3.1 PREVALENCE OF ADHD IN CHILDREN

A review of various studies investigating the prevalence of ADHD suggests that across fairly diverse populations (geographically, racially, socio-economically) there exists a sizeable percentage of school-aged children with ADHD (Baumgaertel, Wolraich, and Dietrich, 1995; Bhatia et al., 1999; Goldman, Genel, Bezman, and Slanetz, 1998; Wolraich et al., 1996). Although early prevalence estimates varied between 1% and 20% (Du Paul, 1991; Szatmari, Offord, and Boyle, 1989c) currently, the consensus of expert opinion is that approximately 3% to 5% of the school aged population in the West (elementary through high school) meet the DSM-IV criteria of ADHD using the most stringent criteria (American Psychiatric Association, 1994; Barkley, 1998). In India, the handful of studies that have evaluated ADHD, report a prevalence ranging from 5% to 10% (Bhatia et al., 1999; Bhatia et al., 1991; Malhi and Singhi, 2000, 2001). These substantial variations in the recorded prevalence rates result not from real difference of prevalence but from important methodological differences among various studies such as variations in terminologies used, method of ascertainment, diagnostic system and associated criteria, differences in the number of sources of information required to make a diagnosis, and the population sampled (Barkley, 1998; Cantwell, 1996; Lambert, Sandoval, and Sassone, 1978; Swanson, Sergeant, Taylor, Sonuga-Barke, Jensen, and Cantwell, 1998).

3.1.1 Prevalence Determined by Population Sampled

The patient sample used is critical owing to wide variations in prevalence in different settings. While children with ADHD make up to 50% of some child psychiatric populations, at least 10% of the behavioural problems
seen in general pediatric settings are due to ADHD (Cantwell, 1996). In contrast to this, a recent review of prevalence rates in school going community samples indicates rates varying from 4% to 12% with estimated prevalence based on combining these studies ranging between 8 percent and 10 percent. The prevalence rates also vary significantly depending on whether they reflect community samples (10.3%) or school samples (6.9%) (American Academy of Pediatrics, 2000).

The few clinic based studies on the incidence of ADHD in the Indian setting report prevalence rates ranging from 5% to 10% (Bhatia, et al., 1999; Bhatia, et al., 1991; Malhi and Singhi, 2000; Malhotra and Chaturvedi, 1984). While the prevalence of DSM-III ADDH estimated by screening 1000 children aged 3-12 years attending a Pediatric Outpatient Department in New Delhi was estimated to be 11.2% (Bhatia et al., 1991), approximately 17.7% of the children (aged 3-12 years) attending Psychiatry Outpatient Department of a tertiary care teaching hospital were found to meet the DSM-IV diagnostic criteria for ADHD (Bhatia et al., 1999). In another study, 245 children in the age group of 3-12 years, who were referred for evaluation to the Psychology Outpatient Service of Department of Pediatrics of a tertiary care teaching hospital were screened for ADHD. Approximately 8.1% of these children were found to meet the DSM-IV criteria for ADHD. The male-female ratio in children with ADHD was 5:1. Fifty percent of the ADHD children were diagnosed to be predominantly hyperactive-impulsive type, 35% were predominantly inattentive type and 15% were combined type (Malhi and Singhi, 2000).

3.1.2 Prevalence Determined by Rating Scales

Screening with a single, simple parent or teacher rating form can produce much higher prevalence rates of ADHD. For instance, Pelham, Gnagy, Greenslade, and Milich (1992) employed teacher ratings of DSM-III-R symptoms for screening a sample of 931 boys of grades K-9 in United States and found a prevalence of 7.1 percent. An epidemiologic survey conducted on 8,258 children from Kindergarten through fifth grade in middle Tennessee County using teacher’s ratings of DSM-III-R and DSM-IV symptoms of ADHD estimated a prevalence of 7.3% and 11.4%, respectively. The prevalence
rates for predominantly inattentive type, predominantly hyperactive-impulsive, and combined type of DSM-IV ADHD in this sample were reported to be 5.4%, 2.4% and 3.6%, respectively (Wolraich et al., 1996). Similarly, a prevalence of 7.7% for predominantly inattentive type, 2% for predominantly hyperactive-impulsive type and 2.9% for the combined type was determined by Gadow and Sprafkin (1997) in a study that utilized the DMS-IV items and recommended symptoms thresholds.

One of the most comprehensive prevalence studies of ADHD, popularly known as the Ontario Child Health Study, was conducted on 4-to-16-years old children of the entire province of Ontario, Canada. The findings of this study revealed that approximately 6.3% of the children have ADHD although the peak prevalence of 8% occurs between 6 years and 9 years and is lower in preschoolers and adolescents (Szatmari et al., 1989c).

Baumgaertel et al. (1995) reported an even higher prevalence rate of 10.9% in an epidemiologic survey carried out on 1,077 non-referred elementary school age children in Germany using teacher ratings of DSM-III-R symptoms. This prevalence further rose to 17.8% if DSM-IV symptoms and cut-off scores were employed and all the subtypes were considered. The results revealed that predominantly inattentive type of ADHD was the most common subtype with a prevalence rate of 9% followed by combined type (4.8%) and predominantly hyperactive-impulsive type (3.9%). The high prevalence of 17.8% could be attributed to the inclusion of children who were in the predominantly inattentive subtype of ADHD (9%), a group that was not typically considered in earlier studies of prevalence using rating scales.

In Japan, an epidemiologic survey was conducted by Kanbayashi, Nakata, Fujii, Kita, and Wada (1994) on 1,022 children in the age groups of 4-12 years, using parent ratings of DSM-III-R symptoms of ADHD. About 7.7% of these children were reported to have ADHD which was very close to prevalence figures estimated by the teacher ratings of DSM-III-R symptoms in US samples (e.g. Pelham et al., 1992; Wolraich, et al., 1996).

In Ukraine, Gadow, Nolan, Litcher, Carlson, Panina, Golovakha et al. (2000) employed a parent completed, DSM-IV referenced rating scale to examine prevalence rates of ADHD behaviours and differences between
subtypes in 10 -to-12 year old Ukrainian children. The overall screening prevalence rate of ADHD behaviours was estimated to be about 19.8% which was relatively higher than that reported by other comparable studies. The results further revealed that predominantly hyperactive-impulsive type of ADHD, with a prevalence of 8.5%, was the most common followed by predominantly inattentive type (7.2%) and the combined type (4.2%). This is in contrast to most community based studies conducted in United States which report that predominantly inattentive type is the most common type with prevalence rates for predominantly hyperactive-impulsive and combined type being fairly similar.

In India, only a few studies have evaluated school going children for ADHD using rating scales. One of the earliest studies which utilized a teacher checklist for estimating the prevalence of hyperactivity in primary school children was conducted by Chawla, Sahasi, Sundaram, and Mehta (1982). Out of the total sample of 2,160 children aged between 6 and 12 years, 101 were identified as meeting the criteria for hyperactivity, thus forming a prevalence rate of hyperactive syndrome of 4.7 percent. The ratio of the prevalence of hyperactive syndrome in boys and girls was 4.5:1. In yet another study on 321 primary school children in the age range of 5 to 10 years, a parent rating scale was used in addition to the teacher’s checklist (Gada, 1987). The results revealed that 8.1% of these children had an attention deficit disorder with hyperactivity according to the DSM-III criteria. About 10.9% of the boys and 2.7% of the girls were identified as ADHD by both the rating scales. Sharma and Sinha (1997) compared the prevalence of ADHD among 2000 male and 2000 female children of various schools of Agra using Conner’s Teacher Rating Scale (CTRS), Parents Rating Scale and Observer Rating Scale. They found that 8.4% of the boys and 3.6% of the girls between the age of 7 and 11 years were identified as ADHD by all the three rating scales, thereby, substantiating the previous findings that hyperactivity is more common in males as compared to females.

