstrate significantly higher rates of diagnoses and symptoms of Depression and Anxiety in early adolescence than children in the low and middle I-AIW trajectory groups. Results were not consistent with this expectation in reference to child report of depressive symptomatology. However, with respect to DSM-IV internalizing diagnoses, boys in the persistent high I-AIW trajectory group and high in both I-AIW and E-AAI trajectory groups had significantly higher rates of diagnoses than boys in the low and middle I-AIW trajectory groups. Thus, results were significant only in the case of diagnosable disorders and only between the high I-AIW and high on both I-AIW and E-AAI trajectory as compared to the low and middle I-AIW trajectory

groups. This is consistent with prior research documenting associations between social inhibition, anxiety, and withdrawal in relation to clinically-meaningful internalizing symptomatology conducted with clinic samples using psychiatric interviews (Turner et al., 1987). The group differences based on DSM-IV internalizing diagnoses suggest that the majority of children (66.7%) in the high I-AIW trajectory group met criteria for a DSM-IV internalizing diagnosis in early adolescence, whereas the minority of children in the low (~6%) and middle (~20%) trajectory groups met such criteria. Consistent with prior research, these findings suggest that high levels of social inhibition, anxiety, and withdrawal in childhood and early adolescence are associated with higher levels of internalizing disorders in early adolescence (Rubin et al., 1989). Given that mother-report was the only source of information used to determine trajectories of internalizing symptom and one of two primary sources of information in terms of child internalizing disorders at ages 11 and 12, these results are not surprising and may in part be influenced by reporter bias (Fergusson, Lynskey, & Horwood, 1993).

Similarly, it was hypothesized that boys in the persistent high E-AAI trajectory group would demonstrate significantly higher rates of externalizing symptomatology and diagnoses in early adolescence than boys in the low and middle E-AAI trajectory groups. Consistent with this prediction, analyses found that boys in the high E-AAI trajectory group had significantly higher levels of child-reported antisocial symptomatology than children in the low E-AAI trajectory group. Additionally, boys in the high I-AIW and E-AAI trajectory group had significantly higher levels of antisocial symptomatology than boys in the low or middle E-AAI trajectory groups, but did not significantly differ from boys in the high E-AAI trajectory group. These results indicate that persistent high levels of impulsivity/hyperactivity, aggression, and anger reactivity, with or without high levels of social anxiety, inhibition and withdrawal, are associated

with higher levels of child-reported antisocial behavior in early adolescence, and unlike the results for internalizing cannot be attributed to a reporting bias, as youth rather than mothers were the informants of age 11 and 12 antisocial behavior.

Within E-AAI trajectory groups, analyses of group differences on DSM-IV externalizing diagnoses (i.e., ODD and/or CD) revealed significant differences, such that boys in the persistent high I-AIW trajectory and high in both I-AIW and E-AAI trajectory groups had significantly higher rates of diagnoses than children in the low and middle I-AIW trajectory groups. Thus, results were significant only in the case of diagnosable disorders and only between the high I-AIW and high on both I-AIW and E-AAI trajectory as compared to the low and middle I-AIW trajectory groups. Boys in both the high I-AIW and high in both I-AIW and E-AAI trajectory groups showed comparatively high rates of diagnoses, such that the majority of boys in these groups met criteria for a DSM-IV externalizing disorder in early adolescence (~80% and 60%, respectively), whereas the minority of boys in the low (~13%) and middle (~30%) trajectory groups met such criteria. Consistent with prior research (Campbell, 1994; Henry et al., 1996), these findings suggest that high levels of impulsivity/hyperactivity, aggression, and anger reactivity in childhood and early adolescence are associated with higher levels of externalizing disorders in early adolescence. As for the results involving internalizing trajectory groups and internalizing disorders, the possibility remains that these findings were at least partially confounded by a maternal reporting bias, as mothers served as the principal informants for trajectories of externalizing symptomatology and one of two informants in establishing externalizing diagnosis. However, as these results were corroborated by symptom count of antisocial activity using youth report, there is greater reason to support their credibility.

Co-occurring DSM-IV Diagnoses

A primary focus of the current study was to examine whether persistently high levels of social anxiety, inhibition, and withdrawal would be preventive against the development of a co-occurring externalizing disorder. However, this hypothesis was not confirmed. In fact, boys with a persistent high trajectory of I-AIW and at least one internalizing disorder demonstrated a 50% probability of demonstrating an externalizing disorder, compared to rates of 38% and 0% in the medium and low I-AIW groups, respectively.

As the findings were in the opposite direction of hypotheses, the proposed model does not adequately explain why some children do not develop co-occurring disorders. As previously discussed, the present results are congruent with other theories of co-occurrence, including the role of shared risk factors; general, non-specific expression of psychopathology; and heightened maladjustment. It is also possible that specific symptomatology in and of itself is not protective against the development of a co-occurring disorder. Thus, other factors, such as parenting, family factors, and environmental variables may be important in determining which children will and will not develop a co-occurring externalizing disorder. For example, observational studies have shown that, in discussions with their children, parents of high-anxiety children have been shown to endorse and support more avoidant strategies than parents of other children (Messer & Beidel, 1994). It is possible that the degree that parents adapt their parenting towards children with high levels of anxiety, such as becoming more protective and/or supportive of avoidant strategies, is important in influencing the development of internalizing and co-occurring externalizing symptomatology. Specifically, parents who support avoidant strategies and are more protective with their children, may promote the maintenance and intensification of avoidant, anxious, and withdrawn behaviors in their children. Alternatively, parenting that is less supportive of avoidant strategies, less protective, and more encouraging of exploration and

independence may be associated with lower levels of internalizing symptomatology over time. However, it is likely that the effects of extremely protective parenting may vary as a function of child characteristics. For some children, it may promote isolation, withdrawal, and internalizing symptomatology. However, for others it may be associated with rebellion, parent-child conflict, and externalizing symptomatology. Thus, as many different factors are likely to affect a child's development, it is likely that family and environmental variables unaccounted for in the present study and the current model have important and differential effects on the development and exacerbation of symptomatology in children and preadolescents. For example, children reared in neighborhoods with high levels of violence may have heightened exposure to delinquent peers and violent activity, which may be associated with the development of externalizing symptomatology. Alternatively, children reared in an isolated environment may have restricted access to other peers for social activity and, by virtue of environment, be more isolated. This may be linked with an exacerbation of avoidant tendencies and internalizing symptomatology. Parents may also inadvertently model different types of psychopathology. For example, children with high levels of social anxiety, inhibition, and withdrawal who have depressed/anxious parents may be more likely to show intensification of their symptomatology than children who have non-depressed/anxious parents or who have parents with antisocial tendencies. In fact, the latter may be associated with exacerbation of externalizing symptomatology through modeling by their parents.

The current study also proposed that high levels of impulsivity/hyperactivity, aggression, and anger reactivity would be preventive against the development of a co-occurring externalizing disorder. However, analyses of externalizing trajectory groups among boys with at least one DSM-IV externalizing diagnosis failed to support the hypothesis that boys with persistently high

E-AAI symptoms would have low rates of internalizing disorders. In fact, 67% of boys in the high trajectory group met criteria for a DSM-IV internalizing diagnosis in early adolescence, versus 33% in the middle and 0% in the low groups. As aforementioned, these findings were also unanticipated but congruent with prior theories of co-occurrence, including the role of shared risk factors; general, non-specific expression of psychopathology; and heightened maladjustment. Again, it is difficult to explain the current findings within the context of the proposed model. As previously discussed, it is possible that specific symptomatology in and of itself is not protective against the development of a co-occurring disorder, such that other factors (e.g., parenting, family factors, and environmental variables) may be important in determining which children will and will not develop a co-occurring externalizing disorder. For example, research has demonstrated that child externalizing symptomatology is associated with peer rejection (Coie & Dodge, 1988; Cole & Carpentieri, 1990; Pope et al., 1991). In turn, peer rejection likely exacerbates hostile attribution biases and aggressive behavior and is also associated with internalizing symptomatology (Patterson et al., 1989). In this manner, the responses of peers are likely to play an important role in the development of externalizing and co-occurring symptomatology. It is possible that the degree to which children are accepted by peers and are generally successful (e.g., in academic functioning and relationships with others) is important in influencing the development of externalizing and co-occurring internalizing symptomatology. Children with protective features, such as high intelligence or an adept sense of humor, may be protected from the negative ramifications of peer rejection and academic failure. Thus, it seems that many factors unaccounted for by the present model, such as peer relations, family factors, and environmental variables, may have important effects on the development and exacerbation of symptomatology in children and preadolescents.

Persistent High Trajectories and DSM-IV Diagnoses

It was also hypothesized that there would be significant differences for boys demonstrating persistent high trajectories of I-AIW versus persistent high trajectories of E-AAI in relation to the prevalence of internalizing and externalizing symptomatology and disorders during early adolescence. However, analyses revealed no significant differences between boys in the high E-AAI trajectory and the high I-AIW trajectory on self-reported depressive or antisocial behavior. There were also no significant differences between these groups on DSM-IV internalizing or externalizing diagnoses. These results do not support the present model but rather a model of general expression of psychopathology. It seems that, at least for boys from a high risk sample (i.e., low-income background), the occurrence of high rates of either externalizing or internalizing symptoms is associated with high rates of co-occurring symptomatology.

