THE COMORBID RELATIONSHIP OF ANXIETY AND DEPRESSION
IN CHILDREN AND ADOLESCENTS

by

Diane Maubach

A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
Department of Human Development and Applied Psychology
Ontario Institute for Studies in Education of the University of Toronto

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The Comorbid Relationship of Anxiety and Depression in Children and Adolescents

Degree of Doctor of Philosophy 1999

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Abstract

The relationship of anxiety and depression was investigated in a sample of non-referred East-European children aged 11 to 16. Using self-report data, confirmatory factor analyses were conducted to determine if a Three Factor (Tripartite) Model of anxiety and depression provided a better fit to the data than a One or Two Factor Model. Age and gender differences in anxious and depressive symptomology were also examined, along with evidence that anxiety predates depression. Results indicated that the One and Two Factor Models provided a better fit to the data than the Three Factor Model. Few age differences in anxious and depressive symptoms were found, although there was a significant age by gender interaction, with more older females reporting higher levels of depression than males. There was no evidence to support the hypothesized temporal relationship between anxiety and depression. Contrary to expectations, a significant age difference between anxious and depressed children was not found. In addition, significant differences in the anxiety and depression scores of both groups of children were reported. The implications of these findings, as well as the limitations of the study and the directions for future work in the area are discussed.
Acknowledgements

I wish to express my gratitude to those people - friends, family and professors, who helped me to complete my dissertation. Help came in so many different ways. In Latvia, I am grateful to Dr. Ieva Ranka for graciously making the data available to me and to Inga Broka, for translating and helping me to examine the data. I also wish to thank my thesis committee members, in particular Dr. Solveiga Miezitis, my thesis supervisor, travel companion and friend. I am especially grateful for her words of encouragement and belief in me in difficult times.

Thanks to my “thesis support group” friends. They provided a much needed sounding board and helped to “normalize” some of my anxieties and frustrations. A special thank you to Pat Señíní, my librarian friend, for her encouragement and for her willingness to help make my work easier.

Finally, to my family, thank you for your never-ending support. You were there for me every time and helped me in every way you could. In particular, thank you to my mother, who was the best possible role model and a source of constant love and encouragement. Thank you also, to my late brother, Gary, whose delight in my achievements energized me and made me want to see my task to its completion.
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Chapter 1

Introduction

Research on anxiety and depression in children and adolescents is marked by several milestones. Two such milestones occurred in the early 1980's. At that time, a consensus was reached regarding the symptoms of childhood depression; in addition, anxiety emerged as a disorder in its own right with the publication of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) (American Psychiatric Association, 1980). Since then, associations between the two disorders have been reported by both clinicians and researchers working with young populations.

The evidence that anxiety and depression have a comorbid relationship has steadily grown. Consequently, the next milestone in the study of anxiety and depression will likely involve coming up with a more cohesive and parsimonious explanation of the phenomena associated with the two disorders. Toward that end, three models of anxiety and depression are examined in the current study, along with age and gender differences in the expression of negative affect. The purpose of these investigations is to determine which model most accurately represents the anxious-depressive relationship in young people and the impact age and gender might have on the model selected. Answering these questions is part of a more general goal to obtain conceptual clarity regarding the relationship of anxiety and depression across the age span.
There is much to be gained from these efforts. Understanding how anxiety and depression are related will impact on research and clinical practice (Maser & Cloninger, 1990). Clinically, it will affect the diagnosis, prognosis, treatment and health care delivery we provide. In addition, many fundamental questions about psychopathology will be raised. Are psychiatric disorders truly discrete and independent disease entities? What does the co-occurrence of anxiety and depressive features imply about the discriminant validity of current diagnostic criteria? How do genetic and environmental factors interact in the development of anxiety and mood disorders?
Chapter 2

2. Literature Review

2.1 The Emergence of Comorbidity in Psychiatric Research

The comorbidity of psychiatric disorders has only recently emerged as a topic of practical and theoretical significance (Maser & Cloninger, 1990). Its origins can be traced back to the period after World War II. At that time, biologic approaches to the classification of mental disorders came under considerable criticism both in and out of the psychiatric profession. This led to an erosion of confidence in the medical model and the notion of discrete mental disorders.

Challenges in classifying mental conditions occurred along several lines. The most fundamental criticism was that mental disorders, in the absence of evidence of some biologic abnormality, were not true "illnesses" and that the application of the concept of illness to behavioural, emotional and cognitive states served society's need for control of deviance rather than the needs of individual patients (Szasz, 1961). A second line of criticism, from anti-labelists, pointed to the adverse social and psychological consequences of psychiatric diagnoses (Menninger, 1963). There was also criticism of the low reliability of the diagnoses made by clinicians and researchers. In addition, psychologists and statisticians, experienced in the use of multivariate statistical techniques, questioned the categorical
nature of the medically dominated diagnostic systems. Lastly, mental health professionals in developing countries regarded the medical model’s diagnostic system as rooted in Western European culture and not valid in, or relevant to other cultures.

Confronted by these challenges, clinicians and researchers soon realized the need for a valid and reliable classification system in the field of psychopathology. In 1965 the National Institute of Mental Health (NIMH) Psychopharmacology Research Branch sponsored a conference on classification in psychiatry and in the early 1970's a new paradigm emerged in the United Kingdom and in North America. This new paradigm was a reaffirmation as well as a modification of the previously used “medical model.” The concept of multiple discrete disorders was retained, but the main innovation was the development of criteria for making individual patient diagnoses of mental disorders (Klerman, 1990) which were later codified in the DSM-III.

The DSM-III with its use of operational criteria, a multiaxial classification system, structured interviews and diagnostic algorithms, led the way for improved reliability and empirical tests of validity, in research on psychopathology, and in diagnosis and classification. Both DSM-III and its successor, DSM-III-R (Diagnostic and Statistical Manual - Revised) (American Psychiatric Association, 1987) explicitly encouraged multiple diagnoses to be made and it is in this context that the concept of comorbidity entered psychiatric research (Klerman, 1990). The issue of comorbidity thus arose as a result of efforts by mental health professionals to produce a reliable and valid system for classifying
In the period of intensified research after the inception of the DSM-III, the number of comorbid psychiatric disorders observed increased markedly (Maser & Cloninger, 1990). Part of this increase was artifactual and due to the fact that some symptoms were shared by several disorders. The DSM-III-R and more recently, the DSM IV (APA, 1994) remedied this situation, in part, but high rates of psychiatric comorbidity continued to be reported, ultimately discrediting the earlier assumption that a patient was unlikely to have more than one disorder (Klerman, 1990). Consequently, to-day, it is generally recognized that patients can, and often do have, multiple disorders.

2.2 The Importance of Studying Comorbidity

Comorbidity is an important area of inquiry as it affects research and clinical practice pervasively (Maser & Cloninger, 1990). A comorbid condition can influence our identification of the etiological factors involved in a particular disorder, the symptoms we assume to be part of a disorder, our choice of treatment, our interpretation of the effects of treatment, our definition of the natural history of a disorder and the level of functional impairment to be expected over time (Angold & Costello, 1995; Feinstein, 1970).

The current study focuses on comorbidity among children and adolescents for several reasons. It has long been believed that certain childhood disorders may predispose
individuals to later psychiatric disturbance (a situation known as pathogenic comorbidity). For example, separation anxiety has been viewed as a possible precursor of agoraphobia (Gittelman & Klein, 1984). In these instances, knowledge of a disorder in the pre-adult years is pertinent to a better understanding of the associated disorder in adulthood. This rationale also applies if a disorder, rather than being categorically distinct, can be shown to exist on a continuum with an early age of onset, as Dobson (1985) suggests in his conceptualization of anxiety and depression. Then, studying the disorder when it first appears will provide a better understanding of its presence in adulthood.

2.3 The Study of Comorbid Anxiety and Depression

Research using the DSM-III and its successors has consistently reported high rates of comorbidity between anxiety and depressive disorders and high co-occurrence of anxious and depressive symptoms (Maser & Cloninger, 1990). Initially, not much attention was paid to these findings, but by the mid 1980's systematic attempts to explore the relationship between anxiety and depression had begun. Early investigations focused on adult populations and often did not go beyond a descriptive analysis of the similarities and differences between the two emotions (Watson & Kendall, 1989). However, research findings did suggest that the observed pattern of comorbidity was not random or totally artifactual (Cloninger, Martin, Guze & Clayton, 1990). Rather, certain symptoms and syndromes tended to occur together in particular patterns. More recently, researchers have begun to test the validity of theories that present a common etiology and logical sequencing

Studies of the relationship of anxiety and depression in child and adolescent populations did not begin to appear in the literature until several years after the adult studies had begun, for several reasons. Firstly, it was only in the early 1980's, after the publication of the DSM-III, that a consensus emerged regarding the diagnostic criteria for child and adolescent depression. (Speier, Sherak, Hirsch, & Cantwell, 1995). Prior to this, childhood depression had gone from not being thought possible at all (see Kashani et al., 1981 for a review), to being defined by such diverse criteria, that almost every childhood symptom could be considered indicative of the disorder (i.e., a depressive equivalent) (Anderson & McGee, 1994; Speier et al., 1995).

Secondly, investigations of the anxious-depressive relationship in young populations were late in appearing because not much attention had been given to anxiety disorders in childhood (Kendall & Brady 1995). Classification of disorders was traditionally an area of interest for institutional psychiatry, and since anxious patients were rarely hospitalized, they came to the attention of psychiatric researchers less frequently than individuals who suffered from disorders that required hospitalization (Jablensky, 1985). In addition, anxiety was seen as a concomitant of many psychiatric disorders and therefore was not considered a disorder in its own right, but rather a nonspecific phenomenon that occupied a low position in the hierarchy of psychiatric syndromes (Glas, 1994). It was only after the introduction of a new
diagnostic category in DSM-III that specifically focused on anxiety disorders that usually first arise during childhood or adolescence that researchers became interested in anxious children and adolescents (Klein & Last, 1989).

Proof of the paucity of research regarding the comorbidity of anxiety and depression in child and adolescent populations comes from a statement made by Finch and colleagues (Finch, Lipovsky, & Casat, 1989) that only a handful of researchers had shown an interest in the interrelationship between anxiety and depression in children over the past decade and that the majority of the studies had appeared in the past 3 to 4 years. The studies that have been conducted, however, echo the findings in the adult literature regarding the nature of the anxious-depressive relationship, namely, that comorbidity is not an artifact (Kovacs, 1990), and that symptom co-occurrence has a stable structure (Stravrakaki, Vargo, Boodoosingh, & Roberts, 1987).

The remainder of the chapter critically reviews the literature on the comorbidity of anxiety and depression and the co-occurrence of anxious and depressive symptoms in childhood and adolescence. Evidence for comorbidity in both clinical and non-clinical populations is provided. A discussion of various models that attempt to account for the comorbid relationship follows. The review concludes with the presentation of a combined model to explain anxious and depressive comorbidity, along with a discussion of the influence of development on the expression of negative affect. The research questions and the hypotheses that will be examined in this dissertation are then presented.
2.4 Comorbid Anxiety and Depression in Children and Adolescents

2.4.1 Evidence of Comorbid Anxiety and Depressive Disorders in Children and Adolescents

Table 1 summarizes the findings of 8 studies that reported data on the co-occurrence of anxiety and depressive disorders in clinical populations, using structured interviews and DSM criteria. Two studies looked at prevalence rates of anxiety and depressive disorders in a sample of nonpsychiatrically referred children. The first study investigated a group of 789 children, aged 7 to 11 years who visited their primary care physician for varying medical reasons. E. J. Costello et al. (1988) interviewed a sample of 300 of these children and their parents using the Diagnostic Interview Schedule for Children (DISC) (Costello, Edelbrock, Kalas, Kessler, & Klaric, 1982) to determine diagnoses. Three children (1.6%) had comorbid disorders. In the second study, Weissman, Leckman, Merikangas, Gammon and Prusoff (1984) studied high-risk children of adult probands with depressive disorders. In their sample of 22 children, they found a rate of overlap between the two disorders of 36.4%.

Last and colleagues published several reports, based on children in their outpatient anxiety clinic, that document co-morbidity with depression. In a sample of five to seventeen year old outpatients, Strauss, Last, Hersen and Kazkin (1988) found that 28.3% of the 106 children and adolescents with anxiety disorders also had diagnosable depression. Last, Perrin, Hersen and Kazdin (1992) reported data on 188 anxiety-disordered children and adolescents from the same outpatient clinic and found rates of co-morbidity with depression
Table 1

Comorbidity of Anxiety and Depressive Disorders in Clinical Populations of Children and Adolescents

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costello, Costello, Edelbrock, Burns, Dulcan, Brent &amp; Janiszewski, 1988</td>
<td>300 pediatric primary care patients</td>
<td>172 anxiety disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13 depressive disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 anxiety and depressive disordered (1.6%)</td>
</tr>
<tr>
<td>Weissman, Leckman, Merikangas, Gammon &amp; Prusoff, 1984</td>
<td>22 high risk children of probands with depressive disorders</td>
<td>5 anxiety disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 depressive disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 anxiety and depressive disordered (36.4%)</td>
</tr>
<tr>
<td>Strauss, Last, Hersen &amp; Kazdin, 1988</td>
<td>106 outpatients at an anxiety disorders clinic</td>
<td>76 anxiety disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 anxiety and depressive disordered (28.3%)</td>
</tr>
<tr>
<td>Last, Perrin, Hersen &amp; Kazdin, 1992</td>
<td>188 outpatients at an anxiety disorders clinic</td>
<td>13 avoidant disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 avoidant and depressive disordered (35%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 panic disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 panic and depressive disordered (41.7%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26 overanxious disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 overanxious and depressive disordered (49%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27 social phobic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>34 social phobic and depressive disordered (55.7%)</td>
</tr>
<tr>
<td>Bernstein &amp; Garfinkel, 1986</td>
<td>26 outpatient chronic school refusers</td>
<td>3 anxiety disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 depressive disordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13 anxiety and depressive disordered (50%)</td>
</tr>
</tbody>
</table>
Bernstein, 1991  
96 outpatient school refusers  
27 anxiety disordered  
27 depressive disordered  
24 anxiety and depressive disordered (25%)

Carey, Finch & Imm, 1989  
29 depressive disordered inpatients  
13 depressive disordered  
16 anxiety and depressive disordered (55.2%)

Kovacs, Gatsonis, Paulauskas & Richards, 1989  
104 depressive disordered outpatients  
61 depressive disordered  
43 anxiety and depressive disordered (41%)

 Bernstein and Garfinkel (1986) found that 50% of their sample of school refusers attending an outpatient clinic had concomitant depressive and anxiety disorders. The authors state that the high rate of comorbidity may have been due to the severity of the illness in the sample of children. They were an older (mean age 13 years, 7 months) chronic school refuser group that had received prior treatment without success. In a replication of this study with a larger sample, Bernstein (1991) found that 25% of the 96 school refusers in her sample had coexisting depressive and anxiety disorders.

Lastly, two studies examined the concomitant presence of anxiety disorders in children and adolescents diagnosed with a depressive illness. Carey, Finch and Imm (1989, as cited in Brady & Kendall, 1992) found that 55.2% of the 29 depressive disordered inpatients in their sample had a comorbid anxiety disorder. The authors stated that the high
percentage of overlap of the disorders may have been due to the fact that the subjects were inpatients, as studies have indicated that children with both diagnoses tend to be more symptomatic and therefore would be more likely to be hospitalized. Kovacs, Gatsonis, Paulauskas and Richards (1989) found the comorbidity rate in their study of clinically referred depressed children to be 41%.

Table 2 presents the findings of six epidemiological studies that reported data on the comorbidity of anxiety and depressive disorders. Anderson, Williams, McGee and Silva (1987) investigated the prevalence of DSM-III disorders in children born in one New Zealand town’s maternity hospital during one year. The children were assessed every two years, and at age 11 they were given a standard psychiatric interview, with additional information collected by questionnaire from parents and teachers. Of the 63 children identified with an anxiety or depressive disorder, 10 (15.9%) had both diagnoses. McGee et al. (1990) used the same population to determine the prevalence of anxious and depressive disorders among the children at age 15 and found that, of the 141 that were identified with an anxiety or depressive disorder, 12 (8.5%) had both diagnoses.

Velez, Johnson and Cohen (1989) interviewed 776 children aged 9 to 18 who lived in northern New York State. The interviews were conducted in three phases over a period of 10 years. In Phase 2 the investigators used the DISC as well as a parent interview and found that 167 children had an anxiety or depressive disorder, while 11 (6.2%) had both diagnoses. Two years later, in Phase 3, when the children were aged 11 to 20, 94 children were
Table 2

Comorbidity of Anxiety and Depressive Disorders in Community Based Populations of Children and Adolescents

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson, Williams, McGee &amp; Silva, 1987</td>
<td>representative sample of 768 11 year olds from the general population in New Zealand</td>
<td>49 anxiety disordered, 4 depressive disordered, 10 anxiety and depressive disordered (15.9%)</td>
</tr>
<tr>
<td>McGee, Feehan, Williams, Partridge, Silva &amp; Kelly, 1990</td>
<td>representative sample of 943 15 year olds from the general population in New Zealand</td>
<td>129 anxiety or depressive disordered, 12 anxiety and depressive disordered (8.5%)</td>
</tr>
<tr>
<td>Velez, Johnson &amp; Cohen, 1989</td>
<td>776 children aged 9-18 in New York state</td>
<td>167 anxiety or depressive disordered, 11 anxiety and depressive disordered (6.2%)</td>
</tr>
<tr>
<td></td>
<td>776 children aged 11-20 in New York state</td>
<td>94 anxiety or depressive disordered, 9 anxiety and depressive disordered (8.7%)</td>
</tr>
<tr>
<td>Bird et al., 1988</td>
<td>224 children aged 4-16 in Puerto Rico</td>
<td>44 anxiety or depressive disordered, 13 anxiety and depressive disordered (22.8%)</td>
</tr>
<tr>
<td>Kashani et al., 1987</td>
<td>150 14-16 year olds from the Midwest</td>
<td>16 anxiety or depressive disordered, 9 anxiety and depressive disordered (36%)</td>
</tr>
<tr>
<td>Fleming, 1991</td>
<td>2,219 children aged 6-16 from Ontario</td>
<td>297 anxiety or depressive disordered, 50 anxiety and depressive disordered (14.4%)</td>
</tr>
</tbody>
</table>
identified with an anxiety or depressive disorder and 9 (8.7%) had both diagnoses. In their study, Bird and colleagues (1988) found that 13 (22.8%) of 57 Puerto Rican children aged 4 to 16 with an anxiety or depressive disorder had both disorders.