From the above review it can be deduced that approximately 7-17% of children between 4 and 16 years of age are likely to have ADHD if only ratings are used to establish prevalence (Barkley, 1998).
3.1.3 Prevalence Determined by Clinical Diagnostic Criteria

The recorded prevalence figures for ADHD may also vary substantially because of the changing diagnostic criteria. While studies based on a psychiatric definition in DSM tradition with specific inclusion criteria for symptom onset, duration, pervasiveness, and impairment report that ADHD is prevalent in 5% to 10% of the general population, this frequency is further reduced to 1% to 2% with ICD tradition which restricts diagnosis to the full syndrome with limited comorbidity (Swanson et al., 1998).

Moreover, within the DSM tradition, the evolution of criteria from DSM-III to DSM-IV, although based on a progressively larger empirical base (Lahey, Schaughency, Hynd, Carlson, and Nieves, 1987) has broadened the case definition and led to an increase in the prevalence rate of this disorder. This can be attributed to a shift in focus from hyperactivity in earlier diagnostic sets to increase in emphasis on attention problems (Goldman et al., 1998). The prevalence of ADHD in children based on DSM-III criteria ranges from 2% to 9.5% with an average prevalence across these studies being 4.9% (Barkley, 1998). Shekim, Kashani, Beck, Cantwell, Martin, Rosenberg et al. (1985) employed a diagnostic interview to screen 114 nine year old children living in a rural Midwestern community of United States for ADHD. The findings indicated that about 12% of the children met the DSM-III criteria for ADHD. Anderson, Williams, McGee, and Silva (1987) conducted a large community epidemiological study on 792 preadolescent children in New Zealand using DSM-III diagnostic criteria. The results revealed a prevalence of 6.7 percent. The male to female ratio for ADHD was found to be 5:1. Another community survey designed to estimate the prevalence of childhood maladjustment in 777 Puerto Riccan children between the ages of 4 and 17 years found that approximately 9.5% of these children met the DSM-III psychiatric diagnosis of ADHD (Bird, Canino, Rubio-Stipec, Gould, Ribera, Sesman et al., 1988).

However, when the DSM-III-R criteria are utilized, the prevalence ranges from 1.4% to 13.3% with an average of 5.9% based on adults reports (Barkley, 1998). A study conducted on a school population of 4, 032 children in Iowa revealed that about 6.1% of these children met the DSM-III-R criteria.
for ADHD (Lindgren, Stromquist, Davis, Milich, and Watson, 1990). In a national survey of teachers, about 2.5% to 4% of US children were estimated to have ADHD (Pelham et al., 1992). One of the highest prevalence rates (18.9%) was reported by Newcorn, Halperin, Healy, O’Brien, Pascualvaca, Wolf et al. (1989) in a study conducted on a small population of inner-city parochial school students. In addition to this, higher than average prevalence rates of 13.3 percent and 12.2 percent were reported by Velez, Johnson, and Cohen (1989) and Jensen, Watanabe, Ritchers, Cortes, Roper, and Liu (1995) respectively. In a study on Chinese school boys Leung, Luk, Ho, Taylor, Mak, and Bacon-Shone (1996) found that prevalence rates increased from 6.1 percent to 8.9 percent when the criteria was changed from DSM-III to DSM-III-R.

Thus, it can be concluded from the above review that DSM-III-R results in the identification of comparatively greater number of children with ADHD than does DSM-III irrespective of whether rating scales (Baumgaertel et al., 1995) or interviews using DSM criteria are applied (Leung et al., 1996).

However, several research endeavors have revealed that utilization of DSM-IV criteria results in the identification of an even larger percentage of children as ADHD than do the previous DSM criteria. These findings have been substantiated by the work of Baumgaertel et al. (1995) in Germany and Wolraich et al. (1996) in Tennessee who obtained teacher reported prevalence for ADHD and other disruptive behaviour disorders using the current DSM-IV criteria and compared them with prevalence figures for DSM-III and DSM-III-R within the same population of elementary school children. In the Tennessee sample, the overall prevalence for ADHD increased from 7.3 percent (DSM-III-R) to 11.4 percent (DSM-IV) thus registering 57 percent increase in the number of children meeting the criteria for the total of all the three DSM-IV subtypes of ADHD compared with DSM-III-R. Similarly, a study on German elementary school children found a significant increase from 9.6 percent (DSM-III) to 17.8 percent (DSM-IV) in the prevalence rate on comparing the DSM-III and the DSM-IV criteria with a non-significant difference between DSM-III and DSM-III-R. This is largely due to inclusion of the new subtype of predominantly inattentive type of ADHD in DSM-IV which
was poorly and unempirically defined in the third edition of the DSM (Baumgaertel et al., 1995).

### 3.1.4 Prevalence Determined by Number of Sources of Information Required to Make Diagnosis

The prevalence of ADHD also appears to differ significantly as a function of the number of observers who must agree on a diagnosis. For example, Lambert et al. (1989) conducted a study on 5000 elementary school children and found that approximately 5% of the children were identified as hyperactive when the opinion of only one caregiver was required. However, this prevalence figure dropped to about 1% when a consensus among the parents, teacher and physician was required. Similarly, Shapiro and Garfinkel (1986) found that only 2.3 percent of a rural, non-referred elementary school population of 315 children met the inattentive-overactive signs of the ADDH (DSM-III) disorder when screened using a combination of teacher rating scales, interviews, and laboratory performance measures.

### 3.2 GENDER DIFFERENCES IN THE PREVALENCE OF ADHD IN CHILDREN

Regardless of the diagnostic criteria or the survey method used, epidemiologic studies both in the West and in India (e.g. Bhatia et al., 1999; Gada, 1987; Levinsohn, Hops, Roberts, Seeley, and Andrews, 1993; Sharma and Sinha, 1997; Szatmari et al., 1989c) have reported clear-cut sex-wise differences in the prevalence of ADHD with preponderance in boys. A review of the studies on gender differences in ADHD have led to the conclusion that in the general population about 9.2 percent (5.8%-13.6%) of males and 2.9 percent (1.9%-4.9%) of females are found to have behaviours consistent with ADHD (American Academy of Pediatrics, 2000). Depending on the sampling method used and the setting, estimates of male ADHD predominance range from 3:1 to 9:1 in clinical samples and from 2:1 to 3:1 in non-clinical samples (American Psychiatric Association, 1994). The male to female ratio ranges from 4:1 for ADHD-HI to 2:1 for ADHD-AD (e.g. Baumgaertel et al., 1995, Wolraich et al., 1996).
Although there has been an increase in the identification of females with ADHD owing to the new category of ADHD-AD in the DSM-IV, yet there are considerably higher rates of males among clinical samples of children compared to community surveys. This can be due to the selective referral bias because girls are more likely to have inattentive symptoms and academic problems while boys tend to be more aggressive, impulsive and antisocial, and this display of disruptive behaviour within structured setting leads to earlier referral. The lower referral rate of ADHD girls reflects a neglect of problems experienced by girls with ADHD (Baumgaertel et al., 1995; Cantwell, 1994; Wolraich et al., 1996).