Lastly, it was also proposed that boys with persistent high trajectories of I-AIW and children with persistent high trajectories of E-AAI would not significantly differ in terms of rates of heterotypic co-occurring disorders in early adolescence. Congruent with this hypothesis, analyses did not find a significant difference between these groups in terms of rates of DSM-IV co-occurring internalizing and externalizing disorders in early adolescence. This seems to suggest that, as proposed, boys with persistent high levels of either I-AIW or E-AAI are at equivalent likelihood to develop a co-occurring disorder.

Limitations

The present study has several limitations. First, the high-risk status of the sample limits generalizability of findings to low-income, urban families with male children. Before drawing inferences to other populations, the findings would need to be replicated with rural and suburban,

higher SES samples, as well as with girls. In relation to gender, although past research has found similar rates of internalizing symptomatology during childhood in boys and girls and slightly higher rates of externalizing symptomatology in males than in females during childhood, it is possible that there may be important differences in terms of the development of co-occurring disorders in females. As the present study utilized a data set comprised solely of males, it is difficult to draw inferences about generalizability of findings to females. It is possible that there may be different patterns of internalizing and externalizing symptomatology in girls during childhood and early adolescence. Further, additional data pertaining to social information processing variables or peer status may have enhanced the breadth and depth of assessments of these variables and perhaps altered the results. For example, more direct measures of children's social responses to actual situations may be more predictive than children's responses to social vignettes. Further, teacher or peer data regarding children's peer status in the classroom would have improved the assessment of children's peer status on a more everyday basis, rather than having observations based on a two-week period when youth were interacting with novel peers. Thus, it may have also been beneficial to utilize data from teachers. Teacher-report data are available, but only for approximately one-half to two-thirds of the sample, which would have reduced sample sizes for comparison to unacceptably low levels for the most persistent and high internalizing and externalizing trajectory groups. Thus, reports of child adjustment were restricted to mothers and youth. Additionally, stopping measurement of antisocial behavior at age 12 might have prevented the detection of effects for the proposed protective role of high I-AIW on antisocial behavior. In this manner, the effects of peers on antisocial behavior would likely just begin emerging at age 12 (Patterson et al., 1989) and continuing measurement of children's behavior past this age may have been beneficial.

Further, it is also possible that factors not measured in the present study may have been informative and may play a preventive role in the development of co-occurring disorders. For example, positive illusory self-perceptions in children are associated with increased aggression (Edens et al., 1999; Hughes et al., 1997) and may be protective against the development of internalizing symptomatology. Similarly, callous-unemotional traits (Frick, 1999) are associated with externalizing symptomatology and may also be protective against the development of internalizing symptomatology insofar as they are likely to prevent the attainment of empathy towards others and self-reflection.

Finally, cell sizes were low for some trajectory groups, particularly within the high E-AAI, high I-IAW, and high co-occurring trajectory groups. The size of these persistently-high groups was frequently less than 10, making it difficult to detect differences unless effect sizes were unusually large. For example, to achieve a large effect size of .80, 30 subjects per cell would have been needed to have an 85% chance of rejecting the null hypothesis. To detect a medium or small effect, cells would have had to be as large as 50 to 200, respectively, to have an 85% chance of rejecting the null hypothesis. Thus, further research in this area would benefit from the use of much larger sample sizes, or oversampling of children with persistently high levels of internalizing and/or externalizing symptomatology.

Future Directions

As the present study did not support the proposed model in accounting for children who do not develop co-occurring internalizing and externalizing disorders, further development of the model and its empirical validation is indicated. Although it may be possible that children with “pure” forms of internalizing and externalizing disorders may significantly differ from children with co-occurring patterns of symptomatology, the present model does not adequately explain

how “pure” forms of symptomatology may be protective against the development of a co-occurring diagnosis. One possibility is that other factors unaccounted for by the present model are important in understanding the development, or lack thereof, of a co-occurring disorder. An understanding of such differences would be both informative and potentially important for treatment of these populations. However, the results of this study do not presently support such a model.

It is possible that factors other than socio-developmental milestones may play a role in the development of co-occurring symptomatology and disorder. For example, biological and neurological factors may play a role in the development of internalizing and externalizing disorders in children. Some research has found differences in central CRF hyperactivity and increased stress reactivity as a result of early life stress, such that early life stresses, coupled with genetic predisposition, may result in neurobiological vulnerability to stress and lower thresholds for developing depression and anxiety in the presence of stressors. (Heim & Nemeroff, 1999). Additionally, in relation to Patterson’s 1989 dual-failure model, it is possible that other child factors may provide protection from negative consequences associated with antisocial behavior, such as peer rejection and academic failure. For example, one study found a subgroup of aggressive children who had higher self- and other- reported support and relationship quality (Edens et al., 1999), suggesting that aggression in some children is not necessarily associated with peer rejection or troubled relationships with others. It is possible that some factors (e.g. intelligence, physical attractiveness, a good sense of humor) may be able to at least partly compensate for the negative effects of aggressive and antisocial behavior, promoting the attainment of socio-developmental milestones (e.g. healthy relationships with others, self-evaluation, self-reflection). Further, research suggests that some aggressive children are

controversial in peer social status, liked by some peers and disliked by others. Children with controversial peer status have been shown to be relatively happy and comfortable with peer relationships (Crick & Ladd, 1993). Thus, although these children are rejected by some peers, acceptance by other peers may be protective against the negative affectivity that may typically accompany peer rejection.

It is also possible that differences in internalizing or externalizing symptomatology may confer a greater or lesser risk for co-occurring heterotypic symptomatology. For example, reactive versus proactive aggressors may differ in their likelihood to develop internalizing symptomatology and course of disorder (Ialongo et al., 1996). Similarly, children with anxiety disorders may be more likely to engage in covert antisocial behavior rather than aggression (Kazdin, 1992). Research elucidating the potential role of these differences in the development of co-occurring symptoms would be beneficial.

Future research assessing the role of such family, peer, and environmental factors in relation to the present model may be of interest. The results of the present study seem to support a general, non-specific pattern of psychopathology and do not provide an answer as to why some children do not develop a co-occurring disorder. Further research in this area utilizing larger sample sizes, children of both genders, and children from diverse backgrounds (e.g., both urban and rural and both low risk and high risk) would be of benefit. Specifically, research assessing child and environmental risk factors, neuropsychological and biological factors, course of disorder, social development, and developmental outcomes in children with pure and co-occurring internalizing and externalizing symptomatology is of utmost importance in clarifying the distinction between and developmental progressions of these conditions. As research has demonstrated similarities and differences in risk factors associated with internalizing and

externalizing disorders, with some research suggesting that co-occurrence represents heightened severity of risk factors, research examining the interaction of child factors relevant to the proposed model (e.g., inhibition, impulsivity) and family risk factors would be particularly informative. The proposed model does not presently incorporate the potential influence of risk factors and research to support, or negate, such a link would be of interest. Therefore, to address the proposed role of socio-developmental milestones, longitudinal research designs assessing differences between pure and co-occurring cases in terms of course and severity of symptomatology (i.e. overall internalizing and externalizing), child factors (e.g., inhibition, impulsivity), family factors, peer relationships, and environmental risk factors are needed. It is important for studies to utilize sample with high levels of internalizing, externalizing, and co-occurring symptomatology. Additionally, it is also important to incorporate adequate measures of social information processing factors, social skills factors, as well as general family and environmental risk factors. It would also be informative to conduct analyses utilizing participants of both genders at various ages (e.g., late childhood, early adolescence, middle adolescence).

REFERENCES

- Achenbach, T.M. (1991). *Manual for the child behavior checklist/4-18 and 1991 profiles*. Burlington, VT: University of Vermont, Department of Psychiatry.
- Achenbach, T.M. (1992). *Manual for the Child Behavior Checklist and revised child behavior profile*. Burlington, VT: University of Vermont, Department of Psychiatry.
- Anderson, J., Williams, S., McGee, R. & Silva, P. (1987). DSM-III disorders in preadolescent children: Prevalence in a large sample from the general population. *Archives of General Psychiatry*, 44, 69-76.
- Angold, A. & Costello, E. (1992). Comorbidity in children and adolescents with depression. *Child and Adolescent Psychiatric Clinics of North America*, 1, 31-51.
- Angold, A. & Costello, E. (1993). Depressive comorbidity in children and adolescents: empirical, theoretical, and methodological issues. *The American Journal of Psychiatry*, 150, 1779-1791.
- Angold, A., Costello, E. , & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry*, 40 (1), 57-87.
- Biederman, J., Faraone, S., Mick, E., & Lelon, E. (1995). Psychiatric comorbidity among referred juveniles with major depression: fact or artifact. *Journal of the American Academy of Child and Adolescent Psychiatry*, 34 (5), 579-591.
- Biederman, J., Newcorn, J. & Sprich, S. (1991). Comorbidity of attention deficit