A study of adolescents by Kashani et al. (1987) drew a sample of 150 14 to 16 year olds in the public schools of a Midwestern city. Nine (36%) of the 25 adolescents identified with an anxiety or depressive disorder had both diagnoses. Lastly, Fleming (1991, as cited in Angold & Costello, 1993) administered the Child Behavior Checklist (CBCL) (Achenbach & Edelbrock, 1983, 1987) to 2,219 children aged 6 to 16, who were attending school in Hamilton, Ont. Teacher and parent versions of the questionnaire were also completed and the results were validated against psychiatric interviews with a subgroup of the sample. Two hundred and ninety-seven children were found to have an anxiety or depressive disorder, and 50 (14.4%) suffered from both disorders.

2.4.2 Evidence of the Co-occurrence of Anxious and Depressive Symptoms in Children and Adolescents

Table 3 summarizes the findings of 3 clinical studies that reported data on the co-occurrence of anxiety and depressive symptoms, using rating scales and checklists. Eason, Finch, Brasted and Saylor (1985) studied a group of hospitalized pediatric patients using as their measures four self-report scales: the Children’s Depression Inventory (CDI) (Kovacs, 1980, 1981, 1992), the Children’s Manifest Anxiety Scale - Revised (CMAS-R) (Reynolds &
Table 3

Co-occurrence of Anxious and Depressive Symptoms in Clinical Populations of Children and Adolescents

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Instruments</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eason, Finch, Brasted &amp; Saylor, 1985</td>
<td>44 medical inpatients aged 7-14</td>
<td>CDI, CMAS-R, STAIC, CDRS, CARS, ARSC</td>
<td>significant correlations between almost all measures (clinical &amp; interview) of depression &amp; anxiety (p = .001)</td>
</tr>
<tr>
<td>Norvell &amp; Brophy, 1985</td>
<td>30 psychiatric inpatients with mean age of 11 years, 6 months</td>
<td>CDI, CMAS-R, STAIC</td>
<td>significant correlations between CDI Total score and a) the CMAS-R Total &amp; factor scores and b) all STAIC scales (p = .01); significant correlations between CDI F2 score &amp; 3 CMAS-R factor scores (p = .01); Physiological and Concentration factors of the CMAS-R predicted Total CDI and CDI F2 scores</td>
</tr>
<tr>
<td>Wolfe, Saylor, Blount, Pallmeyer &amp; Carek, 1987</td>
<td>102 psychiatric inpatients aged 6.5-16 years</td>
<td>CDI, CMAS-R, STAIC, CBCL-TRF</td>
<td>significant correlations between all self-report depression &amp; anxiety scales (p = .003); significant correlations between the CBCL-TRF Depression &amp; Social Withdrawal scale &amp; the Anxiety scale (p = .003); anxiety and depression self-report scale scores predicted the CBCL-TRF Internalizing Scale score</td>
</tr>
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</table>
Richmond, 1978), the State Trait Anxiety Inventory for Children (STAIC) (Spielberger, 1973) and the Children’s Depression Rating Scale (CDRS) (Poznanski, Cook, & Carroll, 1979). In addition, they designed two clinician rating scales for their study: the Children’s Anxiety Rating Scale (CARS) and the Anxiety Rating Scale for Children (ARSC). The study sample consisted of 44 children aged 7 to 14, with various medical problems. Eason et al. found that almost all of the self-report and clinician measures of anxiety and depression were significantly correlated.

Norvell, Brophy, and Finch (1985) investigated the relationship between children’s self-report measures of anxiety and depression, using as their sample 30 psychiatry inpatients with a mean age of 11 years and 6 months. The diagnoses of the 30 children and adolescents who participated included: dysthymic disorder (30%), conduct disorder (10%), overanxious disorder (10%), attention deficit disorder (7%), and other disorders (46%). The respondents completed the CDI, the CMAS-R and the STAIC. The CDI was significantly correlated with the total CMAS-R score and its three factor scores and with the state and trait anxiety scales of the STAIC. When Norvell et al. separated the two factors of the CDI, only Factor 2 (CDIF2), Dysphoric Mood correlated significantly with the CMAS-R and its three factors. With a step-wise regression analysis, they found that two factors of the CMAS-R - Physiological and Concentration, predicted the total CDI score and the CDIF2 score. The authors acknowledged that the results suggested a significant relationship between anxiety and depressive symptoms.
Wolf et al. (1987) conducted a study that looked at the relationship of anxious and depressive symptoms in 102 psychiatric inpatients, ranging in age from 6.5 to 16 years. The DSM-III diagnoses of the participants included conduct disorders (38%), adjustment disorders (15%), attention deficit disorder (12%), affective disorders (11%), anxiety disorders (7%), psychosis (5%), and others (12%). The measures used included self-report forms (the CDI, the CMAS-R, and the STAIC) and the Child Behavior Checklist - Teacher Report Form (CBCL-TRF) (Achenbach & Edelbrock, 1986). Moderate and significant intercorrelations were found between the children’s self-report measures of anxiety and depression and between the CBCL-TRF Depression and Social Withdrawal scale and the Anxiety scale. In addition, multiple regression analyses revealed that the anxiety and depression self-report scale scores predicted the CBCL-TRF Internalizing Scale score.

The fact that many researchers find anxious and depressed groups of children to be distinguishable only on the basis of their depressive symptoms also provides evidence for a comorbid relationship between the two types of symptoms. For example, Stavrakaki, Vargo, Boodoosingh and Roberts (1987) assessed children who had either a depressive or an anxiety disorder, using the CMAS-R, CDI, CBCL (Parent Version) and the Brief Psychiatric Rating Scale for Children (Overall & Pfeifferbaum, 1981). They found that the profile of scores on the Brief Psychiatric Rating Scale for Children and on the CBCL was significantly different for the two groups, with the depressed group rated as more depressed than the anxious group. None of the anxiety-rating measures discriminated the two groups. This inability to differentiate anxious and depressed groups of children on the basis of their self-
reported anxiety symptoms has been reported in other studies as well (Bernstein & Garfinkel, 1986; Hershberg, Carlson, Cantwell & Strober, 1982; Puig-Antich & Rabinovich, 1986).

Table 4 summarizes four studies that used rating scales to investigate comorbid anxiety and depressive syndromes as well as co-occurring anxious and depressive symptoms in community populations. The first study used all three versions of the CBCL - one for the child, the parent and the teacher (Achenbach & Edelbrock, 1986). Fleming and Offord (1990) used scales derived from the CBCLs as the basis for prevalence estimates of symptom clusters that approximate diagnoses. They found that 45% of children that demonstrated sufficient depressive symptomology to establish "caseness" also demonstrated evidence of comorbid "DSM-III-like" anxiety syndromes.

Angst, Vollrath, Merikangas and Ernst (1990) reported on an epidemiologic study of young adults, aged 19 and 20 in Zurich, Switzerland. The original sample of 292 males and 299 females was selected on the basis of scores on the 90 item Hopkins Symptom Checklist (SCL-90) (Derogatis, 1977). Subjects with high scores (i.e., greater than the 85th percentile) comprised two thirds of the sample. The remainder of the subjects were randomly selected from those who scored below the 85th percentile on the SCL-90. Angst et al. used a sub-sample of 395 subjects (189 males and 206 females) in their analysis of comorbid anxiety and depression. The subjects were interviewed three times with a semistructured interview, the Structured Psychopathological Interview and Rating of the Social Consequences for Epidemiology (SPIKE) (Angst, Dobler-Mikola, & Binder, 1984) in 1979, 1981 and 1986.
Table 4

Co-occurrence of Anxious and Depressive Symptoms/Syndromes in Community Based Populations of Children and Adolescents

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Instrument</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleming &amp; Offord, 1990</td>
<td>2852 children aged 6-16 in Ontario</td>
<td>Survey Diagnostic Instrument based on the Parent, Teacher and Child versions of the CBCL</td>
<td>92 demonstrated evidence of a depressive syndrome 76 demonstrated comorbid depressive and anxiety syndromes (45%)</td>
</tr>
<tr>
<td>Angst, Vollrath, Merikangas &amp; Ernst, 1990</td>
<td>395 young adults aged 19-20 in Switzerland</td>
<td>SCL-90, SPIKE</td>
<td>39 anxiety disordered 58 depressive disordered 30 anxiety and depressive disordered (7.6%)</td>
</tr>
<tr>
<td>Strauss, Forehand, Frame &amp; Smith, 1984</td>
<td>252 second through fifth graders in U.S.A.</td>
<td>CDI, CMAS-R, RBPC, teacher and peer nominations of social withdrawal</td>
<td>children with high levels of depressive symptomology reported significantly higher levels of anxiety and were seen by teachers and peers to be more socially withdrawn</td>
</tr>
<tr>
<td>Ollendick &amp; Yule, 1990</td>
<td>663 children aged 8 to 10 (327 from England &amp; 336 from the U.S.A.)</td>
<td>CDI, CMAS-R, FSSC-R</td>
<td>for both groups of children there were: significant correlations between the CDI and a) the CMAS-R and b) the FSSC-R; children with high levels of depressive symptomology reported higher levels of anxiety and greater fear of socially evaluative situations</td>
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</table>
This instrument collects information on 21 psychic and somatic syndromes and on consumption of various substances. Results from the first phase (when the respondents were in late adolescence, i.e., aged 19 and 20) indicated that 30 (7.6%) of the 395 who were interviewed had both an anxiety and a depressive disorder.

Strauss, Forehand, Frame and Smith (1984) administered the CDI and the Children’s Manifest Anxiety Scale - Revised (CMAS-R) to children in grades 2 to 5. They also obtained teacher-reported problems using the Revised Behavior Problem Checklist (RBPC) (Quay & Peterson, 1983), and teacher and peer nominations of social withdrawal. Subjects were assigned to “High” and “Low” depressed groups, on the basis of their CDI scores, generating two groups of 15 each. Subjects in the “High” group scored significantly higher than those in the “Low” group on the CMAS-R and its subscales, on the anxiety-withdrawal factor of the Teacher RBPC and on both the teacher and peer nominated withdrawal. Thus, children who reported themselves depressed also reported themselves anxious. In addition, those children who rated themselves depressed were viewed by others in their school environment as displaying signs of both depression and anxiety.

Lastly, symptom co-occurrence was documented by Ollendick and Yule (1990). They examined the relationship of depression with anxiety and fear in a sample of 327 British and 336 American children. The CDI, the CMAS-R and the Fear Survey Schedule for Children - Revised (FSSC-R) (Ollendick, 1983) were administered. Moderately high, significant correlations between the anxiety and depression measures were found. The
correlation between depression and fear was also significant, but more modest in size. Children identified with high levels of depression (CDI >19) also reported high levels of anxiety and greater fear of failure and criticism (i.e., socially evaluative fears).

2.4.3 Conclusions Regarding the Comorbidity of Anxiety and Depressive Disorders and the Co-occurrence of Anxious and Depressive Symptoms in Children and Adolescents

The findings reviewed above suggest that there is a frequent co-occurrence of categorically defined anxiety and depressive disorders, as well as a high correlation and covariation between dimensionally rated symptoms of anxiety and depression. The available data suggest that, with self-report or interview data, in clinical as well as community populations, depression and anxiety among children and adolescents frequently co-exist. Rates of comorbidity ranging from 1.6% to 55.7% have been reported.

There are several reasons why such a wide range in prevalence rates exists. Rates can vary depending on the sample origins (general population, inpatients, outpatients), the source of information (child, parent, teacher), sample demographics (age, sex, sociodemographic status) and data gathering tools (rating scales, interviews) (Stavrakaki & Gaudet, 1989). For example, in some cases the studies focused on the relationship of anxiety and depression in children with anxiety disorders, while in other cases the purpose was to examine the relationship of the two constructs in children with depressive disorders. Research findings have demonstrated that anxious subjects report less depression than
depressed subjects report anxiety, resulting in different comorbidity rates in each of these populations.

Lack of consistent criteria for assigning diagnoses when symptoms from both disorders are present can also affect the comorbid prevalence rate (Frances, Widiger, & Fyer, 1990; Kendall, P. C., Kortlander, E., Chansky, T. E., & Brady, E. U., 1992). For example, early diagnostic systems tended to establish an a priori hierarchy that restricted multiple concurrent diagnoses. When more than one condition was present, the more severe or pervasive condition took diagnostic priority over the less severe or pervasive condition. DSM-III removed some of the exclusion criteria regarding the diagnosis of the lower hierarchy condition(s) and DSM-III-R went even further in permitting different conditions to be assessed on their own merits and to be diagnosed when present together. In addition to using these differing diagnostic systems, some researchers suspended all the exclusionary rules because the rules obscured information, and used other assessment strategies for clinically identifying anxiety and depression (Puig-Antich & Gittelman, 1982). Consequently, comorbidity rates can vary depending on the approach to classification that the researcher has taken.

The comorbid prevalence rates and the correlations between symptoms in the studies reviewed above are also influenced by the fact that anxiety and depression share several features (Brady & Kendall, 1992). Symptoms such as restlessness, fatiguability, loss of energy, difficulty concentrating and insomnia are criteria for both disorders. Furthermore, an
examination of the various tests, rating scales and interviews used to diagnose anxiety and depression reveals many identical items. For example, the following items appear on the CMAS-R and the CDI: I have trouble making up my mind; I worry that bad things will happen to me and I have trouble sleeping every night. Because anxiety and depression have common features, the presence of one disorder constitutes a partial fulfillment of the criteria for the second disorder, leading to inflated comorbidity rates and high correlations between the two emotions (Angold & Costello, 1993; Brady & Kendall, 1992). However, content overlap is insufficient to fully account for the strength of the observed correlation between anxiety and depression and the measures used to assess them (Watson & Kendall, 1989; for review see Clark, 1989). In fact, Clark (1989) noted that anxiety and depression are likely to remain significantly related, even when the symptoms that best differentiate the two disorders are strongly weighted.

The findings of the present review support the conclusions of Kendall and Brady (1995) and Harrington (1993) that a meaningful relationship exists between anxiety and depression in children and adolescents and that comorbidity rates and the co-occurrence of depressive and anxious symptoms are not simply the result of coincidental overlap; rather, they occur at rates greater than would be expected by chance.

2.5 Models to Explain Comorbid Anxiety and Depression

Evidence for the co-occurrence of anxiety and depression has continued to grow. In a
comment on the current status of the two constructs in the literature, Craig and Dobson (1995, p. xiii) state that, "Data-based studies of anxiety and depression demonstrate substantial overlap in the subjective experiences, physiological correlates and behavioral manifestations that characterize them. Similarly, when either anxiety or depression occurs to a pathological extreme, there is a high probability that the other will also be observed." The authors further state that "the proposition that anxiety and depression are distinct emotional phenomena is breaking down." Elsewhere, in a discussion of depressive comorbidity in childhood, Angold and Costello (1995) report that the epidemiological data have demonstrated beyond a doubt that depression is more often associated with other disorders than would be expected by chance and that the comorbidity rates "are so high that one wonders whether there is such a thing as a 'pure' depression before adulthood" (p132). However, the evidence for comorbidity does not point to any one compelling and universally applicable interpretation of the nature of the anxious-depressive relationship. How then are we to interpret the relationship between these two emotions? Systematic attempts to explore the similarities and differences between anxiety and depression have led to several explanations as to how the two constructs are related.

1) The Unitary Model

The Unitary Model views anxiety and depression as variants of the same disorder and no more than surface manifestations of a common underlying distress factor (Frances et al, 1992; Stravrakaki & Vargo, 1986). From the unitary perspective, anxiety and depression are
two symptomatic stages of affective disorder with symptoms that vary over time such that, the diagnosis given depends upon when in the course of illness the patient is seen (Gersh & Fowles, 1979). In its purest and most radical form, this model would suggest combining all anxiety and depressive disorders into one complex syndrome arranged along a continuum.

Sources of support for the Unitary Model include: overlapping clinical symptoms (Endicott, Cohen, Nee, Fleiss, & Sarantakos, 1981; Facett & Kravitz, 1983; Kotsopoulos, 1989), instability of clinical diagnosis (Kendell, 1974), lack of pharmacological treatment specificity (Johnstone et al., 1980), failure to find separate factors of anxiety and depression in anxiety and depression rating scales (Dobson, 1985b; Mendels et al., 1972; Johnstone et al., 1980); high comorbidity rates for major depression and anxiety states (Barlow, DiNardo, Vermilyea, Vermilyea, & Blanchard, 1986; Boyd et al., 1984; Breier, Charney, & Hensinger, 1984; Leckman, Weissman, Merikangas, Pauls, & Prusoff, 1983) and high correlation between both subject and observer based measures of anxiety and depression (Saylor, C. F., Finch, A. J., Baskin, C. H., Furey, W., & Kelly, M. M., 1984; Deluty, Deluty, & Carver, 1986; Dobson, 1985b; Gotlib, 1984; Tanada-Matsumi & Kameoka, 1986).