Gaub and Carlson (1997a) conducted a meta analysis of past research on gender differences in samples of ADHD based on 18 studies. Their study led to the conclusion that compared with boys, girls with ADHD display greater intellectual impairment, lower levels of hyperactivity, and lower rates of other externalizing symptoms i.e. aggression, defiance, and conduct problems. There were no significant sex differences in impulsivity, academic performance, social functions, fine motor skills, parental education or parental depression. In addition to this, some gender differences were clearly mediated by the effects of referral source. While girls with ADHD identified from non-referred samples displayed lower levels of inattention, internalizing behaviour, and peer aggression than boys with ADHD, girls and boys identified from clinics displayed similar levels of impairment on these variables.

3.3 ACADEMIC, BEHAVIOURAL AND PEER PROBLEMS AMONG SUBTYPES OF ADHD

Reviews of DSM-III studies point out that ADD-WO was more often associated with cognitive problems, learning disorders, and anxiety, whereas in comparison, ADD-H was more often associated with peer rejection and behavioural problems characterized by aggression and non compliance (Lahey et al., 1997).

The DSM-IV field trials for ADHD (Lahey et al., 1994) confirmed that the two subtypes that are defined in part by high levels of inattention (ADHD-C and ADHD-AD) are accompanied by academic impairment. However, the
field trials failed to confirm whether ADHD-C and ADHD-HI, the two subtypes with high levels of hyperactivity, would be accompanied by social impairment.

Since the DSM-IV field trials, several other studies have examined the impairment associated with ADHD subtypes. Baumgaertel et al. (1995) examined the relationship between DSM subtypes and academic performance, perceived behavioural problems, and demographic variables. They found that poor academic performance was the functional hallmark of children with ADHD-AD. Lower academic function was also associated with ADHD-C but children meeting diagnostic criteria only for ADHD-HI were not academically impaired. Almost one-third of the children categorized as ‘below average’ and more than half of those ‘failing’ met diagnostic criteria for ADHD-AD symptoms, whereas less than half that proportion met the criteria for ADHD-C. Eighty-eight percent of children with ADHD-HI were characterized by normal to high academic functioning and a high degree of teacher perceived behaviour problems, but a relatively low rating of ODD.

Wolraich et al. (1996) too compared the academic, behavioural, and peer problems of three ADHD subtypes children in kindergarten through fifth grade in a middle Tennessee county. The teachers reported that 75% of children with ADHD-AD had academic problems, while they reported only 40% to have behavioural problems. On the other hand, only 23% of children with ADHD-HI were reported to have academic problems, while 80% were reported to have behavioural problems. ADHD-C had a high percentage of both academic (73%) and behavioural (92%) problems. Of all the DSM subtypes children with ADHD-C were at the overall greatest risk for behavioural or academic dysfunction. Only 4% had neither academic nor perceived behaviour problems.

Faraone, Biederman, Weber, and Russel (1998) assessed 413 children and adolescents consecutively referred to a pediatric psychopharmacology clinic in order to determine the validity of the DSM-IV subtypes of ADHD. They found that the ADHD-C and ADHD-AD showed greater academic impairment and were more likely to require help with school work than ADHD-HI.
A detailed review of these studies (McBurnett, Pfiffner, and Ottoline, 1998) found that with few exceptions, elevations in inattention (as in ADHD-C and ADHD-AD) were associated with academic problems, and elevations in hyperactivity-impulsivity (as in ADHD-C and ADHD-HI) were associated with social impairment and comorbid disruptive behaviour problems.

3.4 PREVALENCE OF ADHD SUBTYPES BY AGE OF CHILD

Several studies have examined the age related variations in the prevalence of three subtypes of ADHD.

In DSM-IV field trials for attention deficit hyperactivity disorder in children and adolescents Lahey et al. (1994) conducted structured diagnostic interviews of multiple informants for 380 clinic-referred youths aged 4-17 years. They found that ADHD-HI type was significantly younger by an average of almost 3 years than the combined type and by over 4 years than the ADHD-AD. In turn, the combined type was significantly younger than the predominantly inattentive type by more than 1 year on an average. This finding is substantiated by evidence from longitudinal research (Lahey et al. 1997) that the two dimensions follow different developmental courses, with inattention remaining relatively constant but hyperactivity-impulsivity declining substantially with increasing age.

Nolan, Gadow, and Sprafkin (2001) also examined the age differences between ADHD subtypes. Teachers completed a DSM-IV referenced symptom inventory for 3006 school children aged between 3 and 18 years. The inattentive type was relatively uncommon in preschool children (3.9%) whereas the hyperactive-impulsive type was least common in teenagers (0.8%). Elementary and secondary school students had higher rates of inattentive type symptoms than preschool children, but they did not differ from each other. Elementary school students had a higher rate of hyperactive-impulsive symptoms than secondary school students whereas a higher percentage of preschool children had screening scores for hyperactive-impulsive and combined type than elementary and secondary school children. In other words, the study revealed that the prevalence of ADHD-HI and
consequently ADHD-C drops precipitously after the preschool years whereas the inattentive type increases dramatically.

Similarly, DuPaul, Power, Anastopoulos, and Reid (1998) reported that 14-to-18 year olds had significantly lower hyperactivity-impulsivity severity scores than elementary and middle school students, and 11- to -13 year olds had significantly lower severity scores than elementary school children.

In a study aimed at examining the discriminant validity of DSM-IV ADHD subtypes in a nationally representative sample of 35,697 Australian children aged 6 to 17 years, Graetz, Sawyer, Hazell, Arney, and Baghurst (2001) found that the hyperactive-impulsive type was younger than the inattentive type. Similar findings were reported by Pineda, Ardila, Rosselli, Arias, Henao, Gomez, Meji et al.(1999b) who estimated the prevalence of DSM-IV ADHD in 540 children in the age range 4 to 17 years.

Paternite, Loney, and Roberts (1996) assessed the clinical features of DSM-IV subtypes in a clinically referred sample of 28 inattentive, 9 hyperactive/impulsive and 59 combined type ADHD boys. This study used approximated DSM-IV diagnosis based on data gleaned from the DSM-III version of the Diagnostic Interview for Children and Adolescents-Parent version. The inattentive patients were oldest, followed by the combined type and hyperactive-impulsive patients.

Morgan, Hynd, Riccio, and Hall (1996) assessed the clinical features of DSM-IV subtypes in a clinically referred sample of 30 inattentive, 2 hyperactive-impulsive and 26 combined type ADHD boys. The number of hyperactive-impulsive patients was too small for statistical analyses. The inattentive and combined type patients did not differ in age.

Gaub and Carlson (1997b) used teacher data to define ADHD subtypes in a sample of 2,744 school children. They too did not find any age differences among the subtypes.

Eiraldi, Power, and Nezu (1997) presented data on 60 ADHD children in the age range of 6-12 years who had been referred to child and adolescent outpatient clinics. Only the combined and inattentive types were compared because the group of hyperactive-impulsive children was deemed too small to
be informative for statistical analyses. The combined and inattentive subtypes did not differ in age.

The review of the available studies of DSM-IV subtypes of ADHD shows that age differences shown in the DSM-IV field trials have not been consistently replicated in either clinical or community samples.