- hyperactivity disorder with conduct, depressive, anxiety, and other disorders. *American Journal of Psychiatry*, 148, 564-577.
- Cairns, R., Cairns, B., Neckerman, H., Gest, S., & Garipey, J. (1988). Social networks and aggressive behavior: Peer support or peer rejection? *Developmental Psychology*, 24, 815-823.
- Calkins, S., Gill, K., Wilford, A. (1999). Externalizing problems in two year olds: Implications for patterns of social behavior and peers' responses to aggression. *Early Education and Development*, 10 (3), 267-288.
- Campbell, S. (1994). Hard-to-manage preschool boys: Externalizing behavior, social competence, and family context at two-year follow-up. *Journal of Abnormal Child Psychology*, 22, 147-166.
- Capaldi, D. & Stoolmiller, M. (1999). Co-occurrence of conduct problems and depressive symptoms in early adolescent boys: III. Prediction to young-adult attachment. *Development and Psychopathology*, 11, 59-84.
- Caron, C. & Rutter, M. (1991). Comorbidity in child psychopathology: Concepts, issues, and research strategies. *Journal of Child Psychology and Psychiatry*, 32 (7), 1063-1080.
- Chansky, T. & Kendall, P. (1997). Social expectancies and self-perceptions in anxiety-disordered children. *Journal of Anxiety Disorders*, 11 (4), 347-363.
- Chorpita, B., Albano, A. & Barlow, D. (1996). Cognitive processing in children: Relation to anxiety and family influences. *Journal of Clinical Child Psychology*, 25, 170-176.
- Coie, J., Dodge, K., & Coppotelli, H. (1982). Dimensions and types of social status: A

- cross-age perspective. *Developmental Psychology*, 18, 557-570.
- Coie, J. & Dodge, K. (1988). Multiple sources of data on social behavior and social status in the school: A cross-age comparison. *Child Development*, 59, 815-829.
- Coie, J., Dodge, K., & Kupersmidt, J. (1990). Peer group behavior and social status. In S. Asher (Ed.), *Peer rejection in childhood. Cambridge studies in social and emotional development*, pp. 17-59.
- Cole, D. & Carpentieri, S. (1990). Social status and the comorbidity of child depression and conduct disorder. *Journal of Consulting and Clinical Psychology*, 58 (6), 748-757.
- Connor, D., Edwards, G., Fletcher, K., Baird, J., Barkley, R., & Steingard, R. (2003). Correlates of comorbid psychopathology in children with ADHD. *Journal of the American Academy of Child and Adolescent Psychiatry*, 42 (2), 193-200.
- Costello, E., Angold, A., Burns, B., Stangl, D., Tweed, D., Erkanli, A., Worthman, C. (1996). The Great Smoky Mountains Study of youth: Goals, design, methods, and the prevalence of DSM-III-R disorders. *Archives of General Psychiatry*, 53 (12), 1129-1136.
- Costello, E., Costello, A., Edelbrock, C., Burns, B., Dulcan, M., Brent, D., & Janiszewski, S. (1988). Psychiatric disorders in pediatric primary care: prevalence and risk factors. *Archives of General Psychiatry*, 45, 1107-1116.
- Cunningham, C. E., Siegel, L. S., & Offord, D. R. (1991). A dose-response analysis of the effects of methylphenidate on the peer interactions and simulated classroom performance of ADD children with and without conduct problems. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 32, 439-452.

- D'Unger, A., Land, K., McCall, P., & Nagin, D. (1998). How many latent classes of delinquent/criminal careers? Results from mixed Poisson regression analyses of the London, Philadelphia, and Racine cohort studies. *American Journal of Sociology, 103*, 1593-1630.
- Dadds, M., Barrett, P., Rapee, R., & Ryan, S. (1996). Family process and child anxiety and aggression: An observational analysis. *Journal of Abnormal Psychology, 24* (6), 715-734.
- Dadds, M., Sanders, M., Morrison, M., & Rebgetz, M. (1992). Childhood depression and conduct disorder: II. An analysis of family interaction patterns in the home. *Journal of Abnormal Psychology, 101* (3), 505-513.
- Daleiden, E. & Vasey, M. (1997). An information-processing perspective on childhood anxiety. *Clinical Psychology Review, 17* (4), 407-429.
- Dodge, K. A., Price, J. M., Bachorowski, J., & Newman, J. P. (1990). Hostile attributional biases in severely aggressive adolescents. *Journal of Abnormal Psychology, 99*, 385-392.
- Dodge, K. & Frame, C. (1982). Social cognitive biases and deficits in aggressive boys. *Child Development, 53*, 620-635.
- Dodge, K. & Somberg, D. (1987). Hostile attributional biases among aggressive boys are exacerbated under conditions of threat to the self. *Child Development, 58*, 213-224.
- Eisenberg, N., Fabes, R., Guthrie, I., & Reiser, M. (2000). Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78*, 136-157.
- Elliott, D., Huizinga, D., & Ageton, S. (1985). *Explaining delinquency and drug use*.

Thousand Oaks, CD: Sage Publications.

- Fergusson, D., Lynskey, M., & Horwood, L. (1993). The effect of maternal depression on maternal ratings of child behavior. *Journal of Abnormal Child Psychology*, 21 (3), 245-269.
- French, D. (1988). Heterogeneity of peer-rejected boys: Aggressive and nonaggressive subtypes. *Child Development*, 59, 976-985.
- Frick, P. & Ellis, M. (1999). Callous-unemotional traits and subtypes of conduct disorder. *Clinical Child and Family Psychology Review*, 2 (3), 149-168.
- Gabel, S., Schmitz, S., & Fulker, D. (1996). Comorbidity in hyperactive children: issues related to selection bias, gender, severity, and internalizing symptoms. *Child Psychiatry and Human Development*, 27, 15-28.
- Gazelle, H. & Ladd, G. (2003). Anxious solitude and peer exclusion: a diathesis-stress model of internalizing trajectories in childhood. *Child Development*, 74 (1), 257-279.
- Gilliom, M., & Shaw, D.S. (in press). Co-development of externalizing and internalizing problems in early childhood. *Development and Psychopathology*.
- Ginsburg, G., LaGreca, A., & Silverman, W. (1998). Social anxiety in children with anxiety disorders: relation with social and emotional functioning. *Journal of Abnormal Child Psychology*, 26 (3), 175-186.
- Henry, B., Caspi, A., Moffitt, T., & Silva, P. (1996). Temperamental and familial predictors of violent and nonviolent criminal convictions: Age 3 to age 18. *Developmental Psychology*, 32, 614-623.
- Hinshaw, S. (1992). Academic underachievement, attention deficits, and aggression:

- Comorbidity and implications for intervention. *Journal of Consulting and Clinical Psychology, 60*, 893-903.
- Ialongo, N., Edelsohn, G., Werthamer-Larsson, L., & Crockett, L. (1996). The course of aggression in first-grade children with and without comorbid anxious symptoms. *Journal of Abnormal Child Psychology, 24* (4), 445-456.
- Jensen, P. (2003). Comorbidity and child psychopathology: Recommendations for the next decade. *Journal of Abnormal Child Psychology, 31* (3), 293-300.
- Jensen, P., Martin, D. & Cantwell, D. (1997). Comorbidity in ADHD: Implications for research, practice, and DSM-V. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, (8), 1065-1079.
- Jones, B., Nagin, D. & Roeder, K. (2001). A SAS procedure based on mixture models for estimating developmental trajectories. *Sociological Research and Methods, 29*, 374-393.
- Juvonen, J. (1991). Deviance, perceived responsibility, and negative peer reactions. *Developmental Psychology, 27* (4), 672-681.
- Kagan, J., Reznick, J., & Snidman, N. (1987). The physiology and psychology of behavioral inhibition in children. *Child Development, 58*, 1459-1473.
- Kagan, J., Reznick, J., Snidman, N., Gibbons, J., & Johnson, M. (1988). Childhood derivatives of inhibition and lack of inhibition to the unfamiliar. *Child Development, 59*, 1580-1589.
- Katz, L. & Gottman, J. (1993). Patterns of marital conflict predict children's internalizing and externalizing behaviors. *Developmental Psychology, 29*, 940-950.
- Keiley, M., Lofthouse, N., Bates, J., Dodge, K., & Petit, G. (2003). Differential risks of

- covarying and pure components in mother and teacher reports of externalizing and internalizing behavior across ages 5 to 14. *Journal of Abnormal Child Psychology*, 31 (3), 267-283.
- Kennedy, E., Spence, S., Hensley, R. (1989). An examination of the relationship between childhood depression and social competence among primary school children. *Journal of Child Psychology and Psychiatry*, 30, 561-573.
- Klein, D. & Riso, L. (1993). Psychiatric disorders: Problems of boundaries and comorbidity. In: Costello, C., editor. *Basic Issues in Psychopathology* (pp. 19-66) (Vol. IX). New York: Guilford Press.
- Kovacs, M. (1992). *The Children's Depression Inventory manual*. North Tonawanda, NY: Multi-Health Systems.
- Kovacs, M. & Devlin, B. (1998). Internalizing disorders in childhood. *Journal of Child Psychology and Psychiatry*, 1, 47-63.
- Kovacs, M., Paulauskas, S., Gatsonis, C., & Richards, C. (1988). Depressive disorders in childhood: III. A longitudinal study of comorbidity with and risk for conduct disorders. *Journal of Affective Disorders*, 15, 205-217.
- Lahey, B. & Carlson, C. (1991). Validity of the diagnostic category of attention deficit disorder without hyperactivity: A review of the literature. *Journal of Learning Disabilities*, 24, 110-120.
- Lahey, B., Loeber, R., Frick, E., Applegate, B., Zhang, Q., Green, S., Russo, M. (1995). Four-year longitudinal study of conduct disorder in boys: Patterns and predictors of persistence. *Journal of Abnormal Psychology*, 104 (1), 83-93.
- Lahey, B., Schaughency, E., Frame, C., & Strauss, C. (1985). Teacher ratings of