2) The Pluralistic Model

Advocates of the Pluralistic Model acknowledge that anxiety and depression have a number of features in common, but believe that there are sufficient differences between them to consider them separate and distinct entities (Frances et al., 1992). They point out
that anxiety and depression are each sufficiently frequent for some co-occurrence to be expected by chance and co-occurrence might be enhanced in clinical samples because individuals are more likely to seek treatment when they suffer from more than one condition. They also express concern that important categorical distinctions may be lost if one adopts the Unitary Model.

Support for this model comes primarily from Roth and colleagues (the Newcastle Group). They suggest that, with the use of appropriate statistical methods (i.e., principal component analysis and discriminant function analysis), anxiety and depression can be shown to differ on a number of variables. Their studies, along with other more recent ones, have demonstrated that anxious and depressed patients can differ with respect to clinical symptoms (Roth, Gurney, Garside, & Kerr, 1972), patient personality characteristics (Kerr, Schapira, Roth, & Garside, 1970), prognosis (Schapira, Roth, Kerr, & Gurney, 1972), family history (Roth et al., 1972; van Valkenburg, Aksikal, Puzantian, & Rosenthal, 1984) and factor scores on various patient rated and observer rated anxiety and depression scales (Prusoff & Klerman, 1974; Mountjoy & Roth, 1982a).

3) The Predispositional Model

A third explanation of the the relationship between anxiety and depression suggests that anxiety may predispose to depression (Dobson, 1985; Frances et al., 1992). In this model, which can be seen as a variant of the unitary position, anxiety occurs first and
depression is seen as a natural sequela to a prolonged, intense anxious state. In other words, depression may develop if relief from anxiety is not forthcoming.

An example of the Predispositional Model can be seen in the work of Barlow (1991). He saw anxiety as preceding and capable of resulting in depression. In his model, Barlow described both anxiety and depression as composed primarily of high negative affect. However, whereas anxiety was characterized by a state of chronic overarousal and hypervigilance against a possible upcoming negative event, the hallmark of depression was behavioural retardation and loss of pleasurable engagement. In Barlow’s model, early experiences with lack of control result in a psychological vulnerability for anxiety. This vulnerability, when combined with a biological vulnerability and triggered by the stress of negative life events leads to clinical anxiety and, some time later, possibly to depression. Whether one becomes anxious and stays that way or also becomes depressed, depends on the extent of one’s psychological vulnerability, the severity of the life stressor and the coping mechanisms at one’s disposal.

In adult populations, evidence that at least some types of depression are later complications of anxiety comes from the finding that symptoms of depression, but not symptoms of anxiety discriminate anxious and depressed patients (Heimberg, Vermilyea, Dodge, Becke, & Barlow, 1987; Barlow, DiNardo, Vermilyea, Vermilyea, & Blanchard, 1986; DiNardo & Barlow, 1990; Barlow, 1988)). To put it another way, researchers found that almost all depressed patients were anxious, but not all anxious patients were depressed.
Although there is evidence that anxiety predates depression in children and adolescents, the number of investigations is limited (Finch et al., 1989). Kovacs, Gatsonis, et al. (1989) reported that, among the 30 children in their study that had comorbid anxiety and depression, anxiety disorders predated the major depression about two thirds of the time. In a study of the relationship between anxiety and depression, Stavrakaki et al. (1987) found that anxious children were younger, and were low on observer ratings of depressive symptoms, while depressed children were older, were high on observer ratings of depression and had elevated observer ratings of anxiety as well. Strauss, Last, Hersen and Kazdin (1988) reported similar findings. In a review of their studies of children with major depression, Puig-Antich and Rabinovich (1986) found that the main clinical difference between children with anxiety disorders and those with depressive disorders was the presence of depressive symptoms, not anxiety symptoms, since the latter were often present in affectively disordered children. Puig-Antich and Rabinovich concluded that, in most cases, it was as if the affective picture was superimposed on a background of anxiety symptoms. Bernstein and Garfinkel (1986) reported similar results with depressed adolescents.

4) A Combined Model

Each of the above models has some value in defining the relationship that exists between anxiety and depression (Frances et al., 1992). Recognizing this, Watson and colleagues (Watson & Clark, 1984, 1992; Clark & Watson, 1991; Watson, Clark, & Carey,
1988; Watson & Tellegen, 1985) proposed a framework that integrated the Unitary and Pluralistic Models.

a) A Model of Affect

Watson and Tellegen (1985) found that self-rated mood was characterized by two dominant and orthogonal dimensions. The first dimension, which they labeled Negative Affect (NA), encompassed a broad category of negative emotions and was seen as a diffuse measure of psychological distress. Negative Affect was characterized by both anxious and depressive symptomology including feelings of nervousness, tension and worry (cf. anxiety), as well as feelings of guilt, self-dissatisfaction, rejection and sadness (cf. depression). The second dimension, which they labeled Positive Affect (PA), was composed of positive mood states that reflected one's level of pleasurable engagement with the environment. Adjectives such as enthusiastic, joyful, active and attentive characterized PA. Watson and Tellegen regarded their affect model as hierarchical in that NA and PA were seen as two higher order factors that were composed of several lower order correlated, yet ultimately distinct emotional states (e.g. fear, anger, joy, interest, etc.). In a test of this hierarchical structure, Watson and Clark (1992) examined the relations among self-report measures of fear, sadness, hostility and guilt and found a strong higher order Negative Affect that subsumed all 4 negative emotions, thus providing partial support for the model.

b) A Tripartite Model of Anxiety and Depression
Based on their affect model, Watson and Tellegen (1985) proposed that depression and anxiety were both characterized by high NA, but that only depression was characterized by low PA, thereby differentiating it from anxious states. Clark and Watson (1991) reviewed the literature regarding the relationship of anxiety and depression and concluded that a three part (i.e., Tripartite) model best captured the relationship between the two disorders. They found that NA dominated the ratings of anxious and depressive symptomology in both normal and clinical populations. In addition, their analyses revealed that low PA was specifically associated with depressive symptomology and differentiated it from anxiety-related phenomena, while a factor that focused on nervous tension and autonomic arousal was specific to anxiety syndromes.

The Clark and Watson Tripartite Model helped to explain why the various views of anxiety and depression had developed, and it represented a framework for their synthesis. Namely, their investigations of Negative Affect were consistent with the Unitary Model that focused on the commonalities between the two disorders, while studies of the factors specific to each syndrome (i.e., low positive affectivity in the case of depression and physiological hyperarousal in anxiety) were consistent with the Pluralistic Model that views anxiety and depression as distinct syndromes.

Clark and Watson did not incorporate the Predispositional Model within the context of their Tripartite Model. However, the Predispositional Model as described by Barlow (1991) is not incompatible with it. The physiological hyperarousal which Barlow sees as the
hallmark of anxiety and the anhedonia that follows in his "neurotic" depression, both of which are imbedded within a high negative affective state are consistent with the three components of the Clark and Watson model. Barlow, like Clark and colleagues, believes that anxiety and depression are fundamentally similar or identical states; the difference between the two models is that Barlow conceptualizes depression as being chronologically later than anxiety, while Clark et al. do not.

2.6 Evidence for the Tripartite Model of Anxiety and Depression in Child and Adolescent Populations

Although much of the research on negative affectivity and the Tripartite Model has focused on adults (Craig & Dobson, 1995), some attempts have been made to apply this model to child and adolescent populations. King, Ollendick and Gullone (1991) reviewed the evidence for negative affectivity and cited three sources of support for the conceptualization of anxiety and depression as part of a broader negative emotional state in children and adolescents: 1) diagnostic studies that reported high rates of co-occurrence of anxiety and depressive disorders (Bernstein & Garfinkel, 1986; Ollendick & Mayer, 1984; Strauss, Last, Hersen, & Kazdin, 1988; Kovacs, Gatsonis et al., 1989; Kovacs, Feinberg, Crouse-Novak, Paulauskas, & Finkelstein, 1984); 2) the inability of self-report and interview based assessment measures to differentiate the two constructs in both clinical and non-clinical populations (Norvell, Brophy & Finch, 1985; Eason, Finch, Brasted, & Saylor, 1985; Wolfe et al, 1987; Strauss, Forehand, Frame, & Smith, 1984; Ollendick and Yule, 1990;
Stark, Kaslow, & Laurent, 1993) and 3) treatment studies in which treatment for anxiety resulted in a reduction of anxious as well as depressive symptoms (Reynolds & Coates, 1986) and where treatment effects for depression generalized to anxiety syndromes (Stark, Reynolds, & Kaslow, 1987).

The structure of negative affectivity has been found to vary from childhood to adolescence. Weiss et al. (1992) factor analysed the CDIs that had been completed by 768 clinically referred children and adolescents in five separate studies. They found that the symptoms reflecting negative affectivity changed somewhat from childhood to adolescence. Symptoms concerning sadness, fatigue, and aches and pains were common to both groups. However, frequent crying, being bothered by things, trouble sleeping and poor appetite were unique to adolescents, whereas not having friends was the only item unique to children’s reports.

Wolfe et al. (1987) reported findings in support of the differentiation of anxiety and depression. They found that children’s self-report measures of depressive and anxious symptoms each made independent contributions to the prediction of teachers’ scores of children’s internalizing behaviours. The authors concluded that, whereas the self-report measures probably contained a moderate element of negative affectivity which was common to both anxiety and depression, the measures probably also contained elements that were specific to anxiety and depression.
One study (Lonigan, Carey and Finch, Jr., 1994) provided evidence from a child and adolescent population for both a common negative affectivity component in anxiety and depression, and for a component that is specific to depression. Self-reported depression and anxiety were examined in 233 inpatient children diagnosed with either an anxiety or a depressive disorder. No differences were found in the degree of depressed affect reported by the two groups of children and Lonigan et al. suggested that the absence of a difference in the Depressed Affect scores of the anxious and depressed children might be due to a general negative affectivity component that is common to both disorders. However, depressed children did report more loss of interest or low motivation than anxious children. The authors stated that the items on the Low Motivation factor could be seen as the polar opposite of items found on the Positive Affect dimension described by Watson and Tellegen (1985) and the fact that depressed children had higher scores on this factor suggested that one factor that distinguishes depressed and anxious children is the absence of positive affect reported by depressed children. The results of the Lonigan et al. study, however, did not support the Tripartite Model's suggestion that reports of physiological symptoms should be specific to anxiety, but the authors pointed out that very few items that comprised the Physiological factor in their study actually tapped into physiological hyperarousal. Anxious children did, however, report more worry about the future, their well-being and the reactions of others.

Joiner, Catanzaro, and Laurent (1996) also investigated the structure of anxiety and depressive symptoms in child and adolescent psychiatric inpatients to determine whether
there was empirical support for a Tripartite model of anxiety and depression. Using principal component analyses, they found that a three factor structure corresponding to PA, NA and Physiological Hyperarousal best fit the data. However, the authors preselected specific items from their measures of anxiety and depression to assess PA, NA and Physiological Hyperarousal and they acknowledged that their attempts to identify relatively pure markers of the factors in question may have had “great sway over the final product” (i.e., their research findings).

More recently, Boyd and Gullone (1997) investigated the relation between anxiety and depression in a sample of 783 nonreferred adolescents from metropolitan and rural areas of Melbourne, Australia. Principal component analyses revealed a Positive Affect factor that could be easily distinguished from anxiety, as well as a factor that closely resembled Somatic Anxiety. However, the predicted Negative Affectivity factor was not found. Items reflecting depressed mood and those reflecting heightened anxiety did not overlap; instead, these two types of symptoms were represented by separate factors that were related to depression and anxiety respectively.

2.7 Conclusions Regarding the Models of Comorbid Anxiety and Depression in Children and Adolescents

Evidence exists for both the Unitary and Pluralistic models; less evidence exists for the Predispostional Model. Some of the overlap between anxiety and depression that is seen
as support for the Unitary Model is due to the fact that the self-report measures used to assess each construct have common symptoms. In the development of most of the anxiety and depression self-report measures, test construction has typically been geared toward the development of internally consistent and convergently valid measures rather than measures with clear discriminative validity (Wolfe et al., 1987). However, although symptom overlap contributes to the anxious-depressive relationship, it does not account for all of it (see review by Clark, 1989; Watson & Kendall, 1989).

As for the Tripartite Model, there is support in the literature for broad band Negative Affectivity, but not as much support for the disorder specific components of Low Positive Affect and Physiological Hyperarousal. One study (Wolfe et al., 1987) made reference to both common and specific elements in self-report measures of anxiety and depression, but it did not identify what these elements were. Only three investigations (Lonigan et al., 1994; Joiner et al., 1996; Boyd & Gullone, 1997) applied the Tripartite Model to a young population. The Lonigan et al. study showed that, although there were a number of overlapping features between anxiety and depression, depression was identifiable by low PA. Lonigan et al. also stated there may be a host of developmental factors that influence the expression of negative affective states. Boyd and Gullone found support for low PA and Physiological Hyperarousal, but not for NA, while Joiner et al. found evidence for all three factors of the Tripartite Model but admit they may have compromised their findings by preselecting the raw data for their analyses.
At best, we can say that we have partial support for the components of the Tripartite Model in child/adolescent populations. Most of the evidence supports the Negative Affect component, with some evidence for low Positive Affect in depression, but even less evidence for Physiological Hyperarousal in anxiety disorders. However, the identification of PA and Hyperarousal factors has not always occurred, mainly because the measures used did not contain enough items to load on these factors.

2.8 Developmental Differences in the Expression of Negative Affect

In their investigations of negative affectivity in children and adolescents, Weiss et al. (1992) and Lonigan et al. (1994) refer to the impact of age on the phenomenology of depression. Weiss and colleagues reported that symptoms reflecting the negative affect of depression varied somewhat from childhood to adolescence, while Lonigan et al. found significant age and symptom differences in anxious and depressed groups of children and concluded that developmental factors likely played a role in the expression of both negative affective states.

2.8.1 Why Symptoms of Depression Change With Age

Individuals change enormously during childhood and adolescence and it is unrealistic to expect behavioural isomorphism in the symptoms of depression in individuals throughout this age span (Carlson and Garber, 1986; Cicchetti & Schneider-Rosen, 1986).
Developmental psychopathologists maintain that children's less mature and continually changing levels of functioning result in a somewhat different clinical picture of depression at different phases of development. More specifically, they state that differences in the progression of children's cognitive, linguistic and emotional abilities produce differences in the way children experience, interpret and express depressive symptoms over time (Carlson & Garber, 1986; Sroufe & Rutter, 1984; Schachter & Romano, 1993).

Several researchers have provided evidence that changing stages of development result in changes in the way children experience and report depressive symptoms. Harter (1983) demonstrated that young children cannot experience self-denigration - one of the cognitive features that characterizes adult depression. She found that four and five year olds are aware that others are ashamed of them, but it is not until the age of eight that most children talk about being ashamed of themselves and experience a sense of personal failure. Kovacs (1986) reported that young children have difficulty differentiating basic emotions and often mislabel emotions such as sadness and anger. Ushakov and Girich (1972) found that 11 to 13 year olds were more aware of their depressive illness and its cause and gave more concrete symptoms than 7 to 10 year old children. Finally, McConville, Boag, & Purohit (1973) examined the relationship between types of depressive symptoms and age in a sample of 75 6 to 13 year old inpatients. They found that older children manifested more of the cognitive symptoms of depression, and that it was their more advanced verbal abilities that accounted for the increase in symptoms. The findings from these studies suggest that the pattern of depressive symptoms varies according to the age and stage of development of
the child.

2.8.2 Developmental Differences in the Presentation of Depressive Symptoms in Clinical and Community Populations

There are only a few systematic studies comparing the presentation of depressive symptoms in different age groups (Kovacs & Paulauskas, 1984; Ryan et al., 1987; Carlson & Kashani, 1988; Mitchell, McCauley, Burke, & Moss, 1988; Goodyer & Cooper, 1993; Kashani, Rosenberg, & Reid, 1989; Weiss et al., 1992). In the largest study, Ryan et al. compared depressive symptoms in two clinically referred samples of 95 children and 92 adolescents. There was no difference in the overall severity of depressive symptoms or in the severity of the majority of individual depressive symptoms including depressed mood, insomnia, irritability and suicidal ideation. However, prepubertal children had a more depressed appearance, more somatic complaints, psychomotor agitation, separation anxiety, phobias and depressive hallucinations. Adolescents had greater hopelessness/helplessness, anhedonia/lack of interest, hypersomnia, weight change, and use of alcohol and drugs. In a similar study, Weiss et al. (1992) analysed the CDI responses of 1030 clinically referred children and adolescents, aged 8-12 and 13-16 respectively, and found that externalizing behaviour and guilt were more strongly related to depression in children, whereas affective symptoms (anxious, aroused irritability) and concerns about the future (hopelessness) appeared to be more related to depression in adolescents.
Carlson and Kashani (1988) compared the symptom profiles of the children and adolescents in the Ryan et al. (1987) study with the symptomology of nine preschool children with major depression (ages 2.5 - 6 years) and 100 adults who had been hospitalized with unipolar depression. Depressed mood, diminished concentration, insomnia and suicidal ideation occurred with similar frequencies across the age span. Anhedonia, diurnal variation (worse in a.m.), hopelessness, psychomotor retardation, and delusions increased with age. Depressed appearance, low self-esteem, somatic complaints and hallucinations decreased with age.

While Carlson and Kashani (1988) looked at depressive symptomology across the life span, Goodyer and Cooper (1993) examined changes in depressive symptoms within a specified age range. They investigated the features of depression in clinically referred girls aged 11-12, 13-14, and 15-16. Findings showed that many of the depressive symptoms were largely uninfluenced by age. Depressed mood, social withdrawal, agitation, early insomnia and nihilistic ideas were all present with similar high rates across the three age bands. However, the symptom profile did change somewhat. Hopelessness, separation anxiety and somatic anxiety (school related) decreased with age, while weight loss, irritability, suicidal acts and oppositional behaviour (at school) increased with age.