The studies reviewed above reveal that ADHD is an extensively researched disorder in the Western countries. However, there are only a handful of studies on the prevalence of ADHD in the Indian setting. Moreover, majority of these studies have been conducted on clinical samples. There are very few epidemiological studies that have used the DSM-IV criteria for identifying ADHD children. The present investigation aims at identifying the prevalence of ADHD and its subtypes in school going children using the DSM-IV criteria. Specifically, it was hypothesized that

1) There will be a preponderance of males in all the subtypes of ADHD; however, among girls ADHD–AD will be the most common.
2) ADHD–AD and ADHD–C will exhibit greater levels of academic problems than ADHD–HI.
3) ADHD–AD and ADHD–C will exhibit greater levels of behavioural and peer problems than ADHD–AD.
4) The prevalence of ADHD–AD will increase and that of ADHD–HI will decrease with increasing age.

3.5 RELATIONSHIP BETWEEN ADHD IN CHILDREN AND PARENTING

Parents’ interactions with their young children are the most proximal influence on their children’s behavioural development and parenting practices continue to play a critical role in the maintenance of disruptive behaviour throughout children’s development. In this section, studies that have examined the association between hyperactivity and parenting behaviours have been reviewed.

The review has been divided into five parts. The first section reviews the clinical studies on parenting practices of ADHD children. In the second section, longitudinal studies that have assessed the influence of early
parenting behaviours on subsequent manifestation of ADHD are reviewed. Community studies of parenting practices of ADHD children are evaluated in the third section. The fourth section covers studies of stimulant drug effects on parenting. Studies on gender differences in parenting of ADHD children have been reviewed in the last section.

3.5.1 Clinical Studies on Parenting of ADHD Children

Some of the earlier studies on parent-child interactions that have observed the interactions of normal and hyperactive children with their mothers in free play and structured tasks have reported numerous differences in the interaction of mothers with their hyperactive and normal children. One of the earliest studies on the parenting behaviours of hyperactive children was carried out by Campbell (1973) who observed the mother-child interactions of hyperactive, reflective, and impulsive elementary school age boys. She compared ten 8-year-old boys and their mothers in a structured interaction situation with 24 mother-child pairs selected according to the child’s cognitive style (reflective or impulsive) and matched with the hyperactives on age, sex, and IQ. Task difficulty was varied. Mothers of hyperactives provided more direct help, encouragement and suggestions for impulse control during more difficult tasks. Mothers of reflective subjects also gave more direct help. However, no group differences were noted in maternal disapproval or negative feedback.

In a replication study, Campbell (1975) compared hyperactive, learning-disabled and normal boys and found that on difficult tasks mothers of hyperactives gave more encouragement and suggestions for impulse control and were also more directive and disapproving.

Cunningham and Barkley (1979) extended the work of Campbell by observing the interactions and the coding of hyperactive children and their mothers in both unstructured free play and structured – task situations using an antecedent consequent behavioural coding system. Hyperactive children under stimulant drug treatment were identified through physicians who contacted parents and provided names of those consenting to participate. To ensure diagnostic uniformity, only those children scoring more than two
standard deviations above the mean on both the Hyperactivity Scale of the Conners Parent Symptom Checklist and the Werry-Weiss-Peters Activity Rating Scale were included in the hyperactive group. Groups of 20 normal and 20 hyperactive boys in the age range of 6 to 12 years were observed interacting with their mothers in 15 minutes free play and 15 minutes structured task situations. Using a 15 seconds interval coding procedure, one observer recorded the mother’s response to specific antecedent behaviours of the child while a second observer recorded the child’s response to specific behaviours of the mother. Observations revealed that mothers of hyperactive boys were less responsive and imposed more structure and control on the child’s play, social interactions, and task oriented activities. On the other hand, the hyperactive boys were observed to be more active, less compliant and less likely to remain on task than non hyperactive peers both during free play and structured tasks.

Similar findings were reported by Mash and Johnston (1982) who compared the mother-child interactions of both younger (mean age = 4.11 years) and older (mean age = 8.4 years) hyperactive children and contrasted them with those observed in comparable age groups of normals. A total of 43 hyperactive and 53 normal children and their mothers participated in the study. Almost all the children were boys. Children with a developmental history of the disorder with onset by 2-3 years in the absence of gross neurological, sensory or motor impairment and a rating of at least two standard deviations above the normative mean for their age on the Conners Abbreviated Rating Scale and the Werry-Weiss-Peters Activity Scale were included in the hyperactive group. The dyadic interactions observed in an unstructured play and structured task situations were coded using the Response Class Matrix. The previously observed patterns in the mother-child interactions of hyperactives were observed to a more severe degree in younger children. Mothers of hyperactives were found to be generally more negative and directive during play and they were also less responsive and more controlling in response to child-initiated interactions. During the structured task situation mothers were more directive and negative and less interactive and approving, even when their child was interacting appropriately.
Hyperactive children asked more questions and were generally more negative and non-compliant during play, particularly the younger hyperactive children.

Subsequent research endeavours have revealed that interaction conflicts are less reliably seen in free play situations but are more likely to arise during situations where tasks have been assigned to the child to perform. For example, Barkley, Karlsson, Pollard and Murphy (1985b) observed the mother-child interactions of 158 clinic referred hyperactive boys and 81 normal boys between 4 and 12 years in two situations i.e. during free play and task periods. During free play, the mothers and the children were instructed to play as they did at home. In the task situation, the mothers were given a list of five tasks to have a child perform. These playroom interactions were videotaped and later coded by two observers using the Response Class Matrix. Observations revealed that mothers of hyperactive boys gave more commands and directions, interacted less and responded less to the interactions of ADD-H boys than mothers of normal boys during structured task situations. Several other studies (e.g. Barkley, Karlsson, Strzelecki, and Murphy, 1984; Tallmadge and Barkley, 1983) have also reported that interaction problems, which are subtle in free play settings, become particularly salient and more frequent in settings where tasks must be done between the parent and child.

Tarver-Behring, Barkley, and Karlsson (1985) compared the mother-child interactions of 16 clinic referred hyperactive boys and their normal siblings during free play and task settings. They found that mothers had more interaction difficulties with their hyperactive children than with normal children in the same family. Hyperactive boys were less compliant with their mothers’ commands both during free play and task settings. The results further revealed that the mothers were less positive towards them during tasks as compared to their non-hyperactive boys.

Various studies examining the impact of age on the interactions of hyperactive children with their parents have indicated that these negative parent-child interaction problem patterns occur in the younger hyperactive children especially in 4 to 5 year olds (Cohen, Sullivan, Minde, Novak, and
Keens, 1983) and may be at their most negative behaviour which is highly stressful to the parent in this age range (Mash and Johnston, 1982). Barkley, et al. (1985a) also studied the effects of age on the mother-child interactions of ADD-H and normal boys. The mother-son interactions of 60 boys who met the DSM—III criteria for Attention Deficit Disorder with Hyperactivity (ADD-H) were compared with the interactions of 60 normal boys with their mothers during free play and structured task situation. Both groups were equally subdivided into 5 age levels (5, 6, 7, 8, and 9 years). Although there were no effects of age during free play it was observed that the mothers of hyperactives gave more commands and initiated fewer interactions, and the ADD-H boys played more independently of and were more negative towards their mothers. During the task setting, mothers of ADD-H boys gave more commands, were more negative, initiated fewer interactions and responded with greater control over both compliant and off task behaviour than did mothers of normal children. The ADD-H boys were less compliant, sustained their compliance for shorter time periods, and were more negative and off task than normal boys. Several age effects were noted suggesting that mothers of older boys gave fewer commands and controlled their compliance less than mothers of younger boys.