- attention problems in children experimentally classified as exhibiting attention deficit disorder with and without hyperactivity. *Journal of the American Academy of Child and Adolescent Psychiatry*, 24, 613-616.
- Lahey, B., Schaughency, E., Hynd, G., Carlson, C., & Nieves, N. (1987). Attention deficit disorder with and without hyperactivity: Comparison of behavioral characteristics of clinic-referred children. *Journal of the American Academy of Child and Adolescent Psychiatry*, 26, 718-723.
- Lahey, B., Schaughency, E., Strauss, C., & Strauss, C. (1984). Are attention deficit disorders with and without hyperactivity similar or dissimilar disorders? *Journal of the American Academy of Child and Adolescent Psychiatry*, 23, 302-309.
- Lahey, B., Waldman, I., & McBurnett, K. (1999). The development of antisocial behavior: An integrative causal model. *Journal of Child Psychology & Psychiatry & Allied Disciplines*, 40 (5), 669-682.
- Landau, S., & Milich, R. (1988). Social communication patterns of attention deficit disordered boys. *Journal of Abnormal Child Psychology*, 16, 69-81.
- Lilienfeld, S. (2003). Comorbidity between and within childhood externalizing and internalizing disorders: Reflections and directions. *Journal of Abnormal Child Psychology*, 31 (3), 285-291.
- Lochman, J. & Dodge, K. (1994). Social-cognitive processes of severely violent, moderately aggressive, and nonaggressive. *Journal of Consulting and Clinical Psychology*, 62 (2), 366-374.
- Loeber, R., Burke, J., Lahey, B., Winters, A., & Zera, M. (2000a). Oppositional defiant

- and conduct disorder: A review of the past 10 years, part 1. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39 (12), 1468-1484.
- Loeber, R. & Keenan, K. (1994). Interaction between conduct disorder and its comorbid conditions: Effects of age and gender. *Clinical Psychology Review*, 14 (6), 497-523.
- Mac Kinnon-Lewis, C., Volling, B., Lamb, M., Dechman, K., Rabiner, D., & Curtner, M. (1994). A cross-contextual analysis of boys' social competence: From family to school. *Developmental Psychology*, 30 (3), 325-333.
- Manassis, K. & Hood, J. (1998). Individual and familial predictors of impairment in childhood anxiety disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 37 (4), 428-443.
- McConaughy, S. & Achenbach, T. (1994). Comorbidity of empirically based syndromes in matched general populations and clinical samples. *Journal of Child Psychiatry and Psychology*, 35, 1141-1157.
- McConaughy, S. & Skiba, R. (1994). Comorbidity of externalizing and internalizing problems. *School Psychology Review*, 22 (3), 421-436.
- McLeod, J. & Shanahan, M. (1996). Trajectories of poverty and children's mental health. *Journal of Health & Social Behavior*, 37 (3), 207-220.
- Mesman, J. & Koot, H. (2000b). Child-reported depression and anxiety in preadolescence: II. Preschool predictors. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39 (11), 1379-1386.
- Messer, S. & Beidel, D. (1994). Psychosocial correlates of childhood anxiety disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 33, 975-983.
- Milch-Reich, S., Campbell, S. B., Pelham, W. E., Connelly, L. M., & Geva, D. (1999).

- Developmental and individual differences in children's on-line representations of dynamic social events. *Child Development*, 70, 413–431.
- Moffitt, T., Caspi, A., Dickson, N., Silva, P., & Stanton, W. (1996). Childhood-onset versus adolescent-onset antisocial conduct problems in males: Natural history from ages 3 to 18 years. *Development and Psychopathology*, 8, 399-424.
- Munir, K., Biederman, J., & Knee, D. (1987). Psychiatric comorbidity in patients with attention deficit disorder: a controlled study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 26, 844-848.
- Nagin, D. (1999). Analyzing developmental trajectories: A semi-parametric group-based approach. *Psychological Methods*, 4, 139-157.
- Nagin, D. & Lande, K. (1993). Age, criminal careers, and population heterogeneity: Specification and estimation of a nonparametric mixed poisson model. *Criminology*, 31 (3), 327-362.
- Nagin, D. S., & Tremblay, R. E. (2001). Parental and early childhood predictors of persistent physical aggression in boys from kindergarten to high school. *Archives of General Psychiatry*, 58, 389-394.
- Newman, D., Moffitt, T., Caspi, A., & Silva, P. (1998). Comorbid mental disorders: Implications for treatment and sample selection. *Journal of Abnormal Psychology*, 107 (2), 305-311.
- Nottelmann, E. & Jensen, P. (1995). Comorbidity of disorders in children and adolescents: Developmental perspectives. *Advances in Clinical Child Psychology*, 17, 109-155.
- O'Connor, T., Deater-Deckard, K., Fulker, D., Rutter, M., & Plomin, R. (1998a).

- Genotype-environment correlations in late childhood and early adolescence: Antisocial behavioral problems and coercive parenting. *Developmental Psychology*, 34, 970-981.
- O'Connor, T., McGuire, S., Reiss, D., Hetherington, E., & Plomin, R. (1998b). Co-occurrence of depressive symptoms and antisocial behavior in adolescence: A common genetic liability. *Journal of Abnormal Psychology*, 107 (1), 27-37.
- Orvaschel, H. & Puig-Antich, J. (1987). Schedule for Affective Disorders and Schizophrenia for School-Age Children: Epidemiological 4th Version. Ft. Lauderdale, FL: Nova University, Center for Psychological Study.
- Patterson, G., DeBaryshe, B., & Ramsey, E. (1989). A developmental perspective on antisocial behavior. *American Psychologist*, 44 (2), 329-335.
- Patterson, G. & Stoolmiller, M. (1991). Replications of a dual failure model for boys' depressed mood. *Journal of Consulting and Clinical Psychology*, 59 (4), 491-498.
- Pliszka, R. (1989). Effect of anxiety on cognition, behavior, and stimulant response in ADHD. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28, 882-887.
- Pliszka, R. (1992). Comorbidity of attention-deficit hyperactivity disorder and overanxious disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 31 (2), 197-203.
- Pope, A., Bierman, K., & Mumma, G. (1991). Aggression, hyperactivity, and inattention-immaturity: Behavior dimensions associated with peer rejection in elementary school boys. *Developmental Psychology*, 27, 663-671.
- Puig-Antich, J., Lukens, E., Davies, M., Goetz, D., Brennan-Quattrock, J., Todak, G.

- (1985). Psychosocial functioning in prepubertal major depressive disorders. II. Interpersonal relationships after sustained recovery from affective episode. *Archives of General Psychiatry*, 42, 511-517.
- Renouf, A., Kovacs, M. & Mukerji, P. (1997). Relationship of depressive, conduct, and comorbid disorders and social functioning in childhood. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 998-1004.
- Roeder, K., Lynch, K., & Nagin, D. (1999). Modeling uncertainty in latent class membership: A case study in criminology. *Journal of the American Statistical Association*, 94, 766-776.
- Rubin, K. (1993). The Waterloo Longitudinal Project: Correlates and consequences of social withdrawal from childhood to adolescence. In K.H. Rubin & J.B. Asendorpf (Eds.), *Social withdrawal, inhibition, and shyness in childhood* (pp. 291-314). Hillsdale, NJ: Erlbaum.
- Rubin, K., Hymel, S. & Mills, R. (1989). Sociability and social withdrawal in childhood: Stability and outcomes. *Journal of Personality*, 57 (2), 237-255.
- Rudolph, K., Hammen, C. & Burge, D. (1994). Interpersonal functioning and depressive symptoms in childhood: addressing the issues of specificity and comorbidity. *Journal of Abnormal Child Psychology*, 22(3), 355-372.
- Russo, M. & Beidel, D. (1994). Comorbidity of childhood anxiety and externalizing disorders: Prevalence, associated characteristics, and validation issues. *Clinical Psychology Review*, 14, 199-221.
- Russo, M., Lahey, B., Christ, M., Frick, P., McBurnett, K., Walker, J., Loeber, R., Stouthamer-Loeber, M., & Green, S. (1991). Preliminary development of a

- Sensation Seeking Scale for Children. *Personality and Individual Differences*, 12, 399-405.
- Sanders, M., Dadds, M., Johnson, B., & Cash, R. (1992). Childhood depression and conduct disorder: I. Behavioral, affective, and cognitive aspects of family problem-solving interactions. *Journal of Abnormal Psychology*, 101, 495-504.
- Seligman, L. & Ollendick, T. (1998). Comorbidity of anxiety and depression in children and adolescents: An integrative review. *Clinical Child and Family Psychology Review*, 1 (2), 125-144.
- Simic, M. & Fombonne, E. (2001). Depressive conduct disorder: symptom patterns and correlates in referred children and adolescents. *Journal of Affective Disorders*, 62, 175-185.
- Stewart, S. & Rubin, K. (1995). The social problem solving skills of anxious-withdrawn children. *Development and Psychopathology*, 7, 323-336.
- Strauss, C., Frame, C., & Forehand, R. (1987). Psychosocial impairment associated with anxiety in children. *Journal of Clinical Child Psychology*, 16, 235-239.
- Strauss, C., Lahey, B., Frick, P., Frame, C., & Hynd, G. (1988). Peer social status of children with anxiety disorders. *Journal of Consulting and Clinical Psychology*, 56, 137-141.
- Thomas, J. & Guskin, K. (2001). Disruptive behavior in young children: What does it mean? *Journal of the American Academy of Child and Adolescent Psychology*, 40 (1), 44-51.
- Turner, S., Beidel, D., & Costello, A. (1987). Psychopathology in the offspring of anxiety disorders patients. *Journal of Consulting and Clinical Psychology*, 55, 229-235.