Mitchell and colleagues (1988) examined depressive symptoms in 95 outpatients aged 7 to 17 and found only one difference in the symptomology of depressed children and adolescents. Moreover, when they compared their combined group of children and
adolescents to a group of adult outpatients in a similar study (Baker, Dorzab, Winokur, & Cadoret, 1971), their group differed little in symptom presentation from adults with major depression. Out of 31 depressive symptoms, the younger patients described significantly more guilt, low self-esteem and somatic complaints, while the adults reported higher rates of terminal insomnia, weight loss and morning depression. Kovacs and Paulauskas (1984) also found very few differences in depressive symptomology across developmental stages.

Kahsani and colleagues. (1989) investigated the distribution of depressive symptoms in 210 children and adolescents from the general population. They examined three age groups (8, 12 and 17 year olds) and found that fatigue, irritability, agitation when sad, withdrawal and feeling bored increased with age, whereas crying, horrible dreams and stomachaches decreased with age. In addition, depression scores increased with age, while scores of physiological anxiety decreased with age.

More recently, Borchardt and Meller (1996) compared the symptoms of depressed inpatient preadolescents (aged 5 to 12 years) and adolescents (aged 13 to 19 years). The adolescent group reported more loss of appetite, low energy and suicide attempts, while the preadolescent group reported more irritable mood, temper outbursts, physical aggression and distractability.

Some of the findings from the above studies point to a relatively similar picture of depression shown by children and adults (e.g. Kovacs & Paulauskas, 1984; Mitchell et al.,
1988). Symptoms found to be consistent across age include sadness, inner-directed hostility, low self-esteem and various vegetative symptoms. Other findings suggest that there are different patterns of symptom expression at different ages (e.g. Ryan et al., 1987; Carlson & Kashani, 1988). For example, somatic complaints, separation anxiety and depressed appearance are associated more closely with depression in the younger age groups, whereas anhedonia, hopelessness, hypersomnia, psychomotor retardation, and weight change are reported more often in adolescent depression. There are also symptoms that are reported by children and/or adolescents, but are not part of the diagnostic criteria for adult depression (e.g. somatic complaints, social withdrawal, irritability, hopelessness and oppositional behaviour).

2.8.3 Conclusions Regarding Developmental Differences in the Presentation of Depressive Symptomology

Based on the findings, researchers have concluded that there are both substantial similarities between child and adult depressive disorders as well as important dissimilarities (Kutcher & Marton, 1989; Schachter & Romano, 1993; Hammen & Compas, 1994). However, although some trends regarding age-specific symptoms are apparent, there is no consensus on exactly which depressive symptoms are invariant across age and which are influenced by developmental level. Researchers have found that just as many of their specific findings do not replicate those of other studies, as replicate them (Weiss et al., 1992). In fact, inconsistencies across studies appear to be the rule rather than the exception.
(Weiss & Garber, 1991, as cited in Weiss et al., 1992). Weiss et al. (1992) have outlined a number of factors that have contributed to these inconsistencies including variation in a) the manner in which developmental level is defined (e.g. pubertal status vs age), b) the age range across which subjects have been sampled (e.g. children vs adolescents; adolescents vs adults), c) the method of assessment (e.g. interview vs self-report) and d) sample selection procedures (e.g. whether subjects are from a normal or clinic-referred population).

2.9 Developmental Differences in the Prevalence Rate of Depressive Phenomena

2.9.1 Increase in Prevalence Rate of Depressive Symptoms and Depressive Disorders With Age

One area in which there is a consistent picture regarding age and depression is in the prevalence rate (Rutter, 1991). Substantial age differences in the occurrence of depressive phenomena have been reported in both clinical and community populations (e.g. Rutter, 1986a; Angold & Rutter, 1992; Angold, 1988a,b). In the Isle of Wight general population study of 10 to 11 year old children (Rutter, Tizard & Whitmore, 1970), 13% showed a depressed mood at interview, 9% appeared preoccupied with depressive topics and 17% failed to smile. When these children were interviewed at ages 14 to 15, their depressive symptoms had become significantly more prevalent. Over 40% reported substantial feelings of misery and depression during a psychiatric interview, 20% expressed feelings of self-
deprecation and 7-8% reported that they had suicidal feelings (Rutter, 1979/1980; Rutter, Graham, Chadwick, & Yule, 1976).

The same Isle of Wight study provided data on the prevalence of depressive disorders at different developmental stages. Among 2000 children aged 10-11, only 3 cases of depression were found, but at age 14-15, there were 9 cases of “pure” depression and 26 cases of comorbid depressive disorders (Rutter, 1979/80; Rutter et al., 1976). Elsewhere, Kashani et al. (1989) found in their community sample that the prevalence of depression was similar in 8 and 12 year olds (1.4%), but the disorder was four times more common in late adolescence (5.7%), while Fleming, Offord, & Boyle (1989) reported a three-fold increase in the prevalence of a DSM-III like depression in a community sample of children between the ages of 6-11 and 12-16 years.

Clinical data provide a similar picture regarding the prevalence rate of depression. Angold and Rutter (1992) examined the rate of depression in a sample of 3,519 8-16 year old psychiatric patients, and found increasing levels of depression with age in both boys and girls. Weissman et al. (1984) studied the rates of depression in children of depressed parents and reported similar findings. Elsewhere, Carlson and Strober (1983) found that admissions to psychiatric hospitals with depressive diagnoses increased steadily with age. Lastly, Borchardt and Meller (1996) reported that adolescent inpatients experienced a significantly greater number of depressive symptoms than their preadolescent counterparts.
2.10 Change in Gender Patterns of Depression With Age

In addition to an overall increase in prevalence rates with age, there is also a change in the sex ratio for depression around the time of puberty. In both clinical and community samples, studies of prepubertal children have found either a slightly greater incidence of depressed males than females or an even distribution, whereas among postpubertal children there tends to be a female preponderance for depression (Rutter, 1986a; Angold & Rutter, 1992; Anderson & McGee, 1994; Ryan et al., 1987; Harrington, Fudge, Rutter, Pickles, & Hill, 1990; Kolvin et al., 1991; Weissman et al., 1984; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Fleming & Offord, 1990). For example, in the Dunedin Longitudinal study of a cohort of children born during one year in New Zealand, Anderson and McGee found clear gender differences at ages 11 and 15, with a reversal of the 5:1 male predominance in preadolescent depressive disorders, to female dominance for both Major Depression and Dysthymia (1:0.4) by age 15 years.

Research has demonstrated that the difference in sex ratios for depression favouring females begins around age 10. Although the rates of depressive disorder increase steadily with age for both sexes, after the age of 10, the incidence rate for girls increases much more quickly than it does for boys, such that, sometime before the age of 15, the adult pattern of a higher incidence of reported depression in females emerges (Angold & Rutter, 1992; Weissman et al., 1984).
2.11 Summary - Comorbid Anxiety and Depression in Children and Adolescents

Research evidence has demonstrated that there is a significant relationship between anxiety and depression. Several explanations were given about how the two constructs might be related. The Tripartite Model was regarded as the preferred conceptualization of the anxious-depressive relationship because it is compatible with all other models and provides a framework for their synthesis.

According to the Tripartite Model, anxiety and depression are both characterized by high Negative Affect (NA), while low Positive Affect (PA) is specific to depression, and Physiological Hyperarousal is specific to anxiety. Findings from several studies provided support for the existence of a common negative affective state in anxiety and depression, but not as much support was found for the disorder specific components of low PA and Physiological Hyperarousal.

Research findings cited in this review also indicated that development influences the presentation of negative affect. Age differences in the expression of depressive phenomena were reported, although there was no consensus regarding which depressive symptoms were age invariant and which were not. Prevalence rates for depression at both the symptom and disorder levels were found to increase with age and there was a change in gender ratio for depression around puberty, with a female preponderance for the disorder emerging by age fifteen.
2.12 Rationale for the Present Study

I investigated the relationship between anxiety and depression in a large, non-clinical sample of European children and adolescents, aged 11 to 16. To date, most of the investigations of the anxious-depressive relationship have been conducted with clinical populations of American children (e.g. Lonigan et al., 1994; Wolfe et al. 1987). King et al. (1991) state that “most findings (regarding the relationship of anxiety and depression) have been reported by US investigators and require systematic replication and extension in other countries. Moreover, most of this research has concentrated on children in clinical and hospital settings... More investigations of the relationship between anxiety and depression among nonclinic or normal populations of children (are needed)” p. 451. The present study addressed both of these needs.

An investigation using a nonclinical population was especially needed because some researchers have suggested that the lack of differentiation between symptoms of anxiety and depression in clinical populations could be a function of the type of population being studied. Hospitalized patients may exhibit only vague symptoms of distress that cannot be differentiated into specific clusters of symptoms designated as either depression or anxiety or, alternatively, anxiety and depression may have been long term emotional states that might have merged with one another over time and are indistinguishable at the time of the study (Ollendick & Yule, 1990).
To date, investigations of the various anxiety-depression models have often used subject samples that were too small to permit generalizations to non-referred populations (e.g. Bernstein & Garfinkel, 1986), and, in some instances, diagnoses appeared to be based on criteria that did not correspond to any diagnostic scheme currently in use, or upon criteria that were unspecified. (e.g. Kolvin, Berney, & Bhat, 1984). In the current study, a large, representative sample of children and adolescents, as well as a reputable measure of depressive symptomology in children/adolescents (CDI) were used to investigate the Tripartite Model.

My study used confirmatory factor analysis (CFA) to test the Tripartite model. No confirmatory factor analyses have been conducted using a tripartite explanation of the relationship between anxiety and depression in a child and adolescent population. Lonigan et al. (1994) used exploratory factor analyses to identify a number of factors in measures of anxiety and depression, while Joiner et al. (1996) and Boyd and Gullone (1997) both used principal component analysis. By using CFA, I conducted a more stringent and direct test of the Tripartite Model.

I also wanted to investigate age differences in the expression of negative affect. Although there are several studies that have investigated the influence of age on depressive symptomology, no studies have looked at the impact this factor might have on the negative affect that is common to both anxiety and depression and on the negative affect that differentiates the two disorders. Age and gender differences in the prevalence rate and level
of depression were also examined.

In addition, I examined the co-occurrence of anxious and depressive symptomology. Do anxious phenomena occur with depressive phenomena across all ages and gender? If they do, is it at a uniform rate? In answering these questions, I was looking for a predispositional relationship between anxiety and depression. Although this type of comorbid relationship has been discussed in the literature, it has not been widely investigated.

2.13 Hypotheses/Research Questions

In the present study, self-reported anxious and depressive symptomology in a large, community based sample of children and adolescents (aged 11 to 16) were examined. Based on the research findings outlined in this review, it was hypothesized that a significant relationship exists between anxious and depressive symptoms such that, when these symptoms are factor analyzed, a Three Factor (i.e. Tripartite) Model of anxiety and depression would fit the data better than a One or Two Factor (i.e., Unitary or Pluralistic) Model.

Age and gender differences in the expression of negative affect were also investigated. Anxious and depressive symptoms in children and adolescents were compared in order to determine 1) if symptoms characterizing the negative affective states of anxiety and depression vary as a function of age; (changes in specific symptoms across
developmental stages were not predicted because of the lack of consensus in the literature on precisely which symptoms are invariant and which vary with age) and 2) if the prevalence rate for depression demonstrates age and gender effects, with more subjects reporting depressive affect with age, and more females reporting depression than males by mid-adolescence.

The present study also addressed the question of whether anxious symptoms predate depressive symptoms by investigating a) whether there is an age difference between anxious and depressed subjects and b) whether there are differences in the anxiety and depression scores of highly depressed and highly anxious groups of subjects. An age difference between anxious and depressed subjects was expected. In addition, it was anticipated that subjects who score high on depression would also score high on anxiety, while high anxiety scorers would not necessarily score high on depression. In other words, it was anticipated that the only difference between anxious and depressed groups of subjects would be that the depressed subjects would report more depression.

2.13.1 Summary of Hypotheses:

Hypothesis 1: There is a significant relationship between anxiety and depression such that, when anxious and depressive symptoms are factor analyzed, a Three Factor (i.e., Tripartite) Model will fit the data better than a One or Two Factor Model.
Hypothesis 2: The symptoms characterizing negative affect vary as a function of age.

Hypothesis 3: More subjects will report depressive affect with age, and by mid-adolescence, more females will report negative affect than males.

Hypothesis 4: If anxiety and depression are temporally related, anxiety will appear first.
3. Method

3.1 Participants

The participants were 1,113 Latvian children (481 boys and 632 girls), in grades 6, 8, and 10. These children were randomly selected from a larger sample of 3,818 children who participated in the Cross-National Survey on the Health Behaviour of School-Aged Children (HBSC), conducted in Latvia by the World Health Organization (WHO) in November and December, 1993. In the WHO study, children in grades 6, 8 and 10 were targeted in order to ensure that the majority of the respondents would fall within half a year of the age means: 11.5 years, 13.5 years, and 15.5 years. In the current study, 913 (82%) of the children met this age requirement (see Table 5). The remaining 200 (18%) of the children had ages outside the defined age range, with the youngest child aged 10 years, 11 mos. and the oldest aged 16 years, 8 mos.

3.2 Sample Selection Procedure

A cluster sampling approach was used for the WHO study. Children in grades six, eight and ten, from each of Latvia’s four geographical regions and from Riga, the capital city, were sampled. The number of students selected from each region and from the capital
Table 5
Number and Percentage of Children in Each Target Age Group in the Current Study

<table>
<thead>
<tr>
<th>Target Age Group</th>
<th>Number of Children</th>
<th>Percentage of the Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 yrs. 0 mos. - 12 yrs. 0 mos.</td>
<td>262</td>
<td>23.5%</td>
</tr>
<tr>
<td>13 yrs. 0 mos. - 14 yrs. 0 mos.</td>
<td>303</td>
<td>27.2%</td>
</tr>
<tr>
<td>15 yrs. 0 mos. - 16 yrs. 0 mos.</td>
<td>348</td>
<td>31.3%</td>
</tr>
<tr>
<td>Total</td>
<td>913</td>
<td>82%</td>
</tr>
</tbody>
</table>

was proportionate to the percentage of the total student population found in each area. As a result, 30% of the children came from Riga, 26% from Vidzeme, 18% from Kurzeme, 17% from Latgale and 9% from Zemgale. Within each region, participants were selected from towns, villages and the countryside. A sample size of 1300 children at each grade level (for a total of 3,900 children) was recommended in order to ensure that the sample would be representative of the population from which it was drawn. The number of children needed from Riga and from each region, in order to have a total national sample of 1300 children from each target grade level and the number of schools and classes involved were determined. The prescribed number of schools from each area was then randomly selected and all the children in grades 6, 8 and 10 in these schools were tested. To achieve the required sample size, 224 classes from 110 of Latvia’s 690 schools participated in the data collection.

Beginning with a random starting point, every third child that participated in the
WHO study, was selected to participate in the current study. A total of 339 children were excluded from the study for the following reasons: 9 children did not report their age, 173 had missing data, 102 were identified as having extreme scores (i.e. outliers) and 55 children received a higher than average score on the Inconsistency Index of the Multidimensional Anxiety Scale for Children (MASC) (March, 1997) (an index that identifies random or careless responding).

3.3 Consent to Participate

Consent was given by the Latvian Ministry of Education to conduct the HBSC Survey in their Latvian and Russian speaking schools. After the WHO research team had determined which schools would be involved in the survey, a team member approached the individual school principals and asked permission for their students to take part. All principals but one gave their consent. This was the final level of approval obtained. On the day of the data collection, after the questionnaires had been handed out, a member of the research team informed the students that they did not have to complete the forms if they did not want to, but could hand them back blank. (Note: the actual number who did this is not known; but, if it was done at all, the number was likely very small [personal communication]).

3.4 Measures
Three self-report questionnaires were used in the current study: the Health Behaviour in School-Aged Children (HBSC) Survey (WHO, 1993), the Children's Depression Inventory (CDI) (Kovacs, 1985, 1992), and the Multidimensional Anxiety Scale for Children (MASC) (March, 1997).

1) The Health Behaviour in School-Aged Children (HBSC) Survey

The HBSC Survey is an international questionnaire made up of a core and several foci sections. The core section contains questions on 1) selected demographics, 2) health problems (including smoking habits, use of alcohol, eating habits and physical activity) and 3) psychosomatic complaints. The special focii sections contain questions on 1) the school environment, 2) psychosocial health, 3) social inequity and 4) injury related behaviours. Only the items relating to the following demographics are relevant to the current study: age, sex, school grade and place of residence.

In addition to the core and special focii questions, each country participating in the survey was allowed to add questions of national interest. In Latvia, researchers added the Children's Depression Inventory (CDI) to the 1993 questionnaire.

2) The Children's Depression Inventory (CDI)

The CDI (see Appendix A) is a 27 item self-rated symptom oriented scale suitable for
use with children and adolescents aged 7 to 17 years old. The instrument quantifies a range of depressive symptoms including disturbed mood, hedonic capacity, vegetative functions, self-evaluation and interpersonal behaviours. Several items concern the issue of depression in contexts that are specifically relevant to children (i.e., school).

Each CDI item offers three response options, keyed 0, 1, or 2, with higher scores indicating increasing severity of depressive symptomology. For each item, the meaning of each response option can be summarized in the following way: 0 = absence of the symptom; 1 = a mild symptom; 2 = a definite symptom. The child uses the options to rate the degree to which each statement describes him or her for the past two weeks. About 50% of the items start with the choice that reflects the greatest symptom severity; for the rest, the sequence of choices is reversed.