Barkley et al. (1984) observed the mother-child interactions of three age groups of 54 hyperactive children during a double-blind drug-placebo evaluation of two doses of Ritalin in both free play and task settings. A total of 54 hyperactive children (including 5 girls) in the age group of 4 to 9 years, 11 months who met the DSM—III criteria for diagnosis of Attention Deficit Disorder with Hyperactivity participated in the study with their mothers. Results indicated few age or drug effects on the social interactions during free play. However, during task period, it was observed that with age, the mothers decreased their levels of control and management of the children, while the children increased their compliance and decreased their negative behaviour. Moreover mothers decreased their control and negative behaviour towards the children during the high drug dose condition. Several researchers working in this area have observed that even though the degree of conflict in these interactions declines significantly with increasing age of the child, the
hyperactive child has been found to remain significantly deviant from normal in certain aspects of parent-child interactions even in late childhood (e.g. Barkley, DuPaul, and McMurray, 1990; Barkley et al., 1985a; Campbell, 1987; Mash and Johnston, 1982) and adolescence (e.g. Barkley, Anastopoulos, Guerremont, and Fletcher, 1992).

Tallmadge and Barkley (1983) observed the interactions of hyperactive and normal children both with mothers and fathers. They found that mothers were more likely to have greater difficulties during task-related interactions than fathers of hyperactive children. Some other studies have observed that mother-child conflicts may result in increased father-child conflict when mothers and fathers interact jointly (triadically) with their hyperactive children especially boys (e.g. Buhrmeister, Camparo, Christence, Gonzalez, and Hinshaw, 1992).

Several consistent patterns emerge from the above review. The parents, particularly the mothers of hyperactive children are usually found to give more commands, directives, and supervision to their children, to be more negative and reprimanding, and less rewarding and responsive to their child's general social initiatives, compared to the mothers of normal children. They are likely to spend less time in positive interaction with their hyperactive children.

However, there is also some evidence suggesting that negative parenting (e.g. Barkley et al., 1990) may be more closely related to comorbid CD/ODD than to the presence of ADHD alone. Most studies of family correlates of ADHD and related problems have neglected to examine comorbidity or tease apart the ADHD symptoms from co-occurring noncompliance and aggression.

### 3.5.2 Longitudinal Studies on Parenting of ADHD Children

In this section, studies that have typically relied on retrospective or longitudinal designs to assess the influence of early parenting behaviours on the subsequent manifestation of child hyperactivity are reviewed.

Methodologically stronger studies of the early influence of parenting on ADHD have relied on longitudinal designs to follow the relationship over time.
Jacobvitz and Sroufe (1987) explored the early parental caregiving antecedents of hyperactivity in a prospective longitudinal study. The experiential variables (parenting) were derived from a developmental theory of arousal modulation. The core predictive analyses of antecedents of hyperactivity were based on a subsample of 34 hyperactives and 34 control children matched for age and gender derived from 267 families who were part of a prospective longitudinal study. Twenty-four subjects in each group were males. Patterns of maternal intrusive care, seductive behaviour and overstimulation were assessed at 6 months, 2 years and 3 ½ years, respectively. Maternal interference at 6 months and overstimulating care at 3 ½ years significantly predicted hyperactivity in kindergarten at age 5 or 6, as determined by clinically validated ratings made by teachers. These findings underscore the importance of examining psychogenic antecedents for ADD-H in many kindergarten children.

These findings were replicated by Carlson et al. (1995), who followed a subsample of 191 participants of a prospective longitudinal study of low socio-economic status families from infancy to the child’s early school years. Endogenous and exogenous predictors measured in infancy and in early and middle childhood were examined independently and in combination. In early childhood, quality of caregiving more powerfully predicted distractibility, an early precursor of hyperactivity, than did early biological or temperament factors. In middle childhood, the quality of maternal caregiving and contextual factors, (like relationship status of the mother and the emotional support received by the mothers) together with early distractibility significantly predicted hyperactivity in middle childhood. While early distractibility best predicted later hyperactivity in elementary years, caregiving and contextual factors contributed to the maintenance of hyperactivity across the later elementary years. In this study, the influence of parenting on ADHD was greatest at the youngest ages, thereby, suggesting that parenting influences on ADHD may diminish over time.

Using retrospective reports, Whitmore, Kramer, and Knutson (1993) compared adult men with childhood histories of ADHD to their brothers and normal controls. Rather than supporting a direct effect of parenting on the
development of ADHD, the results suggested a more complete or interactive pathway with a mixture of child vulnerability and parenting deficiencies. ADHD men recalled that they had received more punishment and less shared parenting than the control men (with the brothers of ADHD men falling midway between). Contrary to the idea that family and parenting factors are primarily associated with conduct problems, in this study, there was a trend for childhood hyperactivity but not aggression, to be related to parental use of physical punishment.

In contrast to these findings, Wakschlag and Hans (1999) following a high risk sample of African-American children to age 10 and found that lack of maternal responsiveness in mother-infant interactions predicted the child’s subsequent ODD and CD, but not ADHD, even after controlling for concurrent parenting and a variety of biological and family risk factors.

The longitudinal studies of Susan Campbell and colleagues also provide information regarding the temporal ordering of parenting and child ADHD and conduct problems (Campbell, 1994; Campbell, Breaux, Ewing, and Szumowski, 1986; Campbell and Ewing, 1990; Pierce, Ewing, and Campbell, 1999). Forty-six hyperactive children and 22 children with no complaints in the age of 25 and 47 months were recruited from pediatricians’ offices, toddler groups and mothers’ day out programs. They were followed up at age 4 years and again at age 6 years. Complete maternal reports were obtained on 53 of the original subjects at age 6 (32 problem children; 21 control children) and on 48 subjects at all three assessments (29 problem children; 19 controls). Follow-up of these children at age 6 by Campbell et al. (1986) revealed that a conflict ridden mother-child relationship and ongoing family stress and disruption were associated with persistence of hyperactivity and aggression problems in young children, independent of the initial level of child symptomatology. These findings support the results of earlier research investigations conducted on behavioural problems in preschoolers (e.g. Richman, Stevenson, and Graham 1982).

Campbell and Ewing (1990) tried to identify the predictors of continuing symptoms and to measure the adjustment when these hard-to-manage preschoolers were 9 years old. It was observed that the child’s negative
behaviour in the preschool years was not related to later conduct problems at 6 years follow-up but maternal controlling behaviour was highly predictive of such problems. These findings suggest that maternal factors may serve to exacerbate these interaction problems and contribute to their long-term stability even though they may not cause them initially.

Barkley et al. (1991) carried out a prospective 8 year follow-up study of hyperactive and normal children followed from childhood into adolescence. Observations of mother-adolescent interactions outcome showed that hyperactive dyads displayed more negative and controlling behaviours and less positive and facilitating behaviours towards each other than in the normal dyads. These interaction patterns were significantly related to similar patterns in mother-child interactions observed 8 years earlier (Barkley et al., 1985b). While the mothers of hyperactive adolescents perceived their interactions with their teenagers as being more negative, angry and having more issues of conflict than mothers of normal adolescents, the hyperactive adolescents did not rate the same interactions as more negative or conflict-ridden than did normal teenagers. The results further revealed that regardless of the setting or context i.e., free play/neutral discussion or task performance positive mother-adolescent behaviours at study entry predicted continuing positive mother-adolescent behaviours and diminished negative behaviours at outcome 8 years later.