- Verhulst, F. & van der Ende, J. (1993). "Comorbidity" in an epidemiological sample: a longitudinal perspective. *Journal of Child Psychology and Psychiatry*, 34, 767-783.
- Waas, G. (1988). Social attributional biases of peer-rejected and aggressive children. *Child Development*, 59, 969-975.
- Walker, J., Lahey, B., Russo, M., Frick, P., Christ, M., McBurnett, K., Loeber, R., Stouthamer-Loeber, & Green, S. (1991). Anxiety, inhibition, and conduct disorder in children: Relations to social impairment. *Journal of the American Academy of Child and Adolescent Psychiatry*, 30, 187-191.
- Wierzbicki, M. & McCabe, M. (1988). Social skills and subsequent depressive symptomatology in children. *Journal of Clinical Child Psychology*, 17, 203-208.
- Wright, J., Zakriski, A., & Drinkwater, M. (1999). Developmental psychopathology and the reciprocal patterning of behavior and environment: Distinctive situational and behavioral signatures of internalizing, externalizing, and mixed-syndrome children. *Journal of Consulting and Clinical Psychology*, 67, 95-107.
- Youngstrom, E., Findling, R., & Calabrese, J. (2003). Who are the comorbid adolescents? Agreement between psychiatric diagnosis, youth, parent, and teacher report. *Journal of Abnormal Child Psychology*, 31 (3), 231-245.
- Zahn-Waxler, C., Klimes, Dougan, B., & Slattery, M. (2000). Internalizing problems of childhood and adolescence: Prospects, pitfalls, and progress in understanding the development of anxiety and depression. *Development and Psychopathology*, 12, 443-466.

Table 1

Factor Loadings for the Items Included in the Internalizing and the Externalizing Narrow-Band Factors

| | Age 5 | Age 6 | Age 8 | Age 10 | Age 11 |
|--|--------------|--------------|--------------|---------------|---------------|
| Factor Social Anxiety, Inhibition, and Withdrawal (I-AIW) | | | | | |
| clings to adults | .593 | .455 | .316 | .580 | .523 |
| complains of loneliness | .317 | .389 | .447 | .553 | .421 |
| fears certain animals, situations, or places | .461 | .561 | .351 | .426 | .325 |
| fears going to school | .324 | .403 | .468 | .661 | .509 |
| Nervous, high-strung | .308 | .499 | .415 | .565 | .622 |
| too fearful or anxious | .600 | .582 | .559 | .593 | .656 |
| shy or timid | .409 | .372 | .611 | .519 | .561 |
| self-conscious or easily embarrassed | .603 | .420 | .515 | .484 | .417 |
| withdrawn, doesn't get involved with others | .503 | .558 | .470 | .553 | .526 |
| Worrying | .609 | .605 | .607 | .651 | .735 |
| Factor of Anger Reactivity, Aggression, and Impulsivity/Hyperactivity (E-AAI) | | | | | |
| argues a lot | .619 | .648 | .658 | .688 | .695 |
| can't sit still | .595 | .583 | .673 | .748 | .620 |
| can't concentrate | .497 | .670 | .642 | .576 | .658 |
| Destroys his/her own things | .644 | .641 | .599 | .602 | .637 |
| Destroys things belonging to his/her family | .681 | .628 | .616 | .718 | .720 |
| gets in many fights | .588 | .608 | .626 | .554 | .611 |
| impulsive or acts without thinking | .534 | .544 | .643 | .748 | .647 |
| physically attacks people | .466 | .538 | .590 | .545 | .533 |
| Screams a lot | .647 | .647 | .618 | .551 | .564 |
| temper tantrums or hot temper | .652 | .682 | .729 | .715 | .715 |
| unusually loud | .555 | .617 | .607 | .669 | .626 |

Table 2*Mean Scores of Independent and Dependent Variables for Entire Sample*

| Variable | N | Mean | SD | Median |
|--|----------|-------------|-----------|---------------|
| Child Outcome Measures (Child Report) <i>average of ages 11 and 12</i> | | | | |
| Elliott Report of Delinquency | 245 | 3.612 | 3.633 | 2.500 |
| Child Depression Inventory | 255 | 1.127 | 1.426 | .500 |
| Social Information Processing (Child Report) | | | | |
| Interpretation of Ambiguous Events | 230 | 4.72 | 1.96 | 5.00 |
| Endorsement of Avoidant Strategies | 189 | 2.88 | 1.90 | 3.00 |
| Endorsement of Aggressive Strategies | 229 | .75 | 1.40 | 0.00 |
| I-AIW Factor | | | | |
| Age 5 | 276 | .000 | 1.000 | -.171 |
| Age 6 | 255 | .006 | 1.009 | -.216 |
| Age 8 | 243 | -.001 | 1.005 | -.288 |
| Age 10 | 220 | -.005 | .979 | -.309 |
| Age 11 | 234 | -.006 | 1.000 | -.318 |
| E-AAI Factor | | | | |
| Age 5 | 276 | .000 | 1.000 | -.077 |
| Age 6 | 255 | -.010 | 1.001 | -.222 |
| Age 8 | 241 | .006 | 1.005 | -.188 |
| Age 10 | 219 | .000 | 1.004 | -.263 |
| Age 11 | 236 | -.007 | 1.001 | -.318 |

Table 3*Correlations Between I-AIW and E-AAI Factors*

| | I-AIW (age 5) | E-AAI (age 5) | I-AIW (age 6) | E-AAI (age 6) | I-AIW (age 8) | E-AAI (age 8) | I-AIW (age 10) | E-AAI (age 10) | I-AIW (age 11) | E-AAI (age 11) |
|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| I-AIW (age 5) | 1.000 | .420** | .534** | .187** | .477** | .131 | .372** | .109 | .307** | .106 |
| E-AAI (age 5) | .420** | 1.000 | .443** | .681** | .267** | .556** | .273** | .465** | .227** | .413** |
| I-AIW (age 6) | .534** | .443** | 1.000 | .529** | .535** | .242** | .547** | .251** | .449** | .263** |
| E-AAI (age 6) | .187** | .681** | .529** | 1.000 | .288** | .635** | .341** | .586** | .274** | .508** |
| I-AIW (age 8) | .477** | .267** | .535** | .288** | 1.000 | .390** | .670** | .298** | .556** | .438** |
| E-AAI (age 8) | .131 | .556** | .242** | .635** | .390** | 1.000 | .364** | .691** | .366** | .594** |
| I-AIW (age 10) | .372** | .273** | .547** | .341** | .670** | .364** | 1.000 | .418** | .674** | .508** |
| E-AAI (age 10) | .109 | .465** | .251** | .586** | .298** | .691** | .418** | 1.000 | .419** | .731** |
| I-AIW (age 11) | .307** | .227** | .449** | .274** | .556** | .366** | .674** | .419** | 1.000 | .592** |
| E-AAI (age 11) | .106 | .413** | .263** | .508** | .438** | .594** | .508** | .731** | .592** | 1.000 |

** Correlation is significant at the 0.01 level (2-tailed).

Table 4

Chi-Square Analyses of I-IAW Trajectory Group Status on E-AAI Trajectory Group Status

| | Low E-EAAI Trajectory | Middle E-AAI Trajectory | High E-AAI Trajectory |
|------------------------------------|----------------------------------|------------------------------------|----------------------------------|
| Low I-AIW Trajectory | | | |
| Actual Count | 131.0 (73.6%) | 43.0 (24.2%) | 4.0 (2.2%) |
| Expected Count | 108.8 (61.1%) | 56.6 (31.8%) | 12.6 (7.1%) |
| Middle I-IAW Trajectory | | | |
| Actual Count | 40.0 (47.6%) | 37.0 (44.0%) | 7.0 (8.3%) |
| Expected Count | 51.3 (61.1%) | 26.7 (31.8%) | 5.9 (7.0%) |
| High I-AIW Trajectory | | | |
| Actual Count | 2.0 (9.5%) | 10.0 (47.6%) | 9.0 (42.9%) |
| Expected Count | 12.8 (61.0%) | 6.7 (31.9%) | 1.5 (7.1%) |

Table 5

Chi-Square Analyses of I-IAW Trajectory Group Status on DSM-IV Internalizing and Externalizing Diagnoses at Ages 11 and 12

| | No DSM-IV Diagnoses | At least one DSM-IV Internalizing or Externalizing Diagnosis |
|--|----------------------------|---|
| Low I-AIW Trajectory | | |
| Actual Count | 83.0 (74.8%) | 28.0 (25.2%) |
| Expected Count | 73.8 (66.5%) | 37.2 (33.5%) |
| Middle I-IAW Trajectory | | |
| Actual Count | 36.0 (61.0%) | 23.0 (39.0%) |
| Expected Count | 39.2 (66.4%) | 19.8 (33.6%) |
| High I-AIW Trajectory | | |
| Actual Count | 1.0 (16.7%) | 5.0 (83.3%) |
| Expected Count | 4.0 (66.7%) | 2.0 (33.3%) |
| Low E-AAI Trajectory | | |
| Actual Count | 85.0 (78.7%) | 23.0 (21.3%) |
| Expected Count | 72.0 (66.7%) | 36.0 (33.3%) |
| Middle E-AAI Trajectory | | |
| Actual Count | 34.0 (55.7%) | 27.0 (44.3%) |
| Expected Count | 40.7 (66.7%) | 20.3 (33.3%) |
| High E-AAI Trajectory | | |
| Actual Count | 2.0 (25.0%) | 6.0 (75.0%) |
| Expected Count | 5.3 (66.3%) | 2.7 (33.7%) |
| High on Both I-AIW and E-AAI Trajectory | | |
| Actual Count | 1.0 (16.7%) | 5.0 (83.3%) |
| Expected Count | 4.0 (66.7%) | 2.0 (33.3%) |