The CDI provides a total score (ranging from 0 to 54), as well as factor scores for Negative Mood, Interpersonal Problems, Ineffectiveness, Anhedonia and Negative Self-Esteem. The raw test scores can be converted to T-scores and there is separate T-score information for males and females in two age groups: 7 to 12 years and 13 to 17 years. A T-score above 65 is considered clinically significant when a “high base rate” group such as children in a clinical setting is being studied. When children without identified behavioural problems (i.e., a low base rate group) are being studied, a higher criterion score for inferring clinical problems (a T-score of 70) is used.
In addition to quantifying the severity of depressive phenomena, the CDI also provides cut-points in the total score that can be used for selecting children who are likely to exhibit depressive symptoms. The cut-point for use in general screening of nonclinical samples is a CDI score of 19 or 20 (depending on the application of the CDI and the assessor's interest in either minimizing false negatives or false positives). As the cut points are calculated using a sample of clinically depressed children along with the normative sample, caution must be used when applying these points to a Latvian sample of children and adolescents. In the present investigation, a CDI cut-point of 20 is used.

With regard to reliability, CDI test-retest correlations with time intervals of one week to 1 year, range from .38 to .87 (Saylor, Finch, Spirito, & Bennett, 1984; Smucker, Craighead, Craighead, & Green, 1986; Weiss et al., 1991; Nelson & Politano, 1990; Finch, Saylor, Edwards, & McIntosh, 1987; Weiss & Weisz, 1988). Alpha coefficients of internal consistency reliability range from .71 to .89 (Kovacs, 1983; Ollendick & Yule, 1990; Weiss & Weisz, 1988; Weiss et al., 1991; Hepperlin, Stuart, & Rey, 1990), while item-total score correlations range from .28 to .55 in a normal population and .13 to .61 in a clinical population (Kovacs, 1983).

Investigations of the CDI as a valid measure of depressive symptomology in children and adolescents have resulted in significant correlations (ranging from .53 to .94) of the CDI with other similar measures of depression, as well as significant correlations (ranging from .46 to .64) with measures of related constructs, such as anxiety and self-esteem (e.g.
Asarnow & Carlson, 1985; Bartell & Reynolds, 1986; Haley, Fine, Marriage, Moretti, & Freeman, 1985; Hodges, McKnew, Cytryn, Stern, & Kline, 1982; Kovacs, 1985; Shain, Naylor, & Alessi, 1990; Blumberg & Izard, 1985, 1986; Eason, Finch, Brasted, & Saylor, 1985; Saylor, Finch, Baskin, Saylor et al., 1984). In studies of its discriminant validity, the CDI has correctly differentiated depressed cases from nonclinical samples (e.g. Carey, Faulstich, Gresham, Ruggiero, & Enyart, 1987; Hodges, 1990; Knight, Hensley, & Waters, 1988; Lobovits & Handal, 1985; Rotundo & Hensley, 1985; Roback-Moyal, 1979; Saylor, Finch, Spirito, & Bennett, 1984) and it has demonstrated no significant correlation with constructs unrelated to depression (e.g. Kuttner, Delamater, & Santiago, 1989; Kaslow, Rehm, & Siegel, 1984; Kovacs, Iyengar, et al., 1989).

3) The Multidimensional Anxiety Scale for Children (MASC)

The MASC (see Appendix B) is a 39 item, self-report inventory that assesses a wide spectrum of anxious symptoms in children and adolescents aged 8 to 19. The MASC’s 39 items are distributed across four basic scales that investigate different dimensions of anxiety - Physical Symptoms, Harm Avoidance behaviours, Social Anxiety and Separation Anxiety/Panic. Three of these scales have subscales. Physical Symptoms has Tense and Somatic Symptoms subscales, Harm Avoidance has Perfectionism and Anxious Coping subscales, and Social Anxiety/Panic has Humiliation Fears and Performance Fears subscales. In addition, an Anxiety Disorders Index (ADI) and an Inconsistency Index are contained within the MASC. The ADI consists of a set of items that have been useful in identifying
children and adolescents who may be experiencing clinically significant levels of anxiety symptoms. In the present investigation, an ADI score >=18 is used to identify anxious children. The Inconsistency Index identifies children who make random or careless responses.

Each MASC item has four response options: 0 for “never true about me,” 1 for “rarely true about me,” 2 for “sometimes true about me,” and 3 for “often true about me.” The child is asked to consider the extent to which each item describes how he/she has been thinking, feeling or acting recently and then to circle the number that shows how often the statement is true for him/her. All items are phrased in a positive direction (e.g. “I feel tense or uptight”; “I stay away from things that upset me”) and high scores indicate high levels of anxiety.

The MASC generates a total of 13 raw scores. There is a total anxiety score, a score for each of the four scales and six subscales, an Anxiety Disorders Index (ADI) score and an Inconsistency Index score. All of the MASC raw scores can be converted to T-scores and there is separate T-score information for males and females in three different age groups: 8 to 11 years, 12 to 15 years and 16 to 19 years.

The reliability of the MASC was investigated using the normative sample. Alpha coefficients of internal consistency were calculated for each scale and subscale by gender and age groups, and by gender with age groups combined (March, 1997). Approximately
three quarters of the coefficients were in the .60 to .80 range, with somewhat lower coefficients (i.e., in the .50's) in the Perfectionism subscale for males and females and the Anxious Coping subscale for females. Apart from the Anxious Coping subscale, alpha reliabilities were generally comparable across gender. Mean inter-item correlations for the MASC scales and subscales were also calculated separately for the various age and gender groups. The magnitude of these correlations was similar across all groups and was in the .13 to .55 range. Test-retest reliability was examined in a clinical sample of 24 children and adolescents (6 females and 18 males) using retest intervals of 3 weeks and 3 months (March, Parker, Sullivan, Stallings, & Parker, 1997). Intraclass correlation coefficients (ICC) for the MASC scales and subscales were in the .60 to .90 range.

Validity information on the MASC indicates that the instrument "demonstrates sufficient construct validity to warrant publication and recommendation for clinical and research use" (March, 1997, p. 53). March (1997) and March et al. (1997) conducted confirmatory factor analyses to test the replicability of the MASC's 4 factor structure in a clinical sample (n = 390) and in the normative sample. The analyses revealed that the MASC 4 factor model had an excellent fit to the data from both groups. In addition, the intercorrelations of the MASC's scales and subscales were examined separately for males and females and for the three different age groups (8-11, 12-15 and 16-19 year olds) and it was found that the same 4 factor structure was invariant across gender and age.

Convergent validity was assessed by examining the relationship of the MASC scores
with scores on another anxiety measure - the RCMAS (March, 1997). Using the sample of 24 clinically referred children and adolescents described earlier, moderate to high correlations were found with the Physical Symptoms and the Social Anxiety scales (.71 and .55 respectively), while low to moderate correlations were found with the Harm Avoidance and the Separation/Panic scales (-.13 and .43 respectively). The low correlations of the last two scales with the RCMAS is due to the fact that there is little symptom overlap between the MASC and the RCMAS on these dimensions (March, 1997). The correlation of the MASC total score with the RCMAS total score was .63.

To assess discriminant validity, the relationship of the MASC scores with scores on the Children's Depression Inventory - Short (CDI-S) (Kovacs, 1992) were examined in a nonclinical sample of 1,732 children and adolescents (March, 1997). Moderate correlations (ranging from .35 to .52) were found between the Physical Symptoms scale and subscale scores and the CDI-S, while the remaining MASC scores correlated less well (correlations ranging from .03 to .42) with the depression inventory. A significant negative relationship between the Harm Avoidance scale and subscales and the CDI-S was reported.

Two investigations examined the ability of the MASC to differentiate between children and adolescents with and without an anxiety disorder (March, 1997). The first investigation used a sample of 76 children who met the criteria for anxiety disorder and 76 children randomly selected from the normative sample. The overall correct classification rate was 87%. A similar study was conducted using the Anxiety Disorders Index of the
MASC to classify 36 children with an anxiety disorder and 36 children randomly selected from the normative group. The overall correct classification rate was 92%. These results suggest that the MASC can be used to differentiate anxious and nonanxious children.

3.4.1 Modifications of Measures in the Current Study

MASC items 5 ("I have trouble getting my breath.") and 9 ("I try hard to obey my parents and teachers.") were deleted from all analyses because their meaning in Latvian was not considered comparable to the English version. When the CFAs were conducted, all of the CDI factor scores were used, with the exception of Anhedonia, which was further divided, on the basis of face validity, into a Low Satisfaction factor (items 16, 17, 18 and 19) and a Disengagement factor (items 4, 20, 21 and 22). This was done because in confirmatory factor analysis, a minimum of 2 indicators is required for each underlying latent factor. Disengagement and Low Satisfaction were the two indicators that comprised the latent Low Positive Affect factor in the Tripartite Model of anxiety and depression. The MASC Harm Avoidance scale was also not included when the CFAs were conducted, because preliminary analyses indicated that this scale had a non-linear relationship with age, and very low reliability (.07 and .09) as a measure of anxiety in age groups 11-12 and 15-16.

3.4.2 Translation of Measures From English to Latvian

Members of the WHO research team in Latvia translated the HBSC Survey, while
two Latvian bilingual psychologists in collaboration with a bilingual language editor/teacher translated the CDI and the MASC. All the measures in this study were translated using the "backwards-forwards" method. The questionnaires were first translated from English into Latvian, and then back into English and checked for discrepancies with the original English version. This process of translation and back-translation continued until all discrepancies with the original version were reconciled. Every effort was made by the translators to adapt the questionnaires to national circumstances and culture, while at the same time keeping the measures as comparable as possible to the English version. In particular, the CDI and the MASC were checked to ensure that the nuances of meaning inherent in some the the English psychological terms were retained within the Latvian context.

3.4.3 The Use of Measures Developed in North America (i.e., the CDI and the MASC) in a European Setting

In a discussion of cross-cultural research on depression, Jenkins, Kleinman and Good (1991) state that when instruments developed for use in the West are directly translated for use in non-Western settings, several methodological difficulties present themselves no matter how careful the translation. These difficulties act as a caveat and bear keeping in mind when interpreting the results of this study.

Firstly, there is the problem of normative uncertainty. Psychiatric ratings are ultimately grounded in culturally specific and locally defined judgements about normal and
abnormal behaviour and it is unsafe to assume that what is abnormal in Western culture is equally so in a non-Western culture. Then, there is the problem of “centricultural bias” (Wober, 1969) which occurs when only those symptoms found to result in valid diagnoses in American cultures are considered to be valid criteria for the disorder, while symptoms that may be typical of the disorder in another culture are ignored. Thirdly, there is the problem of equivalency of meaning. Even though efforts are made to locate semantic equivalents when translating psychological diagnostic criteria from English into a non-Western language, the determination of equivalence of meaning is extremely difficult to achieve. Fourthly, the sampling of patients’ complaints across different intracultural contexts (e.g. at home, at a clinic, with native healers, in a church healing ritual) is problematic because it may give a very different picture of a patient’s symptoms. Lastly, there is the problem of category validity. At issue here is whether the various forms of depression (e.g. depression experienced primarily in psychological terms; depression experienced primarily in sociosomatic terms) are universal or whether seeming universality is produced as an artifact of research and clinical method.

3.5 Data Collection Procedure

A specially trained research team from the Academy of Medicine in Riga travelled to the participating schools and administered the HBSC Survey and the CDI to all of the students in the pre-selected classrooms. The classroom teacher was not present during the data collection. The students were told that they were participating in a survey to find out
more about the way young people live. It was explained that the questions dealt with things that might influence children's health like eating habits, and life habits. Their answers would be anonymous. They were not to put their names on the questionnaires and only the research team would see their responses.

The students were encouraged to read each question carefully and to answer as honestly as they could. If they needed any kind of help, they only had to raise their hand and ask. They were also reminded that this was not a test and that there were no right or wrong answers. However, they were asked not to talk to each other until everyone was finished, because it was their opinion, and not their neighbour's that was needed. (See Appendix C for a copy of the oral instructions given to the students prior to the completion of the questionnaires).

The research team distributed the HBSC Survey and the CDI together in one booklet. As the questionnaires were being completed, beginning with a random starting point, every third child was called out of the classroom for a medical interview and given a booklet that contained the MASC. The children then returned to their classroom and completed this questionnaire, along with the others.

After all the questionnaires had been handed in, they were placed in a large envelope which was then sealed. On the outside of the envelope, the date, name of the school, the class, and the number of filled in questionnaires were written. A member of the research
team then thanked the students for their participation and asked them how they felt about the questions. Lastly, the students were told that a final report of the study would be given to the school and would be available for them to read.

3.6 Analyses Associated With Hypothesis 1 (A Three Factor (i.e., Tripartite) Model of Anxiety and Depression will fit the data better than a One or Two Factor Model).

3.6.1 Description of the Hypothesized Models

The models to be tested are presented schematically in Figure 1 and a brief explanation of the symbols is provided. By convention, factors are represented by circles or ovals, while observed variables are represented by squares or rectangles. The single-headed arrows leading from each oval to the boxes are regression paths that link each of the factors to their respective set of observed variables. Each regression path indicates a factor loading. Thus, in Fig. 1, Model 1 postulates that 10 variables load on a single anxiety-depression factor; Model 2 proposes that 6 variables load on a depression factor and 4 variables, on an anxiety factor, while Model 3 postulates that 6 variables load on a negative affect (NA) factor, 2 on a depression factor (low positive affect (PA)) and 2 on an anxiety factor (physiological hyperarousal). The single-headed arrows pointing to each box represent the observed measurement error (i.e., unique variance) associated with each variable. Finally, the double-headed arrows between the ovals indicate factor intercorrelations.
negmood = negative mood
inprprob = interpersonal problems
ineff = ineffectiveness
negsest = negative self-esteem
lowsatis = low satisfaction
disengag = disengagement
seppan = separation/panic
socanx = social anxiety
tense = tense symptoms
somatic = somatic symptoms

A = anxiety
D = depression
NA = negative affect
Low PA = low positive affect
Hyperar = physiological hyperarousal

Figure 1a) Hypothesized One Factor Model of Anxiety and Depression

b) Hypothesized Two Factor Model of Anxiety and Depression
3.6.2 Description of the Low Positive Affect and Physiological Hyperarousal Factors of the Tripartite Model

The Low PA factor consists of two variables (Low Satisfaction and Disengagement) which were obtained by dividing the items of the CDI Anhedonia subscale into two groups on the basis of their face validity. Each variable consists of 4 items. The Anhedonia subscale has good internal reliability (.66). The CDI has a five factor structure and factor
analyses have identified Anhedonia as one factor that is only moderately correlated with the other 4 factors (.43 to .54), providing evidence that Anhedonia is measuring a distinct dimension of depression.

The Physiological Hyperarousal factor consists of two variables (Tense symptoms and Somatic symptoms). Both variables are subscales of the MASC and each consists of 6 items. Both variables have adequate internal reliability. Cronbach’s alpha coefficients range from .68 to .81 for the Tense variable and from .66 to .77 for the Somatic variable, while mean inter-item correlations range from .26 to .42 for the Tense variable and from .24 to .36 for the Somatic variable. Confirmatory factor analyses have verified that the MASC has a four factor structure that includes a Physical Symptoms factor comprised of the 12 Tense and Somatic items. The Physical Symptoms factor has low to moderate correlations (.09 to .45) with the other MASC factors, providing evidence that it is measuring a distinct anxiety dimension that focuses on tense and somatic/autonomic symptoms.

3.6.3 CFAs and Post Hoc Analyses of the Hypothesized Models of Anxiety and Depression

The CDI and the MASC provided the data that were used to evaluate the models. The total sample of N=749 was divided by odd and even numbers, into two separate samples. Using Sample 1 (n=374), Confirmatory Factor Analyses (CFAs) were conducted to test the hypothesized models shown in Figure 1.
None of the 3 initially hypothesized models provided an adequate fit to the data. In an effort to improve the fit, post-hoc model fitting was conducted in which the error terms associated with the CDI and the MASC subscales were free to covary.

3.6.4 CFAs and Post Hoc Analyses of the Hypothesized Models of Anxiety and Depression by Age Group

In order to determine if age differences contributed to the initial findings of inadequate fit for each of the hypothesized models, separate CFAs were conducted to test for the validity of the three models across three age groups: 11-12 year olds, 13-14 year olds and 15-16 year olds. In each age group, none of the 3 initially hypothesized models provided an adequate fit to the data. Consequently, post-hoc model fitting was again conducted in which error terms associated with the CDI and the MASC were allowed to covary.

3.6.5 Cross Validation of the One, Two and Three Factor Models of Anxiety and Depression

In the second stage of data analysis, the final One, Two and Three Factor models developed using Sample 1, were validated using Sample 2. Sample 1 served as the calibration sample on which the initially hypothesized models were tested, as well as post hoc analyses conducted in the process of attaining well-fitting models. After adequate models were obtained with Sample 1, they were tested on Sample 2 (the validation sample). In other words, the best fitting One, Two and Three Factor Models for the calibration
sample, became the hypothesized models under test for the validation sample.

3.6.6 Criteria Used in the Assessment of Model Fit

Model fit determines the degree to which the hypothesized structural equation model fits the sample data. In the present investigation, CFAs were performed using the LISREL 8.14 program (Joreskog & Sorbom, 1996a) and assessment of model fit was based on multiple criteria provided by this program. The criteria included: a) the chi square statistic, b) the chi square/df ratio (Wheaton, Muthen, Alwin & Summers, 1977), c) the Root Mean Square Error of Approximation (RMSEA) (Steiger 1990), d) the Goodness-of-Fit Index (GFI), e) the Adjusted Goodness-of-Fit Index (AGFI) (Joreskog & Sorbom, 1989), f) t values associated with model parameters, g) modification indices (MIs), and h) standardized residuals. In addition, parsimony and the substantive meaningfulness of the model guided the evaluation of fit (MacCallum, 1986).