Accumulating evidence from longitudinal studies, therefore, suggests that warmth, responsiveness and appropriate limit setting by parents foster the development of socially more competent behaviours in young children. Uninvolved, rejecting, and harsh parenting coupled with negative control is more likely to be associated with hyperactive, non-compliant, aggressive and impulsive behaviours in preschool-aged children (Mercugliano, 1999). The negative parent-child interactions in preschool years are also significantly predictive of persistence of these interactions conflicts and continuation of hyperactivity into late childhood and adolescence. Although the longitudinal studies offer support for the role of parenting in the origins of both conduct and ADHD behaviours, they are inconclusive regarding whether or not ADHD
and conduct problems share the same or different interactive patterns with parenting.

3.5.3 Community Studies on Parenting of ADHD Children

Studies that have focused on the domains of parenting styles or beliefs as opposed to observation of discrete parent–child interactions in clinical samples are reviewed in this section.

Woodward et al. (1998) examined the parenting and family life correlates of childhood hyperactivity in a community sample of London school children. Thirty boys with pervasive hyperactivity in the age group of 7-10 years were compared with 28 classroom control children on a range of parenting and family functioning measures. The results showed that poor parental coping and the use of aggressive disciplinary methods were significantly associated with hyperactivity after adjusting for the effects of conduct disorder and parental mental health. Disciplinary aggression characterized by shouting at, losing temper with and physically punishing the child was identified as the best parenting predictor of hyperactivity, thereby, suggesting that quality of parenting provided to hyperactive children may contribute to their behavioural difficulties.

Hinshaw, Zupan, Simmel, Nigg, and Melnick (1997) investigated the behavioural (overt and covert antisocial activity), internalizing (self-reports and observed social isolation) and familial (authoritative, authoritarian, and permissive parenting beliefs) predictors of peer sociometric nominations in boys with and without ADHD. The study was conducted on 73 ADHD and 60 comparison boys, in the age group of 6-12 years, belonging to ethnically diverse population. The ADHD boys were recruited through physician and mental health referrals and via parent self-help groups and each had received a community diagnosis of ADHD and treatment with stimulant medication for at least 4 months prior to the summer program. Boys who surpassed the established cut off scores for hyperactivity or ADHD on at least three of the following four measures were included in the study: 1) Conners Abbreviated Symptom Questionnaire with the 2-SD criterion of 15; 2) Attention Problem Scale of the Child Behavior Checklist with the empirically established score of 71.
60; 3) Structured parent interview with an abridged Diagnostic Interview for Children and Adolescents (DICA) with the cut off score of 5 symptoms of attention problem disorder from Loney’s Divergent and Convergent Items (DACI); 4) symptoms of ADHD from DBD Checklist with criterion of eight symptoms from DSM-III-R. Newspaper advertisements or announcements placed in local service agencies or schools were used for recruiting comparison boys. Findings revealed that mothers of boys with ADHD displayed parenting beliefs that were less authoritative than those of comparison mothers, but no difference emerged for the authoritarian or permissive dimensions.

Hinshaw (2002) examined the parenting practices of girls with ADHD in a study which aimed at studying the background characteristics, cognitive and social functioning, comorbidity in a socio-economically and ethnically diverse sample of preadolescent girls with ADHD. The study compared 93 girls with combined type and 47 girls with inattentive type of ADHD with 88 age-and ethnicity matched comparison girls in the age group of 6-12 years, who participated in research summer programs. Mothers of ADHD girls were more authoritarian in their parenting beliefs as compared to mothers of non-ADHD comparison girls.

3.5.4 Studies of Stimulant Drug Effects on Parenting of ADHD Children

Negative mother-child interactions in the preschool years have been found to be associated with the continuation of hyperactivity into late childhood and adolescence. However, it is difficult to conclude whether the hyperactive children’s behaviour is worse because of poor child rearing or the severity of hyperactivity elicits greater maternal negative reactions because most of these studies are correlational in nature. Several studies have, therefore, been conducted to evaluate the direction of effect of stimulant medication on the interaction conflicts of elementary school-age ADHD children. Their results indicate that methylphenidate decreases the off task and non-compliant behaviour while increasing both the initiation and maintenance of compliance to assigned tests (Barkley, 1988; Barkley et al., 1984; Humphries, Kinsbourne, and Swanson, 1978). Their mothers in
response reduce their use of directions, commands and negative behaviours although they may not increase their approval and positive attention to the children (e.g. Barkley et al., 1985a; Pollard, Ward, and Barkley, 1983).

Barkley (1988) evaluated the effects of methylphenidate on the interactions of 27 preschool ADHD children with their mothers using a double-blind placebo controlled crossover design. His findings strongly suggested that it was the child’s behaviour rather than the parents’ behaviour, which was a more important determinant of conflict in the parent-child interactions during task accomplishment involving ADHD children.

This, however, does not preclude the possibility that the mother’s reactions may exacerbate the child’s problems with control (Mash and Johnston, 1982). These studies suffer from several methodological and theoretical limitations such as short term nature of the child’s medication status, the artificial nature of the laboratory interactions, the relatively small sample sizes, the failure to differentiate changes in ADHD versus conduct problem symptoms. Moreover, the results of these studies were not entirely consistent across measures and situations, which reduce the importance that can be assigned to them. For example, the effects of child medication on parent behaviour were often apparent only during task interactions and only at higher medication doses. (Johnston and Mash, 2001). More research in this area is required before the above cited results can be accepted with conviction.

3.5.5 Parenting Styles and Gender of the ADHD Children

Gender of the child is one of the most powerful bases for the allocation of privileges and penalties. There is considerable evidence to indicate that a parent’s attitudes and beliefs vary according to the gender of the child i.e. differential child rearing practices are employed by parents for boys and girls. Only a handful studies have examined the gender differences in parenting beliefs of ADHD boys and girls. These studies have relied on direct observations of parent-child interactions in the laboratory.

Befera and Barkley (1985) examined the potential sex differences in the parent-child interactions, parent and family psychiatric histories, and
parent ratings of child psychopathology in hyperactive children. They compared 30 hyperactive and 30 normal children with the groups equally divided by sex. The children were in the age group of 6 to 11 years. While hyperactive sample was obtained from referrals to a child psychology clinic within a medical college, the comparison group children were recruited through friends of families with hyperactive children. The mother-child interactions were observed in a playroom with a one-way observation mirror and intercom. The interactions were videotaped and later coded using the Response Class Matrix. Hyperactive children were observed to be less compliant and more negative, and their mothers responded more negatively to their compliance than mothers of normal children. Hyperactive boys received more direction and praise during free play than hyperactive or normal boys and girls. However, they received fewer general, non-directive interactions during free play than either hyperactive girls or normal boys and girls. Mothers of hyperactive boys expressed more concern about their adjustment than mothers of hyperactive girls or normal children. During task completion the boys received more praise but not more commands than the girls.

Barkley (1989) not only attempted to replicate these findings of sex differences in the mother-child interactions of hyperactive children but also tried to evaluate the effects of doses of methylphenidate on these interactions. A total of 40 hyperactive children participated in this study, with equal members of each sex. The subjects were selected from consecutive referrals to a clinic for hyperactive children in a large metropolitan city. The children ranged in age from 3 years, 7 months to 10 years, 1 month. The subject selection criteria and methods for studying these mother-child interactions in the present study were identical to those used by Beera and Barkley (1985), thereby, permitting the direct comparison of findings between the two studies. Pretreatment observation of the interactions of the mothers and children revealed few sex differences during free play. Mothers of hyperactive boys were more controlling and directive of their children’s independent play than were mothers of hyperactive girls. During the task period hyperactive boys were less compliant with their mothers’ commands. An evaluation of the
differential effects of Ritalin on the mother-child interactions of hyperactive girls and boys revealed no significant sex differences. During task performance, the children increased their duration of compliance while parents increased their level of more general, non-directive interactions and passive observation of their children. These findings are consistent with previous studies of stimulant drug effects on the social interactions of hyperactive children, and also extend these results to mother-daughter interactions (Barkley et al., 1985a,b).