Table 6

ANOVA of I-IAW Trajectory Groups and Social Information Processing

| | Hostile Interpretation | | | Endorsement of Avoidant Strategies | | |
|---|-------------------------------|-------------|-----------|---|-------------|-----------|
| | <i>N</i> | <i>Mean</i> | <i>SD</i> | <i>N</i> | <i>Mean</i> | <i>SD</i> |
| Low I-AIW Trajectory | 137 | 4.85 | 1.97 | 113 | 2.65 | 1.86 |
| Middle I-AIW Trajectory | 74 | 4.58 | 2.02 | 62 | 3.32 | 1.88 |
| High I-AIW Trajectory | 9 | 4.67 | 2.00 | 5 | 2.80 | 2.59 |
| High on I-IAW and E-AAI Trajectory | 8 | 4.13 | 1.36 | 7 | 3.00 | 1.83 |

Table 7

Chi-Square Analyses of I-IAW Trajectory Group Status on Peer Neglect

| | Not of Neglected Peer Status | Neglected Peer Status |
|---|-------------------------------------|------------------------------|
| Low I-AIW Trajectory | | |
| Actual Count | 80.0 (92.0%) | 7.0 (43.8%) |
| Expected Count | 77.5 (89.1%) | 9.5 (10.9%) |
| Middle I-IAW Trajectory | | |
| Actual Count | 40.0 (83.3%) | 8.0(50.0%) |
| Expected Count | 42.7 (89.0%) | 5.3 (11.0%) |
| High I-AIW Trajectory | | |
| Actual Count | 4.0 (80.0%) | 1.0 (6.3%) |
| Expected Count | 4.5 (90.0%) | 0.5 (10.0%) |
| High on I-IAW and E-AAI Trajectory | | |
| Actual Count | 6.0 (100.0%) | 0.0 (0.0%) |
| Expected Count | 5.3 (88.3%) | 0.7 (11.7%) |

Table 8

Chi-Square Analyses of I-AIW trajectory groups on DSM-IV diagnoses at age 11 or 12

| | No DSM-IV internalizing diagnosis at age 11 or 12 | DSM-IV internalizing diagnosis at age 11 or 12 |
|--|---|--|
| Low I-AIW Trajectory | | |
| Actual Count | 107.0 (93.9%) | 7.0 (6.1%) |
| Expected Count | 97.4 (85.4%) | 16.6 (14.6%) |
| Middle I-AIW Trajectory | | |
| Actual Count | 46.0 (78.0%) | 13.0 (22.0%) |
| Expected Count | 50.4 (85.4%) | 8.6 (14.6%) |
| High I-AIW Trajectory | | |
| Actual Count | 2.0 (33.3%) | 4.0 (66.7%) |
| Expected Count | 5.1 (85%) | 0.9 (15%) |
| High on both I-AIW and E-AAI Trajectory | | |
| Actual Count | 3.0 (50.0%) | 3.0 (50.0%) |
| Expected Count | 5.1 (85%) | 0.9 (15%) |

Table 9

Chi-Square Analyses of I-AIW trajectory groups in terms of co-occurring DSM-IV diagnoses

| | Children with an DSM-IV internalizing diagnosis that do not meet criteria for a DSM-IV externalizing diagnosis at age 11 or 12 | Children with an DSM-IV internalizing diagnosis that also meet criteria for a DSM-IV externalizing diagnosis at age 11 or 12 |
|--|--|--|
| Low I-AIW Trajectory | | |
| Actual Count | 7.0 (100.0%) | 0.0 (0.0%) |
| Expected Count | 4.4 (62.9%) | 2.6 (37.1%) |
| Middle I-AIW Trajectory | | |
| Actual Count | 8.0 (61.5%) | 5.0 (38.5%) |
| Expected Count | 8.2 (63.1%) | 4.8 (36.9%) |
| High I-AIW Trajectory | | |
| Actual Count | 2.0 (50.0%) | 2.0 (50.0%) |
| Expected Count | 2.5 (62.5%) | 1.5 (37.5%) |
| High on both I-AIW and E-AAI Trajectory | | |
| Actual Count | 0.0 (0.0%) | 3.0 (100.0%) |
| Expected Count | 1.9 (63.3%) | 1.1 (36.7%) |

Table 10

ANOVA of E-AAI Trajectory Groups and Social Information Processing

| | Hostile Interpretation | | | Endorsement of Avoidant Strategies | | |
|---|-------------------------------|-------------|-----------|---|-------------|-----------|
| | <i>N</i> | <i>Mean</i> | <i>SD</i> | <i>N</i> | <i>Mean</i> | <i>SD</i> |
| Low E-AAI Trajectory | 131 | 4.71 | 1.99 | 131 | .75 | 1.49 |
| Middle E-AAI Trajectory | 80 | 4.83 | 1.99 | 79 | .71 | 1.24 |
| High E-AAI Trajectory | 10 | 4.80 | 1.87 | 10 | .60 | 1.07 |
| High on I-IAW and E-AAI Trajectory | 8 | 4.13 | 1.36 | 8 | 1.00 | 1.60 |

Table 11

Chi-Square Analyses of E-AAI trajectory groups on DSM-IV diagnoses at age 11 or 12

| | No DSM-IV externalizing diagnosis at age 11 or 12 | DSM-IV externalizing diagnosis at age 11 or 12 |
|--|---|--|
| Low E-AAI Trajectory | | |
| Actual Count | 96.0 (86.5%) | 15.0 (13.5%) |
| Expected Count | 84.1 (75.8%) | 26.9 (24.2%) |
| Middle E-AAI Trajectory | | |
| Actual Count | 44.0 (67.7%) | 21.0 (32.3%) |
| Expected Count | 49.3 (75.8%) | 15.7 (24.2%) |
| High E-AAI Trajectory | | |
| Actual Count | 3 (37.5%) | 5 (62.5%) |
| Expected Count | 6.1 (76.2%) | 1.9 (23.8%) |
| High on both I-AIW and E-AAI Trajectory | | |
| Actual Count | 1 (16.7%) | 5 (83.3%) |
| Expected Count | 4.5 (75.0%) | 1.5 (25.0%) |

Table 12

Chi-Square Analyses of E-AAI trajectory groups in terms of co-occurring DSM-IV diagnoses

| | Children with an DSM-IV externalizing diagnosis that do not meet criteria for a DSM-IV internalizing diagnosis at age 11 or 12 | Children with an DSM-IV externalizing diagnosis that also meet criteria for a DSM-IV internalizing diagnosis at age 11 or 12 |
|--|--|--|
| Low E-AAI Trajectory | | |
| Actual Count | 21.0 (100.0%) | 0 (0.0%) |
| Expected Count | 16.2 (77.1%) | 4.8 (22.9%) |
| Middle E-AAI Trajectory | | |
| Actual Count | 10 (66.7%) | 5 (33.3%) |
| Expected Count | 11.6 (77.3%) | 3.4 (22.7%) |
| High E-AAI Trajectory | | |
| Actual Count | 1 (33.3%) | 2 (66.7%) |
| Expected Count | 2.3 (76.7%) | 0.7 (23.3%) |
| High on both I-AIW and E-AAI Trajectory | | |
| Actual Count | 2 (40.0%) | 3 (60.0%) |
| Expected Count | 3.9 (78.0%) | 1.1 (22.0%) |

Table 13

Chi-Square Analyses of High I-AIW, High E-AAI, and High on Both Trajectory Groups on DSM-IV Externalizing Diagnoses at Age 11 or 12

| | No DSM-IV externalizing diagnosis at age 11 or 12 | DSM-IV externalizing diagnosis at age 11 or 12 |
|--|---|--|
| High I-AIW Trajectory | | |
| Actual Count | 3.0 (50.0%) | 3.0 (50.0%) |
| Expected Count | 2.1 (35.0%) | 3.9 (65.0%) |
| High E-AAI Trajectory | | |
| Actual Count | 3.0 (37.5%) | 5.0 (62.5%) |
| Expected Count | 2.8 (35.0%) | 5.2 (65.0%) |
| High on both I-AIW and E-AAI Trajectory | | |
| Actual Count | 1.0 (16.7%) | 5.0 (83.3%) |
| Expected Count | 2.1 (35.0%) | 3.9 (65.0%) |

Table 14

Chi-Square Analyses of High I-AIW, High E-AAI, and High on Both Trajectory Groups on DSM-IV Internalizing Diagnoses at Age 11 or 12

| | No DSM-IV internalizing diagnosis at age 11 or 12 | DSM-IV internalizing diagnosis at age 11 or 12 |
|--|---|--|
| High I-AIW Trajectory | | |
| Actual Count | 2.0 (33.3%) | 4.0 (66.7%) |
| Expected Count | 3.0 (50.0%) | 3.0 (50.0%) |
| High E-AAI Trajectory | | |
| Actual Count | 5.0 (62.5%) | 3.0 (37.5%) |
| Expected Count | 4.0 (50.0%) | 4.0 (50.0%) |
| High on both I-AIW and E-AAI Trajectory | | |
| Actual Count | 3.0 (50.0%) | 3.0 (50.0%) |
| Expected Count | 3.0 (50.0%) | 3.0 (50.0%) |

Table 15

Chi-Square Analyses of High I-AIW, High E-AAI, and High on Both Trajectory Groups on DSM-IV Diagnoses at Age 11 or 12

| | No DSM-IV co-occurring internalizing and externalizing diagnoses at age 11 or 12 | DSM-IV co-occurring internalizing and externalizing diagnoses at age 11 or 12 |
|--|--|---|
| High I-AIW Trajectory | | |
| Actual Count | 4.0 (66.7%) | 2.0 (33.3%) |
| Expected Count | 3.9 (65.0%) | 2.1 (35.0%) |
| High E-AAI Trajectory | | |
| Actual Count | 6.0 (75.0%) | 2.0 (25.0%) |
| Expected Count | 5.2 (65.0%) | 2.8 (35.0%) |
| High on both I-AIW and E-AAI Trajectory | | |
| Actual Count | 3.0 (50.0%) | 3.0 (50.0%) |
| Expected Count | 3.9 (65.0%) | 2.1 (35.0%) |

Figure 1

Proposed correlates of persistent high levels of social anxiety, inhibition, and withdrawal.