In the present investigation, the reported indices of model fit are based on differences between the observed (i.e. the sample) covariance matrix and the model-implied (i.e., hypothesized) covariance matrix. A significant chi square relative to the degrees of freedom indicates that the observed and hypothesized covariance matrices differ, while a nonsignificant chi square indicates that the two matrices are not statistically different. Thus, a nonsignificant chi square is sought because it implies that the model provides an adequate fit to the data. Another measure of fit is the chi square/df ratio, with a ratio >2 representing
an inadequate fit (Byrne, 1989). The GFI measures the amount of variance and covariance in the sample covariance matrix that is predicted by the model implied covariance matrix. The AGFI adjusts the GFI for the degrees of freedom of a model relative to the number of variables. Values of the GFI and the AGFI vary on a 0.0 to 1.00 continuum, with values >.90 considered to be indicative of adequate model fit (Schumacker & Lomax, 1996). The RMSEA is a function of the chi square, degrees of freedom and sample size of the model. It provides a measure of the degree of discrepancy between the observed and hypothesized covariance matrices per degree of freedom. Browne and Cudeck (1993) have advised that RMSEA values below .05 indicate a close model fit in relation to degrees of freedom, values of .05 to .08 imply reasonable errors of approximation, whereas values greater than .1 indicate that a model should not be accepted.

To determine possible sources of poor fit, one can examine a) the hypothesized model’s parameter estimates and associated t values, b) standardized residuals and c) modification indices. Parameter estimates should have the correct sign (either plus or minus) and should be within an expected reasonable range of values. The t values associated with each estimate represent the magnitude of the parameter divided by its standard error. The t values tell us whether or not a parameter estimate is significantly different from zero with values >1.96 being statistically significant at the .05 probability level. Standardized residuals represent discrepancies between elements in the sample covariance matrix and the corresponding elements in the hypothesized covariance matrix. More specifically, standardized residuals are residuals divided by their estimated standard errors (Joreskog &
Sorbom, 1988). As such, they are analogous to z-scores and they represent estimates of the number of standard deviations the residuals are from a perfect model fit of zero residuals. Standardized residuals >2 point to possible misspecification in the model (Byrne, 1989), with a large positive residual indicating that the model underestimates the covariance between two variables, and a large negative residual indicating that the model overestimates the covariance between the variables. Modification Indices (MIs) pertain only to fixed parameters and indicate the expected decrease in chi square if the imposed constraint on the parameter in question is relaxed. An MI value less than 5 indicates that the parameter in question does not need to be respecified in an attempt to improve the model fit.

In the second stage of the analyses where the models developed using Sample 1 data are tested for their validity on Sample 2 data, the Cross-Validation Index (CVI) (Cudeck & Browne, 1983) is used to evaluate model fit. The CVI measures the distance between the restricted (model-imposed) variance-covariance matrix for Sample 1 and the unrestricted variance-covariance matrix for Sample 2. The evaluation of fit is determined by the size of the CVI - models with the smallest value have the best fit (Bollen, 1989).

3.7 Analyses Associated With Hypotheses 2, 3, and 4

In order to determine if the symptoms characterizing negative affect varied as a function of age (Hypothesis 2), Pearson chi square analyses of the MASC and CDI items by age group were conducted. With the MASC, the percentage of subjects who endorsed a
symptom as "often true" about themselves was compared to the percentage of subjects who reported the symptom as "rarely true" or "sometimes true"; with the CDI, the percentage of subjects who endorsed a symptom was compared to the percentage who reported no symptom or a mild form of the symptom.

Age and gender differences in the prevalence rate of depression (Hypothesis 3) were examined using Pearson chi square analyses with depressed (i.e., CDI Total score =>20) and anxious (i.e., MASC ADI =>18) subjects. The percentage of depressed subjects across three age groups (11-12, 13-14, and 15-16 year olds) was compared, as well as the percentage of depressed boys and girls in each age group. Age and gender differences in the level of depression reported (Hypothesis 3) were determined using an ANOVA with the mean CDI Total scores of the depressed boys and girls in three age groups as the dependent variable.

Hypothesis 4 (anxiety predates depression) was investigated using t-tests to determine if there was a significant difference in a) the age of depressed and anxious subjects and b) the MASC and CDI Total and Subscale scores for anxious and depressed subjects.
Chapter 4

4. Results

4.1 Hypothesis 1

(A Three Factor Model of anxiety and depression will fit the data better than a One or Two Factor Model).

4.1.1 CFAs and Post-Hoc Analyses of the Hypothesized Models of Anxiety and Depression

1) Model 1 (One Factor Model)

Model 1 proposes that all ten variables are linearly dependent on a single anxiety-depression factor. As indicated by the fit indices in Table 6, goodness-of-fit for the initially hypothesized One Factor Model was less than adequate. A review of the MIs revealed that model respecification would yield a substantially better fit if the error terms associated with the subscales of the CDI and the MASC were free to covary. (Error covariances often represent a relationship resulting from response set bias or redundancy in item content and are not uncommon in the testing of psychological assessment measures (see e.g., Byrne, 1994)). The hypothesized model was respecified to include the estimation of 10 error covariances. As shown in Table 6, this reparameterization resulted in a better fitting model, with all of the model's parameters (including the error covariances) statistically significant.
Table 6

Summary of Fit Statistics for Model 1 of Anxiety and Depression

<table>
<thead>
<tr>
<th>Model 1</th>
<th>X</th>
<th>df</th>
<th>p</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMSEA</th>
<th>X/df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Model</td>
<td>218.57</td>
<td>35</td>
<td>.000</td>
<td>.86</td>
<td>.78</td>
<td>.120</td>
<td>6.25</td>
</tr>
<tr>
<td>Final Model</td>
<td>37.03</td>
<td>25</td>
<td>.057</td>
<td>.98</td>
<td>.96</td>
<td>.036</td>
<td>1.48</td>
</tr>
<tr>
<td>(10 correlated errors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; RMSEA = root mean square error of approximation.

2) Model 2 (Two Factor Model)

In Model 2, six variables are linearly dependent on a depression factor, and four are linearly dependent on an anxiety factor. As shown in Table 7, the initially hypothesized model was found to be inadequate. Again, a review of the MIs suggested that incorporation into the model of several correlated error terms would lead to a substantial improvement in fit. The hypothesized model was respecified to include 6 error covariance parameters and

Table 7

Summary of Fit Statistics for Model 2 of Anxiety and Depression

<table>
<thead>
<tr>
<th>Model 2</th>
<th>X</th>
<th>df</th>
<th>p</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMSEA</th>
<th>X/df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Model</td>
<td>86.43</td>
<td>34</td>
<td>.000</td>
<td>.95</td>
<td>.92</td>
<td>.064</td>
<td>2.54</td>
</tr>
<tr>
<td>Final Model</td>
<td>43.19</td>
<td>28</td>
<td>.033</td>
<td>.98</td>
<td>.95</td>
<td>.038</td>
<td>1.54</td>
</tr>
<tr>
<td>(6 correlated errors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
then reestimated. This resulted in a better fit, with all parameter estimates of the final model statistically significant.

3) Model 3 (Three Factor Model)

Model 3 proposes that six variables are linearly dependent on a negative affect factor, 2 variables are linearly dependent on a specific depression factor (anhedonia) and 2 variables on a specific anxiety factor (physiological hyperarousal). Consistent with the findings of the first two models, the initially hypothesized three factor model was inadequately specified (see Table 8). A review of the MIs indicated that respecification of 7 error covariances, all associated with the negative affect factor, would generate a better fitting model. However, reestimation of a model that included these parameters led only to a modest improvement in model fit. All of the final model's estimated parameters were significant, but a chi square/df ratio >2, an RMSEA index >.05, and a highly significant chi square suggested that this model provided a less adequate fit to the data than the one and two factor models.

Table 8

Summary of Fit Statistics for Model 3 of Anxiety and Depression

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>df</th>
<th>p</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMSEA</th>
<th>X/df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Model</td>
<td>164.45</td>
<td>32</td>
<td>.000</td>
<td>.90</td>
<td>.83</td>
<td>.110</td>
<td>5.14</td>
</tr>
<tr>
<td>Final Model</td>
<td>81.71</td>
<td>25</td>
<td>.000</td>
<td>.96</td>
<td>.91</td>
<td>.078</td>
<td>3.27</td>
</tr>
<tr>
<td>(7 correlated errors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The One, Two and Three Factor final models, with their factor loadings are presented schematically in Fig. 2. Several loadings have been fixed to 1.0 for purposes of statistical identification. The double-headed arrows joining boxes represent pairs of measurement error that are correlated.

4.1.2 Comparison of the Final One, Two and Three Factor Models of Anxiety and Depression

1) Goodness of Fit Indices

The Goodness-of-Fit Indices for each of the final models in Table 9 suggest that the One and Two Factor Models provide a better fit to the data than the Three Factor Model. In the One Factor Model, none of the fit indices indicated poor model fit, but it is important to note that this model required several additional freed elements (i.e., 10 correlated errors compared to 6 in the Two Factor Model) in order to achieve an adequate chi square. Regarding the Two Factor Model, all of the fit indices were within an acceptable range, with the exception of the chi square value. Although this value indicated that there was a significant difference between the parameters of the sample and those of the hypothesized model, Marsh, Balla and McDonald (1988) have stressed the difficulty in obtaining nonsignificant chi square values with large sample sizes. What is important is that the magnitude of the chi-square statistic in the Two Factor Model (43.19) is comparable to the corresponding statistic in the One Factor Model (37.03), but much smaller than the chi-
**2a)**

![Diagram of One Factor Model of Anxiety and Depression](image)

\[ X = 37.03 \quad p = .057 \]

- negmood = negative mood
- inprprob = interpersonal problems
- ineff = ineffectiveness
- negsest = negative self-esteem
- lowsatis = low satisfaction
- disengag = disengagement
- seppan = separation/panic
- socanx = social anxiety
- tense = tense symptoms
- somatic = somatic symptoms

**2b)**

![Diagram of Two Factor Model of Anxiety and Depression](image)

\[ X = 43.19 \quad p = .033 \]

- A = anxiety
- D = depression
- NA = negative affect
- Low PA = low positive affect
- Hyperar = physiological hyperarousal

Figure 2a) Final One Factor Model of Anxiety and Depression

b) Final Two Factor Model of Anxiety and Depression
Figure 2c) Final Three Factor (Tripartite) Model of Anxiety and Depression

Thus, the chi-square size and the current study's sample size (n=374) suggest that it would be inappropriate to consider the Two Factor Model inadequate on the basis of its significant chi square statistic. As for the Three Factor Model, both the chi square/df ratio and the RMSEA value, in conjunction with a highly significant chi square, suggest that this model provides a less adequate fit to the data than the other two models.
Table 9

Summary of Fit Statistics for the Final One, Two and Three Factor Models of Anxiety and Depression

<table>
<thead>
<tr>
<th>Model</th>
<th>X</th>
<th>df</th>
<th>p</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMSEA</th>
<th>X/df</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Factor Final Model (10 correlated errors)</td>
<td>37.03</td>
<td>25</td>
<td>.057</td>
<td>.98</td>
<td>.96</td>
<td>.036</td>
<td>1.48</td>
</tr>
<tr>
<td>Two Factor Final Model (6 correlated errors)</td>
<td>43.19</td>
<td>28</td>
<td>.033</td>
<td>.98</td>
<td>.95</td>
<td>.038</td>
<td>1.54</td>
</tr>
<tr>
<td>Three Factor Final Model (7 correlated errors)</td>
<td>81.71</td>
<td>25</td>
<td>.000</td>
<td>.96</td>
<td>.91</td>
<td>.078</td>
<td>3.27</td>
</tr>
</tbody>
</table>

2) Standardized Residuals

As discussed earlier, standardized residuals represent discrepancies between elements in the sample covariance matrix and the corresponding elements in the model generated covariance matrix, with values greater than 2 suggestive of misspecifications in the model.

An inspection of the final models revealed, that while the One and Two Factor Models had 8 and 4 significantly discrepant residuals, respectively, the Three Factor Model had 18, ranging in value from -4.69 to 3.80. Not only is the high number of large sized residuals suggestive of a problematic model fit to the data, but so is the fact that the discrepancies occur in both directions. This indicates that the hypothesized model’s parameters are both under- and over-estimated. Thus, the standardized residuals suggest that the One and Two Factor Models provide a better fit to the data than the Three Factor Model.
4.1.3 CFAs and Post-Hoc Analyses of the Hypothesized Models of Anxiety and Depression by Age Group

Confirmatory factor analyses were also conducted to test the validity of each hypothesized model in three age groups: 11-12 year olds, 13-14 year olds and 15-16 year olds. In each instance, the initially hypothesized model provided an inadequate fit to the data and post hoc analyses that permitted the estimation of error covariances led to an improvement in model fit. Error terms were allowed to covary if their respective subscales were part of the same measure or if the subscales loaded on the same latent factor.

The findings (see Table 10) reveal that the fit of the three models followed a similar pattern in each age group. Although the differences were not large, in every age group, the One and Two Factor Models provided a somewhat better fit to the data than the Three Factor Model. This was particularly true for the Two Factor Model which, in comparison to the Three Factor Model, had a higher AGFI, lower RMSEA, no non-significant parameter estimates and fewer standardized residuals >2 S.D. In addition, in each age group, the Two Factor Model had a non-significant chi square value, and required fewer freed error covariances before an adequate fit to the data was achieved.

4.1.4 Cross Validation of the Final One, Two and Three Factor Models of Anxiety and Depression
Table 10

Comparison of the Final One, Two and Three Factor Models of Anxiety and Depression Across Three Age Groups

<table>
<thead>
<tr>
<th>Model</th>
<th>X</th>
<th>df</th>
<th>p</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMSEA</th>
<th>t &gt;2</th>
<th>St. Res. &gt; 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age Group 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Factor Model (7 correlated errors)</td>
<td>18.70</td>
<td>28</td>
<td>.91</td>
<td>.96</td>
<td>.93</td>
<td>.000</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Two Factor Model (1 correlated error)</td>
<td>33.96</td>
<td>33</td>
<td>.42</td>
<td>.94</td>
<td>.90</td>
<td>.017</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Three Factor Model (3 correlated errors)</td>
<td>55.52</td>
<td>29</td>
<td>.002</td>
<td>.90</td>
<td>.81</td>
<td>.096</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td><strong>Age Group 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Factor Model (6 correlated errors)</td>
<td>38.16</td>
<td>29</td>
<td>.120</td>
<td>.94</td>
<td>.89</td>
<td>.050</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Two Factor Model (2 correlated errors)</td>
<td>37.59</td>
<td>32</td>
<td>.230</td>
<td>.94</td>
<td>.90</td>
<td>.037</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Three Factor Model (5 correlated errors)</td>
<td>39.68</td>
<td>27</td>
<td>.055</td>
<td>.94</td>
<td>.88</td>
<td>.061</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td><strong>Age Group 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Factor Model (6 correlated errors)</td>
<td>37.62</td>
<td>29</td>
<td>.13</td>
<td>.95</td>
<td>.90</td>
<td>.046</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Two Factor Model (2 correlated errors)</td>
<td>38.25</td>
<td>32</td>
<td>.21</td>
<td>.95</td>
<td>.91</td>
<td>.037</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Three Factor Model (3 correlated errors)</td>
<td>63.99</td>
<td>29</td>
<td>.000</td>
<td>.92</td>
<td>.84</td>
<td>.092</td>
<td>2</td>
<td>11</td>
</tr>
</tbody>
</table>

Note. t > 2 = the number of model parameters with t values greater than 2; St. Res. > 2 = the number of standardized residuals greater than 2.
Cross-validation involved testing the final (i.e., best fitting) One, Two and Three Factor Models derived from post hoc analyses, on a second independent sample from the same population, and then using the Cross Validation Index (CVI) (Browne & Cudeck, 1989) to evaluate model fit. The results of the three cross-validation runs are presented in Table 11. In a comparison of CVI values, the findings suggest that Models 1 and 2 provide a better fit to the data than Model 3. In other words, Models 1 and 2 demonstrate a higher degree of predictive validity - they would be expected to replicate better for other independent samples from the same population.

Table 11

Cross Validation of the Final (i.e., Best Fitting) One, Two and Three Factor Models of Anxiety and Depression on an Independent Sample (Sample 2)

<table>
<thead>
<tr>
<th>Model</th>
<th>Cross Validation Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Factor Model</td>
<td>.17</td>
</tr>
<tr>
<td>Two Factor Model</td>
<td>.19</td>
</tr>
<tr>
<td>Three Factor Model</td>
<td>29.61</td>
</tr>
</tbody>
</table>

4.1.5 Conclusions Regarding the Models of Anxiety and Depression

CFAs of the three models of anxiety and depression, whether the data were analyzed as a single sample (Table 9) or by age groups (Table 10), along with the findings regarding the cross validation of the models on an independent dataset (Table 11), suggest that the One and Two Factor Models of anxiety and depression provide a better fit to the data than the
Three Factor Model. Criteria used in the assessment of model fit provided evidence to support this conclusion. Namely, chi square values, in the majority of instances, were non-significant for the One and Two Factor Models, but significant for the Three Factor Model; the One and Two Factor models had higher GFIs and AGFIs, and lower RMSEAs than the Three Factor Model, and lastly, the One and Two Factor Models had fewer non-significant model parameters and fewer significantly discrepant standardized residuals that the Three Factor Model.

In comparing the fit of the One and Two Factor models, the results suggest that both models provided comparable levels of fit; however, the Two Factor model provided a marginally better fit because it had fewer discrepant standardized residuals and it required fewer freed correlated error elements to achieve an acceptable level of fit.

4.2 Hypothesis 2

(The symptoms characterizing negative affect vary as a function of age).