Only a couple of studies have examined the gender differences in the mother-child interactions of hyperactive boys and girls which limits the conclusions that can be drawn from the existing literature. Observational studies of parent-child interactions have typically focused on mother-son interactions although a large number of girls might be suffering from ADHD. Wherever girls with hyperactivity have been studied, they have invariably been included with the hyperactive boys for the analysis. While previous literature emphasized the impact of sex of the hyperactive child on the intellectual impairment, level of hyperactivity and rates of externalizing behaviours, hardly any research, either in the West or in India, has addressed the possible differential impact of sex of the child on parenting practices of ADHD children.

From the above review of literature several consistent patterns emerge. Firstly, most of these studies examining the parenting of ADHD children have relied on the observation of parent-child interactions in structured laboratory situations. Although a generally consistent pattern of results has emerged, it is essential to replicate them under naturalistic conditions before results can be generalized to everyday family interaction. Secondly, most of these studies have focused on the observation of mother-son interactions although a number of girls may be suffering from ADHD. With decreasing differential child rearing practices for male and female children, one may find a different picture while comparing the sexes on ADHD. Moreover, these studies are limited by small sample sizes, a limited scope of assessment and the absence of gender matched comparison subjects. These limitations impede an adequate understanding of gender effects and the ability to separate gender
effects on parenting of ADHD children from the main effects of gender within ADHD subjects. Thirdly, the sample size of majority of these studies is small which limits the precision of the results. Fourthly, most of these studies on the parenting correlates of ADHD and related problems have not examined the impact of these variables after controlling for the presence of comorbid ODD/CD. Finally, since these studies have been conducted in the West, owing to the diverse cultural patterns in India and Western countries it will not be justifiable to make generalization on the basis of the literature from the West.

Keeping the above points in view, and based on the review of the above studies, the primary aim of the present research endeavour was to examine the maternal parenting beliefs of ADHD children in India and compare them with the parenting beliefs of mothers of non ADHD control children. Specifically, it was hypothesized

1. Mothers of ADHD children will be more authoritarian in their parenting beliefs as compared to mother of non ADHD control children.
2. Mothers of ADHD children will be less authoritative in their parenting beliefs as compared to mothers of non ADHD control children.

One of the secondary aims of the present research was to investigate the trends in parenting beliefs or practices of ADHD children separately for boys and girls. However, in the absence of relevant theoretical models to fallback upon, no specific hypothesis was framed. Since it was expected that parenting would influence the hyperactive behaviour of children it was decided to identify predictors of ADHD in children. Indicators of early parenting risk would enable prevention and early intervention providers to identify those mothers who are most in need of services.

3.6 RELATIONSHIP BETWEEN ADHD IN CHILDREN AND FAMILY ENVIRONMENT

This section integrates and reviews studies that have explored the relationship between family functioning and ADHD in children. Although in recent years evidence has accumulated indicating that ADHD is a familial disorder, research endeavours have indicated that the quality of family

-76-
relationships of children with ADHD plays a significant role in the development and prognosis of behavioural and interpersonal problems of children with ADHD.

The review is divided into four parts. In the first section studies conducted on clinically diagnosed ADHD children are reviewed. The second section covers the longitudinal studies on the family environment factors associated with persistence of ADHD and related psychopathology. The studies of family environment risk factors associated with clinically diagnosed ADHD are evaluated in the third section. The last section reviews the studies of family environment of ADHD children with comorbid conduct problems

3.6.1 Clinical Studies on Family Environment Factors Associated with ADHD

In this section clinical studies of family environment risk factors associated with ADHD have been reviewed.

In one of the earliest studies Marshall, Longwell, Goldstein, and Swanson (1990) examined the family factors associated with aggressive symptomatology in boys with attention deficit hyperactivity disorder. A total of 29 boys who met the DSM-III criteria for ADHD and their parents participated in the study. Affective attitudes of both parents and their ADHD sons were studied using modified measures of expressed emotion-the five-minute-speech-sample (FMSS-EE). The investigation led to the conclusion that aggressiveness and a negative family climate may be independent factors in determining the long term course of ADHD children.

Biederman and his colleagues (1995 a, b,c,1998) carried out a series of studies on pediatrically and psychiatrically referred children in order to assess the family environment risk factors associated with ADHD.

Biederman et al. (1995 b) compared the family environment of 140 ADHD and 120 normal control boys in the age range of 6-17 years. The ADHD probands were selected using a three stage ascertainment procedure (i) clinical diagnosis of ADHD by a child psychiatrist or pediatrician (ii) confirmation of diagnosis of ADHD by screening for DSM-III-R symptoms using a telephone questionnaire with the mother (iii) Kiddie’s Schedule for Affective Disorders and Schizophrenia for school age children. Rutter's
indicators of adversity were used to predict the occurrence of ADHD and related psychopathology as well as impaired cognitive and psychosocial functioning. A summary measure of family conflict derived from Relationship Dimension of Family Environment Scale (Moos and Moos, 1974) was used as a proxy for severe marital discord. A comparison of the ADHD and normal control boys revealed that ADHD boys were significantly more likely to belong to families with high conflict and lower SES. The odds ratio for the diagnosis of ADHD increased as the number of Rutter’s adversity indicators increased. These findings supported the work of Rutter and also stressed the importance of adverse family environment variables as risk factors for children with ADHD.

In another study using the same sample, Biederman et al. (1995c) investigated the impact of familial adversity on comorbidity and functioning of children with ADHD. Three subscales of Family Environment Scale i.e. cohesion, expressiveness, and conflict were used to measure the quality of interpersonal family relationships. Exposure to parental psychopathology and conflict were used as indicators of adversity and their impact on ADHD and ADHD-related psychopathology and dysfunction in children were assessed. Their investigations led to the conclusion that ADHD children are significantly more likely to belong to families with higher parental conflict, greater number of psychiatric illnesses in parents during the child’s lifetime and greater proportion of child’s life exposed to maternal psychopathology.

Biederman, Faraone, Mick, Williamson, Wilens, Spencer et al. (1999) examined the clinical correlates of ADHD in females. The family functioning of 140 girls with ADHD ascertained from pediatric and psychiatric referrals was compared with that of 122 comparison girls without ADHD matched for age and social class. Standardized assessments of family functioning were made by raters who were blind to the clinical diagnosis. Assessment of family functioning by three subscales of relationship dimension of Family Environment Scale (Moos and Moos, 1974) revealed that girls with ADHD had significantly higher levels of family dysfunction indexed through more impaired scores on conflict and cohesion subscales.
Very few Indian studies have examined the family environment factors associated with ADHD in children. Bhatia et al. (1991) in a study on attention deficit hyperactivity disorder among pediatric outpatients of a tertiary care hospital compared the family environment of ADHD children with comparison children. They found that families of ADHD children were characterized by persistent parental discord and higher incidence of broken homes.

Bhatia et al. (1999) also reported similar findings in a study on 64 psychiatrically referred children. They found that the incidence of broken homes, persistent parental discord or complaints of aggressive behaviours by parents were more common in ADHD children. Their findings led to the conclusion that unhappy and disrupted family atmosphere increases the risk of hyperactivity.