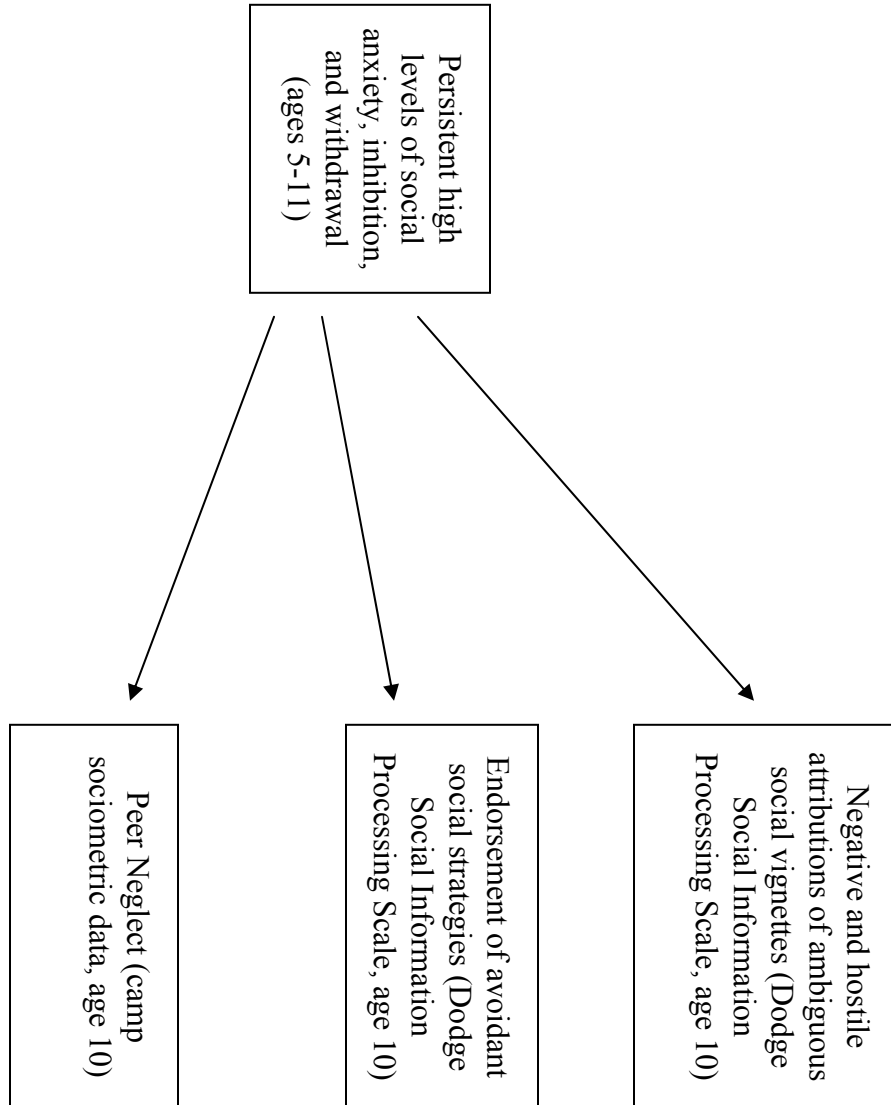


Figure 2

Proposed levels of internalizing and co-occurring diagnoses in children with persistent high trajectories of social anxiety, inhibition, and withdrawal versus children with low or middle trajectories.

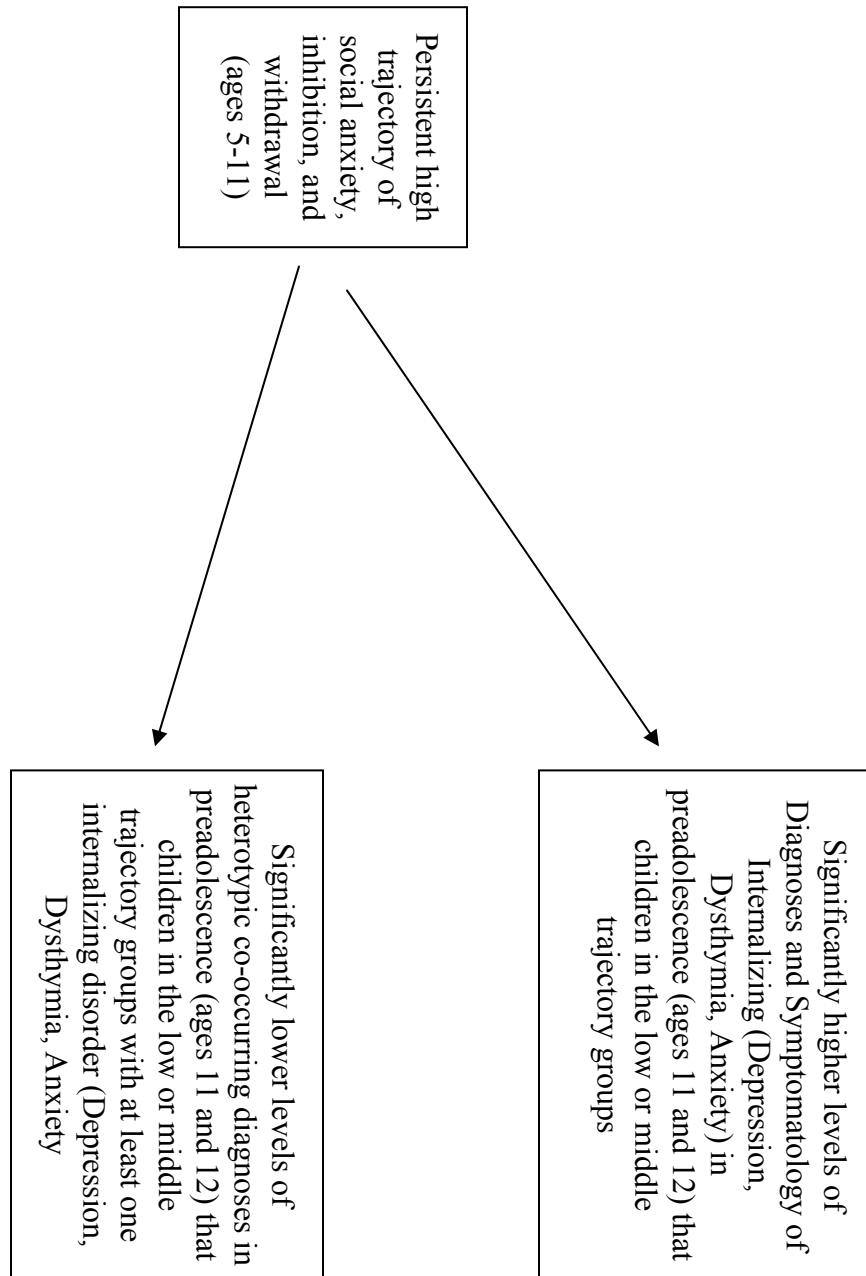


Figure 3

Proposed correlates of persistent high levels of impulsivity/hyperactivity, aggression, and anger reactivity.