4.2.1 Chi Square Analyses of the MASC and CDI Items by Age Group

1) MASC

A chi square analyses of the MASC items by age group was conducted, in which the percentage of subjects that endorsed a symptom as “often true” about themselves was
compared to the percentage of subjects that reported the symptom as “rarely true” or 
"sometimes true". The results indicated that there was a significant age difference in 6/37 
items (16%) (p = .000 - .009). (Three items were from the Harm Avoidance scale and three 
items were from the Separation/Panic scale). Table 12 indicates that all of the symptoms 
decreased with age. The 31 remaining MASC items (84%) did not show a significant age 
difference in symptomology.

Table 12

Percentage of Subjects Responding “Often true about me,” to MASC Items Across Three 
Age Groups of Children From the General Population

<table>
<thead>
<tr>
<th>MASC Item</th>
<th>11-12 yr. olds</th>
<th>13-14 yr. olds</th>
<th>15-16 yr. olds</th>
<th>x (df=2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I get scared when my parents go away.</td>
<td>8.4</td>
<td>4.5</td>
<td>1.4</td>
<td>14.42</td>
<td>.000</td>
</tr>
<tr>
<td>Bad weather, the dark, heights, animals or bugs scare me.</td>
<td>10.3</td>
<td>2.8</td>
<td>3.5</td>
<td>15.73</td>
<td>.000</td>
</tr>
<tr>
<td>The idea of going away to camp scares me.</td>
<td>4.7</td>
<td>6.5</td>
<td>1.4</td>
<td>9.41</td>
<td>.009</td>
</tr>
<tr>
<td>I usually get permission.</td>
<td>38.3</td>
<td>26.0</td>
<td>16.3</td>
<td>31.28</td>
<td>.000</td>
</tr>
<tr>
<td>I try to stay near my mom or dad.</td>
<td>44.4</td>
<td>20.3</td>
<td>10.4</td>
<td>81.33</td>
<td>.000</td>
</tr>
<tr>
<td>I check things out first.</td>
<td>39.3</td>
<td>29.3</td>
<td>26.0</td>
<td>10.62</td>
<td>.005</td>
</tr>
</tbody>
</table>
A chi square analysis of the CDI items by age group was conducted. The percentage of subjects that endorsed a symptom was compared to the percentage of subjects that reported no symptom or a mild form of the symptom. The results indicated that 4 out of 27 items (15%) showed a significant change in symptomology across age ($p = .000 - .024$). (One item came from each of the Interpersonal Problems, Negative Mood, Anhedonia and Negative Self-Esteem scales). In each instance, the depressive symptoms decreased (see Table 13). The remaining 23 depression items (85%) did not show a significant change in symptomology with age.

Table 13

Percentage of Subjects Endorsing Each CDI Item Across Three Age Groups of Children From the General Population

<table>
<thead>
<tr>
<th>CDI Item</th>
<th>11-12 yr. olds</th>
<th>13-14 yr. olds</th>
<th>15-16 yr. olds</th>
<th>x (df=2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do not want to be with people at all.</td>
<td>7.7</td>
<td>6.2</td>
<td>2.8</td>
<td>9.37</td>
<td>.009</td>
</tr>
<tr>
<td>I cannot make up my mind about things.</td>
<td>11.7</td>
<td>12.7</td>
<td>7.1</td>
<td>7.48</td>
<td>.024</td>
</tr>
<tr>
<td>Most days I do not feel like eating.</td>
<td>8.3</td>
<td>5.1</td>
<td>2.0</td>
<td>15.33</td>
<td>.000</td>
</tr>
<tr>
<td>Nobody really loves me.</td>
<td>4.6</td>
<td>2.2</td>
<td>1.0</td>
<td>9.11</td>
<td>.007</td>
</tr>
</tbody>
</table>
4.2.2 Conclusions Regarding the Expression of Negative Affect Across Age

The above findings suggest that there are very few age changes in the symptoms characterizing negative affect - both in the symptoms that are common to anxiety and depression and in the symptoms that differentiate the two disorders (i.e., Low Positive Affect and Physiological Hyperarousal). Only 16% and 15% of the MASC and the CDI items respectively showed a significant change with age, with subjects reporting a decrease in symptomology on all items.

4.3 Results of Hypothesis 3

(More subjects will report depression with age, and by mid-adolescence, more females will report depressive affect than males).

4.3.1 Age and Gender Differences in the Prevalence Rate of Depression

Using subjects identified as depressed (i.e., having a CDI Total score =>20), chi square analyses were conducted to determine if there were significant age and gender differences in the prevalence rate of depression. The results indicated that there were no age effects in the prevalence of depression, \( x^2 (2, n=117) = .82, p = .66 \). However, gender effects were found, with more females reporting depression than males, \( x^2 (1, n=117) = 9.31, p = .002 \). Chi square analyses that examined gender effects in each age group, revealed that the significantly higher rate of depression in females occurred in 13-14 and 15-
16 year old subjects, but not in the younger age group (see Table 14).

Table 14

Gender Differences in the Prevalence Rate of Depression by Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of Depressed Boys</th>
<th>Number of Depressed Girls</th>
<th>x</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-12 year olds (n=39)</td>
<td>19</td>
<td>20</td>
<td>.026</td>
<td>1</td>
<td>.87</td>
</tr>
<tr>
<td>13-14 year olds (n=43)</td>
<td>14</td>
<td>29</td>
<td>5.23</td>
<td>1</td>
<td>.02</td>
</tr>
<tr>
<td>15-16 year olds (n=35)</td>
<td>9</td>
<td>26</td>
<td>8.26</td>
<td>1</td>
<td>.004</td>
</tr>
</tbody>
</table>

4.3.2 Age and Gender Differences in the Level of Depression Reported

A 2x3 ANOVA was conducted to determine if there were significant age and gender differences in the amount of depression reported. It was hypothesized that higher levels of depression would be reported with age, and that by age 15, females would report more depression than males. Table 15 shows that the 2 older age groups reported significantly higher levels of depression than the youngest age group, F(2, 743) = 4.09, p = .02. There was no significant difference in the scores reported by males and females; however, there was an age by gender interaction, F(2, 743) = 5.22, p = .01. While the level of depression reported by males was relatively constant across all three age groups, post hoc tests revealed that females reported significantly higher levels of depression in the two older age groups than in the youngest age group (see Figure 3).
Table 15

Level of Depression Reported by 11-12, 13-14, and 15-16 Year Olds

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Mean CDI Score</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-12 year olds</td>
<td>37.76</td>
<td>5.84</td>
</tr>
<tr>
<td>13-14 year olds</td>
<td>39.31*</td>
<td>5.80</td>
</tr>
<tr>
<td>15-16 year olds</td>
<td>39.12*</td>
<td>5.19</td>
</tr>
</tbody>
</table>

Note. * denotes a significantly higher score than the score obtained by 11-12 year olds.

Figure 3: Mean CDI Scores for Males and Females in Age Groups 1, 2 and 3
4.3.3 Conclusions Regarding the Prevalence Rate and Levels of Depression

The findings suggest that the increase in the prevalence rate of depression is a result of an increase in the number of females who report depression as they get older. In addition, the level of depression increases with age and this also occurs as a result of females reporting more depression as they get older. The level of depression for males remains fairly constant across age.

4.4 Hypothesis 4

(If anxiety and depression are temporally related, anxiety will appear first).

4.4.1 Determining Age Differences Between Anxious and Depressed Subjects

A T-test was conducted to determine if there was a significant age difference between Ss identified as anxious and those identified as depressed. In accordance with Hypothesis 4, it was anticipated that anxious children would be younger than depressed children; however, the results indicated that there was no significant age difference between the two diagnostic groups, t(93) = 1.37, p=.17 (see Table 16).

4.4.2 Examining MASC and CDI Total and Subscale Scores in Anxious and Depressed Subjects
Table 16: Mean Age and Standard Deviation of Anxious and Depressed Groups of Children

<table>
<thead>
<tr>
<th>Diagnostic Group</th>
<th>Mean Age in Years</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>anxious Ss (n=40)</td>
<td>13.55</td>
<td>5.84</td>
</tr>
<tr>
<td>depressed Ss (n=55)</td>
<td>13.99</td>
<td>5.80</td>
</tr>
</tbody>
</table>

In a second attempt to determine if anxiety precedes depression, the relationship between anxiety and depression in anxious and depressed subjects was examined. Based on the predispositional model, it was anticipated that all depressed subjects would be anxious, but not all anxious subjects would be depressed. T tests were conducted to compare MASC and CDI Total and Subscale scores for anxious and depressed subjects. Table 17 indicates that a significant difference between the two groups was found on every score. On the CDI, anxious subjects reported significantly less depression than the depressed group, and on the MASC, depressed subjects reported significantly less anxiety than the anxious group.

4.4.3 Conclusions Regarding the Hypothesized Temporal Relationship Between Anxiety and Depression

The evidence presented suggests that there is no temporal relationship between anxiety and depression. The lack of a significant age difference between anxious and depressed groups of children suggests that anxiety does not precede depression. In addition, on all MASC and CDI scale and subscale scores, anxious and depressed subjects reported more anxiety and depression respectively. While it is consistent with a temporal relationship
that depressed subjects report more depression than anxious subjects, it is not consistent that depressed subjects report less anxiety than anxious subjects.

Table 17
MASC and CDI Total and Subscale Scores for Anxious and Depressed Subjects

<table>
<thead>
<tr>
<th>Type of Score</th>
<th>Anxious Subjects*</th>
<th>Depressed Subjects*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=40</td>
<td>n=55</td>
</tr>
<tr>
<td>Total MASC Score</td>
<td>107.13</td>
<td>89.58</td>
</tr>
<tr>
<td>MASC Subscales:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separation/Panic</td>
<td>17.22</td>
<td>13.76</td>
</tr>
<tr>
<td>Social Anxiety</td>
<td>28.10</td>
<td>24.07</td>
</tr>
<tr>
<td>Physical</td>
<td>30.10</td>
<td>26.46</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td>26.08</td>
<td>20.95</td>
</tr>
<tr>
<td>Total CDI Score</td>
<td>39.98</td>
<td>49.58</td>
</tr>
<tr>
<td>CDI Subscales:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anhedonia</td>
<td>11.60</td>
<td>14.29</td>
</tr>
<tr>
<td>Ineffectiveness</td>
<td>6.60</td>
<td>8.29</td>
</tr>
<tr>
<td>Interpersonal Problems</td>
<td>5.08</td>
<td>6.71</td>
</tr>
<tr>
<td>Negative Mood</td>
<td>8.68</td>
<td>10.80</td>
</tr>
<tr>
<td>Negative Self-Esteem</td>
<td>8.03</td>
<td>9.50</td>
</tr>
</tbody>
</table>

Note. * indicates that all pairs of scores for anxious and depressed subjects are significantly different (p < .01).
Chapter 5

5. Discussion

5.1 Hypothesis 1

5.1.1 Summary of Findings

This study investigated the relationship between anxiety and depression in a sample of non-referred East European school children. In Hypothesis 1, confirmatory factor analyses (CFAs) were used to determine if a Three Factor Model of anxiety and depression would fit the data better than a One or Two Factor Model. Estimates of model fit, tests of the models across three age groups, and crossvalidation of the models on an independent data set all suggested that the Two Factor Model provided the best fit. There was slightly less support for the One Factor Model, while the Tripartite Model provided the least adequate fit to the data.

5.1.2 Comparison of Findings With Other Studies

1) Tripartite Model

Findings in the literature have demonstrated that a significant relationship exists
between anxiety and depression in children and adolescents and that comorbidity rates and the co-occurrence of anxious and depressive symptoms occur at rates greater than would be expected by chance (Kendall & Watson, 1989). Systematic attempts to explain the anxious-depressive relationship have led to the development of several theoretical models (i.e., the Unitary, Pluralistic, Predispositional and Tripartite Models). The Tripartite Model developed by Clark & Watson (1991) is made up of three factors - Negative Affect (NA), Low Positive Affect (PA) and Physiological Hyperarousal. This model can be regarded as the preferred model because it subsumes the Unitary and Pluralistic Models and provides a framework for their synthesis. Investigations of NA are consistent with studies of the Unitary Model that focus on the commonalities between anxiety and depression, while investigations of the factors specific to each syndrome (i.e., low PA in the case of depression and Physiological Hyperarousal in anxiety) are consistent with studies of the Pluralistic Model that views anxiety and depression as distinct syndromes.

To date, only two studies have looked at the Tripartite Model with child and adolescent samples (Joiner et al., 1996; Boyd & Gullone, 1997) and both of these investigations have used principal component analysis to examine the data. The current study used CFA to test the Tripartite Model of anxiety and depression because of its ability to substantiate or invalidate theoretical models that have been specified a priori, and because it uses goodness-of-fit and statistical tests to evaluate the adequacy of a model’s parameters. Exploratory factor analysis (EFA) does not allow a priori model specification nor does it provide statistical tests to evaluate a model’s adequacy.
Although currently, there are no studies that use CFA to test the Tripartite Model in child and adolescent samples, Burns and Eidelson (1998) tested the Tripartite Model using CFA with three samples of adult clinical and non-clinical subjects, and they found that the model did not fit any of the sample data. Citing both psychometric and clinical grounds for questioning the Tripartite Model, the authors proposed an alternative Two Factor Model in which the Anhedonia and Nonspecific Depression Factors loaded on a second-order Depression Factor, while the Somatic Hyperarousal and Nonspecific Anxiety Factors loaded on a second-order Anxiety Factor. CFA revealed that the second order model provided an excellent fit to the data and that the Nonspecific Depression and Nonspecific Anxiety Factors were the most valid indicators of depression and anxiety respectively. Burns and Eidelson concluded that the nonspecific symptoms of anxiety and depression are phenomenologically distinct and cannot be combined into a single cluster of negative affect symptoms.

The current study, like that of Burns and Eidelson (1998), found that the Tripartite Model provided an inadequate fit to the data and that a two factor model that recognized the distinctness of anxious and depressive phenomena fit the data best. These findings are very interesting because Burns and Edelson’s subjects were aged 15-80 and included outpatients. Future tests of anxiety and depression models should include an assessment of the fit provided by Burns and Eidelson’s second-order Two Factor Model and a comparison of their model’s fit with the fit provided by the Two Factor Model used in the present study.

2) One and Two Factor Models
Crowley and Emerson (1996) used confirmatory factor analysis, with a sample of fourth and fifth grade students, to investigate a One and Two Factor Model of anxiety and depression and they concluded that the Two Factor Model provided the best fit to the data. In the present study, the Two Factor Model provided only a slightly better fit to the data than the One Factor Model. The convergence between the present study and that of Crowley and Emerson is minimal because the discrepancy between the One and Two Factor Models’ fit to the data was much larger in the Crowley and Emerson study than it was in the current study. For example, the One and Two Factor Models’ goodness-of-fit (GFI) statistics for Crowley and Emerson were .78 and .93 respectively, while in the current study the corresponding statistics were both .98.

Although the present study’s findings converge only minimally with Crowley and Emerson’s (1996) results, they are in accordance with Feldman’s (1993) findings in the adult literature. Feldman examined the One and Two Factor Models of anxiety and depression using confirmatory factor analysis on extant data from three studies involving adult clinical and non-clinical samples. She found that “the four sets of confirmatory factor analyses provided fairly consistent evidence that anxiety and depression self-report scales measure a single mood construct” and that “the one factor models fit the data as well as the two factor models do for most data sets” (i.e., 2 out of 4 of Feldman’s CFAs indicated that the Two Factor Model provided the best fit; the remaining 2 CFAs suggested that the One Factor Model was just as good as the Two Factor Model) (p.633).
Why did the present findings concur with those of Feldman (1993), but not with those of Crowley and Emerson (1996)? Crowley and Emerson used a non-clinical sample of children aged 8 to 12, while Feldman's four samples included a total of 623 non-clinical and 76 clinical adult females, and 282 non-clinical adult males. Research has shown that, from adolescence onward, females report more depression than males, and clinical subjects report more depression than non-clinical subjects. As 71% of Feldman's subjects fell into one of these two categories, we could expect that, compared to Crowley and Emerson, the mean levels of reported depression would be higher in her study.

Similarly, in the present study, the levels of reported depression were higher than the levels reported by Crowley and Emerson's (1996) subjects. In their study, the means on the various anxiety and depression measures (including the CDI) were "somewhat lower than those reported previously in the literature for each instrument" p. 144. By contrast, in the current study, the mean total and subscale scores obtained by subjects on the CDI were generally higher than the scores obtained by the normative sample and by Crowley and Emerson's subjects, and more in line with scores reported in the CDI manual for a clinical group of children. For example, the mean Total CDI score for subjects in the present study was 11.74, while it was 9.98 for the normative sample, 6.82 in the Crowley and Emerson study, and 11.8 for a sample of depressed children. Subjects in the current study also reported MASC Total and subscale scores that were higher than reported scores for the normative sample. What the above findings suggest is that subject variables (e.g., gender and level of symptomology) that result in elevated anxiety and depression scores, may
influence model fit.

Overall, the findings of the present investigation, regarding the models of anxiety and depression, concur with those of Feldman (1993), Burns and Eidelson (1998) and to a lesser extent, with Crowley and Emerson (1996). The results extend earlier findings because all three models of anxiety and depression are examined together using CFA, and the Tripartite model, contrary to expectations, provided the least adequate fit to the data. Two leads for future model testing have also emerged; namely, to determine the adequacy of a second-order Two Factor Model of anxiety and depression and to investigate the role of gender and level of symptomology in assessing model fit.

5.1.3 Limitations/Reasons for Inadequate Fit of the Tripartite Model

Measurement limitations may have partly contributed to the finding regarding the inadequate fit of the Tripartite Model in the present study. At issue is whether the Low Positive Affect and Physiological Hyperarousal factors were adequately represented by subscales from the CDI and the MASC respectively. (The CDI has been found to be heavily loaded with Negative Affect content (Feldman, 1993)). When the Tripartite Model was tested in the Burns and Eidelson (1998) study, for example, the Anhedonia and Physiological Hyperarousal factors were each represented by three subscales taken from two separate instruments; whereas in the current study, each factor is measured by two subscales, taken from one instrument. Low PA is measured by two CDI subcales and Physiological
Hyperarousal is measured by by two MASC subscales. As no single instrument can perfectly represent an underlying construct (Cole, Truglio, & Peeke, 1997), perhaps having an additional subscale from a second instrument might have enhanced the construct validity of the two factors in question.