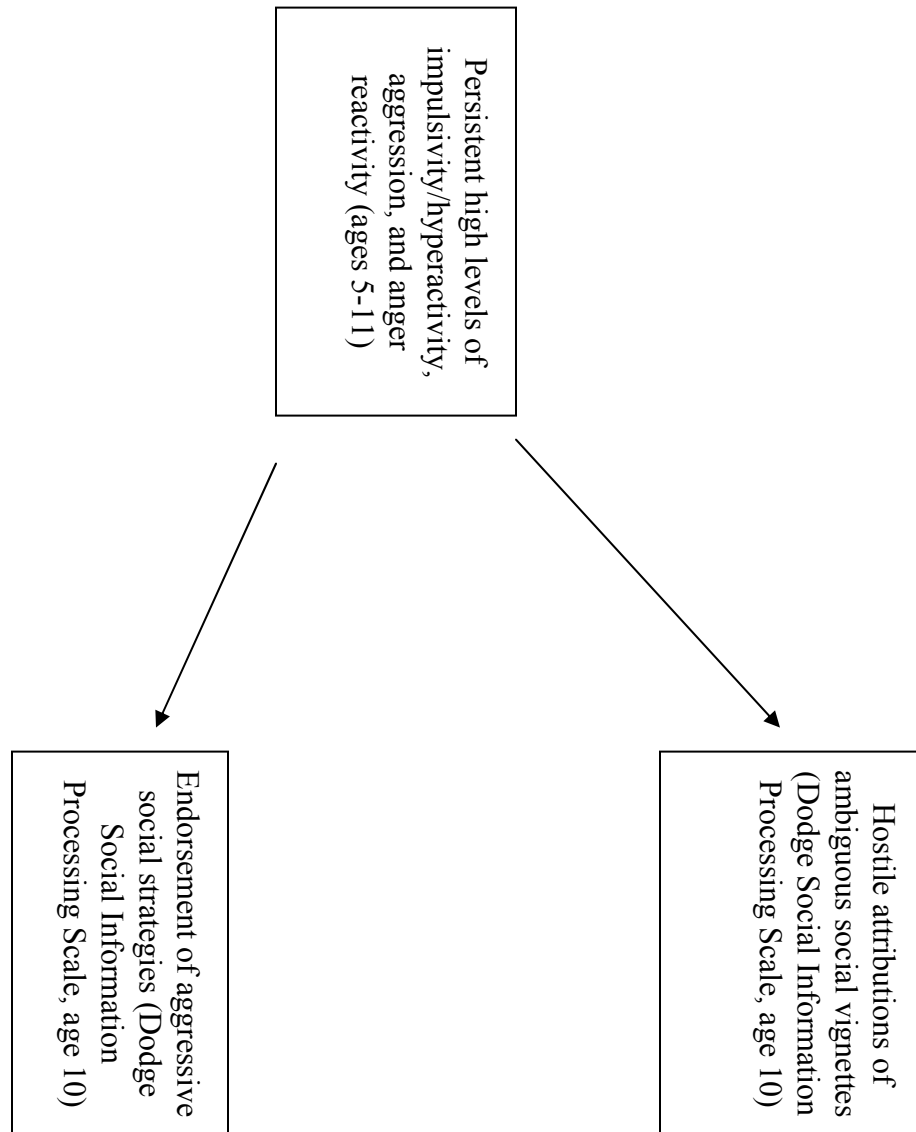


Figure 4

Proposed levels of externalizing and co-occurring diagnoses in children with persistent high trajectories of impulsivity/hyperactivity, aggression, and anger reactivity versus children with low or middle trajectories.

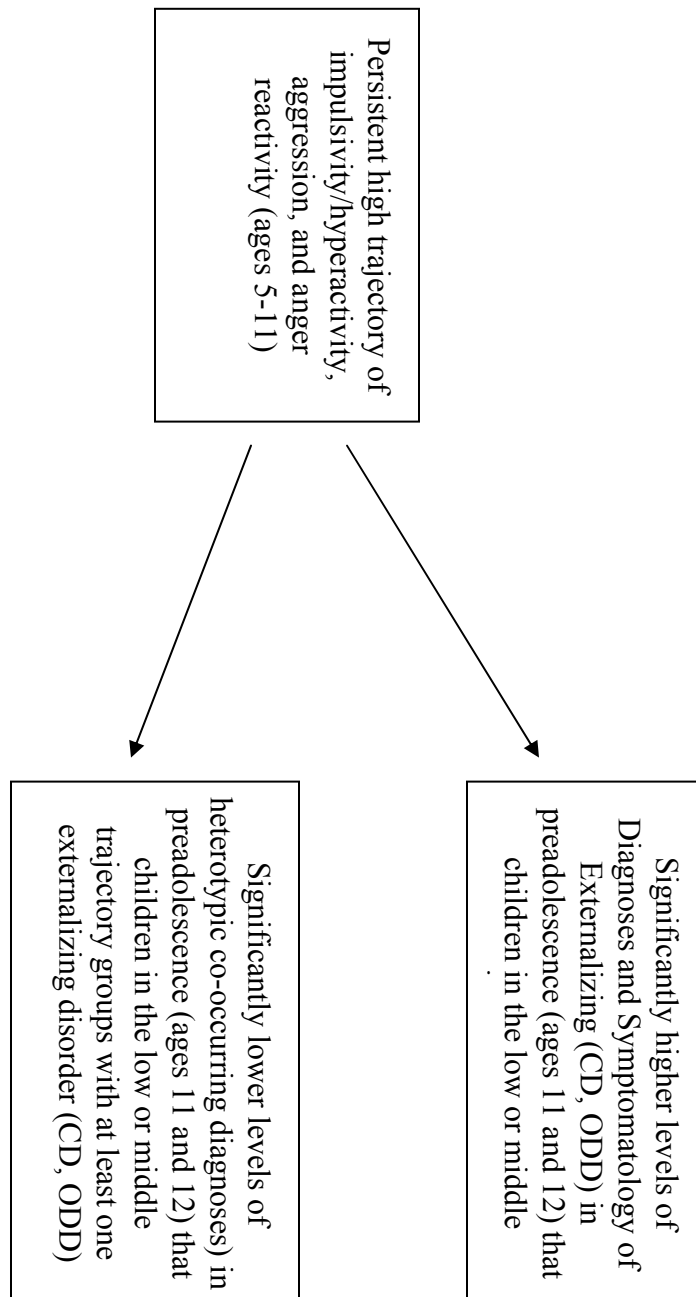


Figure 5

I-IAW Trajectory Groups.

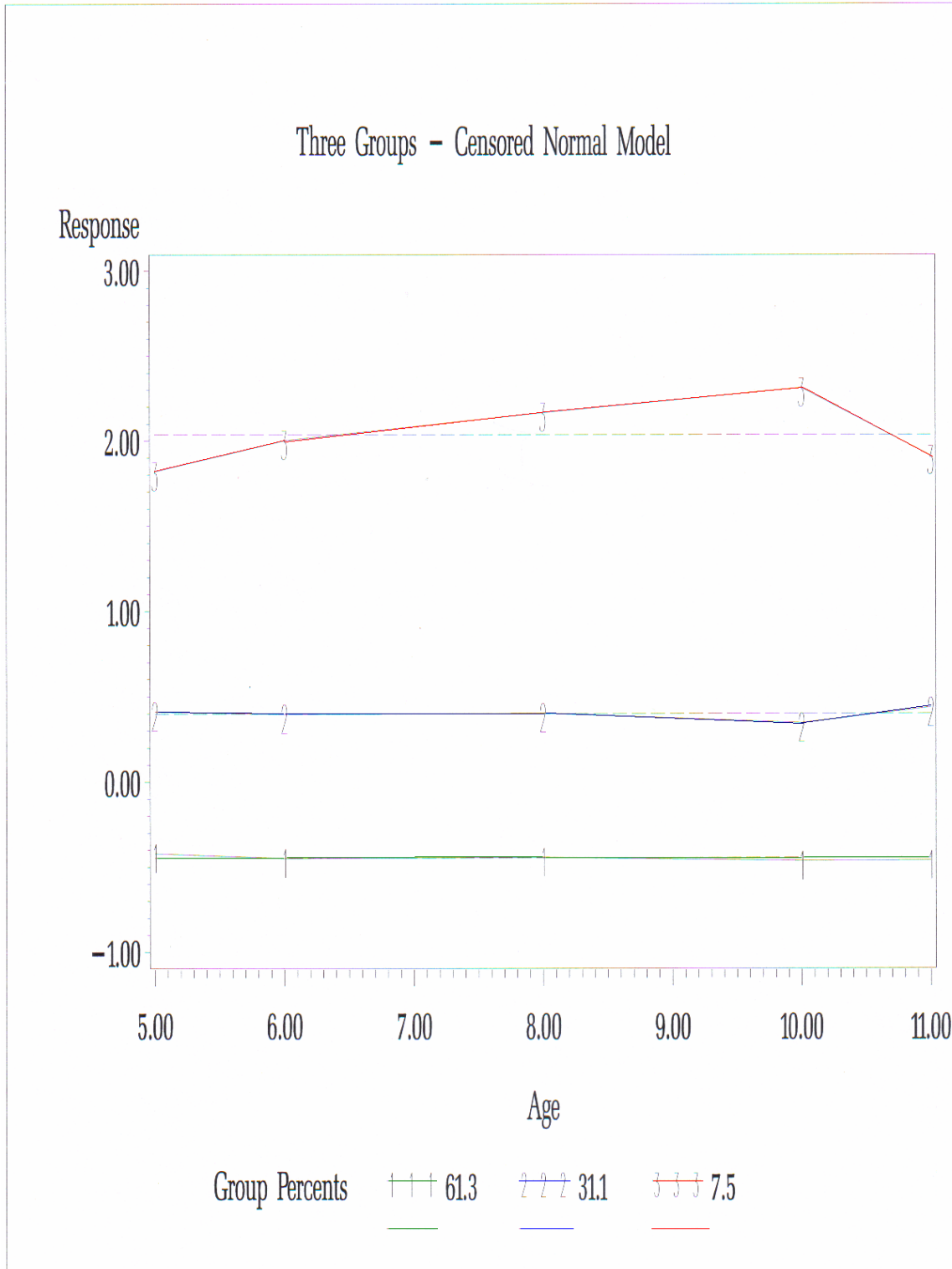


Figure 6

E-AAI Trajectory Groups.