Another reason for the inadequate fit of the Tripartite Model may be that the specific indicators of anxiety and depression may be too narrow to identify many clinically anxious and depressed subjects (Burns and Eidelson, 1998). Among concerns raised by clinicians is that the diagnosis of depression, according to the DSM IV (APA, 1994), need not include anhedonia, and that, conversely, the loss of interest or pleasure in daily activities can also occur in the absence of depression. Similarly, physiological hyperarousal is not a prominent diagnostic feature of all forms of anxiety and it can also occur in the context of many other normal and abnormal states, including strenuous exercise and intense anger. Consequently, it is possible for many anxious and/or depressed subjects not to have clinical symptoms that are in keeping with the disorder specific factors of the Tripartite Model.

Another limitation is that the discriminant validity in self-report measures of anxiety and depression is lower in non-patient samples than in patient samples. Hiller, Zaudig and von Bose (1989) found that the overlap between anxious and depressive symptoms decreases (i.e., symptoms become more disorder specific) as the severity of psychopathology increases. Consequently, a non-patient sample exhibiting fewer disorder specific symptoms may have contributed to the failure of the Low PA and Physiological Hyperarousal factors, and
ultimately the Tripartite Model, to adequately fit the data.

Alternatively, the better fit of the One and Two Factor Models may provide support for this conceptualization of anxiety and depression in an East European non-clinical population. Most of the research on models of depression to date, has taken place in North America and with clinical and hospital populations (King et al., 1991). Perhaps the Tripartite Model is more applicable in those settings than in a non-clinical and/or East European population.

5.2 Hypothesis 2

5.2.1 Summary of Findings

In hypothesis 2, the symptoms characterizing negative affect (i.e., anxiety and depression) were expected to vary with age, although changes in specific symptoms across age were not predicted because of the lack of consensus in the literature on precisely which symptoms are age invariant and which are not. Very few age changes in the symptoms characterizing negative affect were found. Only 16% of the MASC and 15% of the CDI items showed a significant change with age, with subjects reporting a decrease in symptomology on all items.

5.2.2 Comparison of Findings With Other Studies
Findings in the present study converge with findings in the literature regarding the paucity of age differences in the expression of negative affect. Several studies have systematically investigated the symptoms of anxiety and depression, and found that there were few significant differences in symptom occurrence across age. For example, Mitchell et al. (1988) reported that depressed children and adolescents did not differ substantially from each other in their symptom presentation, except that adolescents acknowledged more hypersomnia than children. Weiss et al. (1992) found that clinic-referred children and adolescents differed significantly on only 5 of 27 CDI items and those differences that were significant, were small in magnitude. Ryan et al. (1987) concluded that the similarities in the phenomenology of depression far outweighed the differences among depressed school aged children and adolescents. Lastly, Goodyer and Cooper (1993) found in their sample of non-clinical adolescent girls, aged 11-16, that the only symptom which was affected by age was early insomnia which showed an increased frequency with age.

In addition, there is also limited consensus in the literature regarding which symptoms of anxiety and depression are age invariant and which are not, as well as the direction of the change. An example of this lack of consensus can be seen with anhedonic and self-esteem symptoms. In separate studies that investigated depressive symptoms in referred children and adolescents, anhedonia has been shown to increase with age (Borchardt & Meller, 1996), to decrease with age (Kashani, Rosenberg, & Reid, 1989) and to show no change with age (Mitchell et al., 1988). Similarly, self-esteem has been found to decrease with age (Carlson & Kashani, 1988), and to show no change with age (Mitchell et al., 1988).
The findings in the current study are consistent with the above findings in the literature: there were few significant age differences in the expression of negative affect, and while some age changes concurred with the literature, there were some that did not. For example, the present study confirmed findings regarding decreased separation anxiety with age as reported by Ryan et al. (1987) while, at the same time, it failed to confirm findings regarding increased anhedonia with age, also reported by Ryan et al. (1987). Inconsistencies such as these, across studies, make it difficult to formulate a clear picture of age-related symptoms of anxiety and depression, and the findings of the current study underscore this. One possible way to increase the probability of detecting reliable changes in depression with age in the current study as well as generally, might be to investigate depressive phenomena across a wider age span - perhaps from early childhood to adulthood.

5.3 Hypothesis 3

5.3.1 Summary of Findings

In Hypothesis 3, more subjects were expected to report depression with age, and by mid-adolescence, more females were expected to report depression than males. The findings in the current study were consistent with these expectations. Increases with age, in both the prevalence rate and the level of depression were found. These increases were related to gender, with a greater number of females aged 13-14 and 15-16 reporting depression. The rate and level of depression reported by males remained fairly consistent across age.
5.3.2 Comparison With Other Studies

The findings in the present study converge with findings in the literature regarding age differences in the prevalence rate of depression. In both clinical and community samples, the rate of depression increases in adolescence (Weissman et al., 1984; Rutter, 1979/80; Rutter et al., 1976; Borchardt and Meller, 1996). Prior to puberty, more males, or, an even distribution of males to females is found, but after puberty more females report depression (Rutter et al., 1976; Angold & Rutter, 1992; Anderson & McGee, 1994; Ryan et al., 1987; Weissman et al., 1984; Lewinsohn et al., 1993; Fleming & Offord, 1990). Research has demonstrated that the change in sex ratios for depression begins after age 10, and the higher incidence of depression in females emerges by age 15 (Angold & Rutter, 1992; Weissman et al., 1984). In the present study, gender differences, with higher depression scores for females, first appeared in the 13-14 year olds and was maintained in the 15-16 year olds, while depression in males remained level across all three age groups.

5.4 Hypothesis 4

5.4.1 Summary of Findings

In Hypothesis 4, symptoms of anxiety were expected to precede symptoms of depression. As a result, it was hypothesized that a) anxious subjects would be younger than depressed subjects, and b) anxious subjects would not necessarily be depressed, but
depressed subjects would be anxious. An examination of age differences as well as the MASC and CDI scale and subscale scores in anxious and depressed children (n=117) provided no evidence for the hypothesized temporal relationship. No significant age difference between anxious and depressed subjects was found. In addition, although depressed subjects reported significantly more depression than anxious subjects, contrary to expectations, they reported significantly lower levels of anxiety.

5.4.2 Comparison With Other Studies

Hershberg et al. (1982) investigated anxiety and depressive disorders in psychiatrically disturbed children, aged 7 to 17, and found that depressed children appeared more depressed than anxious children, and anxious children were more anxious than their depressed counterparts. Hershberg et al.'s findings were limited however, because their results were based on observations that were difficult to systematize (e.g. anxious appearance, tremulousness of voice). The present study concurs with the Hershberg et al. findings regarding anxious and depressed subjects, and contributes to the literature because the findings are not based on quasi-systematized observations, but on the scores of standardized measures (i.e., the MASC and the CDI).

In contrast to these studies, Stavrakaki et al. (1987) examined the relationship between anxiety and depression in children between the ages of 6 and 16 who had sought psychiatric treatment, and found that the depressed group was more depressed than the
anxious group, but that none of the anxiety-rating measures discriminated between the two groups. Similarly, Barlow (1991) concluded that almost all depressed patients were anxious, but not all anxious patients were depressed. Brady & Kendal (1992) reviewed comorbid anxiety and depression in children and adolescents and reported that the trend in studies was that depressed children scored high on both anxiety and depression scales, but anxious children scored high on anxiety measures but lower on depression measures. However, they added that it was difficult to summarize results across the different studies because of the variability in subject samples. For example, sometimes the subjects had anxiety disorders, sometimes they were diagnosed with depression.

The present study converged with the findings of Stavrakaki et al. (1987), Barlow (1991), and Brady and Kendall (1992) in that depressed subjects reported more depression than anxious subjects, but it differed from these studies regarding the level of anxiety reported by depressed subjects. Differences in the level of anxiety reported by depressed subjects in the present study and the aforementioned ones may have occurred because the subject groups were not diagnostically equivalent. In the present study, anxious and depressed subjects were identified by using cut off scores on the MASC and the CDI, whereas Stavrakaki et al., Barlow, and Brady and Kendall selected their clinical groups on the basis of DSM-III criteria. Consequently, the two different sets of disorder criteria may have resulted in non-equivalent anxious and depressed groups of subjects.

Another reason why depressed subjects in the present study did not report high levels
of anxiety may be related to the type of depression they were experiencing. In a prospective, longitudinal study of depressed children aged 8 to 13, Kovacs, Gatsonis et al. (1989) found that while anxiety disorders predated Major Depressive Disorder (MDD) two thirds of the time, among the cases of Dysthymic Disorder (DD), anxiety preceded depression in only 2/9 cases. Kovacs concluded that it was six times more likely for anxiety to have preceded MDD than DD. Based on these findings, it is reasonable to expect that in the majority of instances where comorbid anxiety and depression exist, subjects are suffering from MDD. In the current study, the failure to find depressed subjects who were also highly anxious may be due to the fact that these subjects were part of a non-clinical population, and as such, they were more apt to be suffering from DD than from MDD. However, this is speculative as no diagnostic distinctions were made between type of depression.

Regarding age differences between anxious and depressed children, Stavrakaki et al., (1987) found that anxious children tended to be younger. Data from other studies (Strauss, Last et al., 1988; Strauss, Lease, Last, & Francis, 1988) have shown that children with overlapping anxiety and depressive syndromes are older than children with just an anxiety disorder. However, Bernstein and Garfinkel (1986) compared anxious, depressed, and anxious-depressed children, along with controls and found no age differences. The present study concurred with Bernstein and Garfinkel’s findings in that no age differences were found between anxious and depressed subjects.

5.5 General Implications of the Findings
1) The Models of Anxiety and Depression

In the present study, the Tripartite Model of anxiety and depression did not provide the best fit to the data. The best fit was provided by the Two Factor Model, followed closely by the One Factor Model. What this tells us, is that, at least for an East-European population of children and adolescents, the traditional conceptualization of anxiety and depression as a One or Two Factor Model is more accurate.

Crowley and Emerson (1996) tested the One and Two Factor models using CFA, with non-referred fourth and fifth grade students aged 8 to 12, and found that the Two Factor Model provided a better fit to the data. This finding, along with those of Joiner et al. (1996), who used principal component analysis with a psychiatric child and adolescent sample and found evidence in support of the Tripartite Model, and Boyd and Gullone (1997), who used principal component analysis with non-referred adolescents, and did not find evidence for this same model, highlight the need for more tests of all three models concurrently, with both North American and European samples, in order to determine which model provides the best fit, and under what circumstances it does so (i.e., clinical or non-clinical subjects; children and/or adolescents, self-report or interview data etc). Consideration should also be given to newly emerging models of anxiety and depression, such as the second-order model proposed by Burns and Eidelson (1998). Determination of the best fitting model will influence the screening criteria and the treatment strategies for both anxiety and depressive disorders.
2) Negative Affect (i.e., Anxiety and Depression) Varies With Age

The findings of the current study regarding the age related changes in negative affect suggest that the majority of the symptoms of anxiety and depression remain the same throughout childhood and adolescence. Despite this, inconsistent findings regarding which symptoms change and in what direction, are common across studies. Systematic investigations involving wider age groups, different methods of assessment (e.g., interviews or observations) and types of subjects (normal or clinical) are needed to clarify these inconsistencies because identification of clearly defined age differences in symptom presentation is important in making diagnoses, formulating treatment strategies and evaluating treatment response. In addition, variations in negative affect with age will impact on the development and further refinement of anxiety and depression models.

3) Age and Gender Differences in the Prevalence Rate and Level of Depression

In the present investigation, age and gender differences in the prevalence rate and level of depression suggest that more females report higher levels of depression with age, while male reports of depression remain consistent over age. This finding needs to be considered in investigations of age differences in symptoms of depression. What may appear as an age difference may in fact be more correctly described as an age by gender difference in depressive symptomology, with an increase in depressive symptoms with age reported by females, while depressive symptoms in males show very little change over time.
4) Symptoms of Anxiety Precede Symptoms of Depression

This study found no evidence for a temporal relationship between anxiety and depression. However, before any final answer can be given, prospective longitudinal studies need to be conducted because the question of temporal sequencing can not be answered definitively with cross-sectional or retrospective reports. Determining if there is a progression from anxiety to depression, is important because efforts at forestalling depression could be undertaken on the basis of early identification of anxious children.

5) Cross Cultural Findings

The findings of the present study underscore findings in the literature on anxiety and depression in North American children and adolescents and contribute to the further understanding of these disorders in East-European children and adolescents in two ways. Firstly, like North American studies, this study reports that the symptoms of negative affect vary little with age, and that the list of which symptoms change and which do not is not always reliable. Secondly, as in North American samples, levels of depression increase with age, and this is largely due to the increase in depression in adolescent girls.

5.6 General Limitations of the Study

The findings in the present study describe the relationship between anxiety and
depression in an East European sample of children and as such, may not be generalizable to a North American population of children. In addition, translation of the measures into Latvian may have had an impact on the validity of the instruments. Words describing psychological states often have nuances of meaning that might be difficult to replicate in another language. This was the case, in the present study, when items 5 and 9 on the MASC were excluded from data analyses because, in retrospect, their meaning in Latvian was not considered comparable to the English version.

The measure used to assess anxiety symptoms (i.e., the MASC) is new and consequently there is limited information on its reliability, validity and factor structure. In addition, subject fatigue may have contributed to the number of incomplete data sets, as the completion of the MASC always took place at the end of the testing session.

The data used to investigate a possible temporal relationship between anxiety and depression are cross-sectional and as such, can only provide indirect evidence. Longitudinal studies are needed to determine if anxiety precedes depression. This study used only self-report data in the assessment of anxiety and depression. Similar methods of assessing a construct have a common source of bias or artifact that is directly related to how the data are collected (Kazdin, 1992). Introducing a second and different method of assessing the same construct reduces the effect of this bias on the scores obtained. Consequently, measuring anxiety and depression using a second and different method (e.g. via an interview) in the present study, would have reduced the bias associated with using only self-report data.
and might have led to a better fit of the models to the data.

Lastly, while CFA provided the most stringent test of the models’ fit in the present study, it limited the conceptualization of anxiety and depression to the arrangements of the factors that were specified a priori. This is not to say that new models cannot emerge from the study of CFA results. But perhaps, a more effective method of data analysis would have included exploratory factor analysis to identify possible new factors, or factors that may have been specific to the East European population of children used in this study and then the incorporation of these factors into models that are then tested using CFA.

5.7 Future Directions

Overall, the findings in this study suggest that the Pluralistic Model of anxiety and depression should continue to be used in childhood and adolescence. The confirmatory factor analyses and the findings regarding a temporal relationship between the two constructs point to anxiety and depression as distinct, but correlated factors. However, further tests of these findings are needed before rejecting all other models of anxiety and depression. In addition, more work is needed to determine definitive age and gender differences in negative affect and the results should be incorporated into the investigation of any anxious-depressive models.
Appendix A

The Children’s Depression Inventory (CDI)

This questionnaire consists of 27 groups of statements. After reading each group of statements carefully, put an X next to the one statement in each group that best describes how you have been feeling for the past two weeks. Remember, there are no right or wrong answers. Just pick the statement that best describes the way you have been feeling over the past two weeks.

Item 1

_ I am sad once in a while.
_ I am sad many times.
_ I am sad all the time.

Item 2

_ Nothing will ever work out for me.
_ I am not sure if things will work out for me.
_ Things will work out for me O. K.

Item 3

_ I do most things O. K.
_ I do many things wrong.
_ I do everything wrong.

Item 4

_ I have fun in many things.
_ I have fun in some things.
_ Nothing is fun at all.

Item 5

_ I am bad all the time.
_ I am bad many times.
_ I am bad once in a while.

Item 6

_ I think about bad things happening to me once in a while.
_ I worry that bad things will happen to me.
_ I am sure that terrible things will happen to me.

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Appendix B

MASC: The Multidimensional Anxiety Scale for Children

Name: ___________________________  Age: ______  Sex: Male  Female (circle one)
Date: ______/_____/_______  School Grade: ______
  Month  Day  Year

This questionnaire asks you how you have been thinking, feeling, or acting recently. For each item, please circle the number that shows how often the statement is true for you. If a sentence is true about you a lot of the time, circle 3. If it is true about you some of the time, circle 2. If it is true about you once in a while, circle 1. If a sentence is hardly ever true about you, circle 0. Remember, there are no right or wrong answers, just answer how you have been feeling recently.

Here are two example to show you how to complete the questionnaire. In example A, if you were hardly ever scared of dogs, you would circle 1, meaning the statement is rarely true about you. In example B, if thunderstorms sometimes upset you, you would circle 2, meaning that the statement is sometimes true about you.

Example A  I'm scared of dogs...........................................0  1  2  3
Example B  Thunderstorms upset me.................................0  1  2  3

Now try these items yourself.

1. I feel tense or uptight...............................................0  1  2  3
2. I usually ask permission............................................0  1  2  3
3. I worry about other people laughing at me.....................0  1  2  3
4. I get scared when my parents go away..........................0  1  2  3

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Dear pupil,

Thank you for helping us with this survey. By answering these questions you will help us to find out more about the way in which young people live. The same questions are used in surveys in 23 other countries.

Your answers will be looked at by the Survey study team and by no-one else. They will not be seen by your parents or teachers. There is no need to write you name on the questionnaire. After you have filled it in, you can put it in the envelope provided and seal it.

Take your time to read each question carefully and answer it as best you can. Please write down your own answers. Remember that we are only interested in your opinion. This is not a test.
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