From the above review, it can be concluded that clinically diagnosed ADHD children belong to dysfunctional families characterized by conflict and low socio-economic status.

3.6.2 Longitudinal Studies on Family Environment Factors Associated with ADHD

A number of longitudinal studies have examined the family environment factors associated with emergence and persistence of externalizing behavioural problems including hyperactivity.

Egeland, Kalkoske, Gottesman, and Erickson (1990) followed three groups of preschoolers with behavioural problems (i.e. acting out, withdrawn, and attention problems) and a group of competent non-problematic preschoolers through first, second and third grade. They found that the preschool behaviour problem children who functioned in a competent fashion in school came from home environments that were organized, predictable, and were more stimulating and responsive to the child's needs. Mothers of these children were accepting, respectful, and had a positive feeling and attitude towards the child. Family stress was significantly lower for the competent continuity group compared to the children who were competent in preschool but who had behavioural problems in early elementary school. The preschool behaviour group who improved over time had significantly more
stimulation at home and higher predictability and organization of the home environment than did the behaviour problem continuity group. Thus, these findings lend support to the conclusion that home environment, specifically the degree of stimulation, predictability and organization are important elements in the equation of behavioural continuity and change across early to middle childhood.

Susan Campbell (1987, 1990,1991,1994,1996) conducted one of the most comprehensive longitudinal studies to determine the persistence of early behaviour problems and to identify the predictors of good and poor outcome. Out of the 46 hard-to-manage 3 year olds who were identified as difficult in toddlerhood or early preschool years by parents, 32 children were followed up at age six. Follow up at age 6 indicated that half the original problem group was still having clinically significant difficulties at school entry as determined from maternal interviews and questionnaires. The maternal symptom ratings at age 6 were predicted by severity of children’s initial symptoms of both hyperactivity and aggression, quality of mother-child relationship and family stress. Children who were initially more symptomatic showing both more hyperactivity and oppositional behaviour and living in less stable families characterized by conflicted mother-child interaction were more likely to continue to have difficulties at age six. Conversely, children with either less severe or more circumscribed initial problems (Campbell, 1987) and living in more stable families were more likely to be showing transient problems that may have been a manifestation of a difficult but a typical developmental transition.

Campbell and Ewing (1990) followed up 29 of these hard-to-manage preschoolers at age 9. The mothers completed a structured interview which consisted of a series of questions on family change including change in work status, marital status, and other changes or stresses in the family. Regression analysis indicated that children showing early signs of hyperactivity and impulsivity control problems living in more stressful or disorganized families were more likely to be rated by their teachers as showing significant symptoms at age 9.
In another short-term longitudinal study, Campbell, March, Pierce, Ewing, and Szumowski (1991) attempted to replicate and extend these findings. One year follow up of 112 boys identified as problematic by mothers and/or teachers at preschool age revealed that children with problematic behaviours continued to experience more stressful events and family change.

A follow up of 105 of these boys 2 years after initial assessment by Campbell (1994), led to the conclusion that boys with persistent problems came from families that had been experiencing difficulties from at least the time of study entry which was reflected in higher rates of maternal depression, more stressful life events and lower rates of maternal satisfaction. Boys with potentially emerging problems were characterized by more family problems than the remaining control boys.

Thus, these findings highlight the important role that family context plays in both the onset and stability of problems.

Barkley et al. (1990) prospectively followed a large sample of 123 hyperactive children meeting the research diagnostic criteria and 66 normal control children over an 8 year period into adolescence in order to determine the psychiatric outcome. Over 80% of the hyperactives were ADHD and 60% had either oppositional defiant disorder and/or conduct disorder at outcome. Using structured psychiatric interviews with mothers they found that family status of the hyperactives changed considerably over the 8 year follow-up period relative to the controls group. In sum, they found that the stability of marriage, job and residence was much less typical of families of hyperactives than of normal children.

Biederman et al. (1996) evaluated the predictors of persistence of ADHD in a large sample of clinically referred children and adolescents with DSM-III-R ADHD. At 4-year follow up, 85% children met full or subthreshold criteria for ADHD with associated impairment. Family indices of psychosocial adversity assessed using exposure to parental psychopathology and parental conflict emerged as strong predictors of persistence of ADHD.

Biederman, Faraone, Taylor, Sienna, Williamson, and Fine (1998) compared the clinical expression and correlates of attention-deficit hyperactivity disorder of children and adolescents. The sample consisted of
140 non-Hispanic psychiatrically referred ADHD boys in the age group of 6-17 years. Family functioning and psychiatric diagnosis were assessed using DSM-III-R structured diagnostic interviews, psychometric measures and blind raters. Psychosocial adversity was assessed using the proportion of child’s life exposed to maternal and paternal psychopathology, socio-economic status, family intactness (divorce or separation of parents), an Index of Family Conflict and Rutter’s index of adversity. A summary index of Family Conflict was obtained from Family Environment Scale (Moos and Moos, 1981). The results indicated an almost identical pattern of psychosocial adversity in children and adolescents with ADHD with small but statistically significant differences in social class and family intactness between ADHD children and controls. Larger differences were identified between ADHD and control subjects on Rutter’s indicators of adversity, exposure to parental psychopathology and parental conflict measured by the FES irrespective of development status (child versus adolescent).

From the longitudinal studies reviewed above it can be concluded that family conflict and psychosocial adversity are significant predictors of the occurrence and persistence of ADHD in both clinical and community samples of hyperactive boys and girls. Moreover, children with behavioural problems were more likely to belong to families which were disorganized.

3.6.3 Community Studies on Family Factors Associated with ADHD

In the Dunedin Multidisciplinary Child Development Study, McGee, Williams, and Silva (1984b) examined the psychosocial correlates of inattentive, hyperactive, and antisocial behaviours of 926 non-clinic referred children at age 9 using the Rutter Scale B and some additional items from DSM-III criteria for ADHD. The family functioning was assessed by maternal reports using direct interviews or questionnaires. They concluded that teacher's ratings of inattention and antisocial behaviour were predicted primarily by more visible aspects of the family i.e. socio-economic status, solo parenting and separated parents. Low SES and solo parenting in combination with maternal psychological symptoms and poor relationships within the
family, on the other hand, predicted parental ratings of antisocial, hyperactive and fearful behaviour.

McGee, Williams, Bradshaw, Chapel, Robins, and Silva (1985) explored the relationship between the behavioural problems and family background of 940 seven-year-old children enrolled in Dunedin Multidisciplinary Child Development Study. A family adversity index was developed which was based on (i) SES levels V and VI representing semiskilled and unskilled father's occupation (ii) large family size of 4 or more children (iii) parental separation upto age 7 years (iv) low maternal mental ability (v) maternal reports of poor mental health (vi) reportedly poor relationships indicated by a score of 14 or less on the measures of family cohesion, expressiveness and conflict of Family Environment Scale (Moos and Moos, 1974). Children were considered to be from adverse family circumstances if 3 or more of the above conditions were met. Analysis revealed that aggressiveness and hyperactivity varied significantly over increasing level of family adversity. In terms of overall problem behaviour the presence of two or more risk factors resulted in a significant increase in level of reported problems compared to children with no adverse family stresses.

The psychosocial correlates of ADHD including the household, parental, family and child domains were investigated by Szatmari et al. (1989b). The sample consisted of 154 ADHD children in the age range of 4-16 years who participated in Ontario Child Heath Study. Family functioning was assessed using the General Functioning Scale derived from McMaster Family Assessment Device. Analysis of the results indicated that family dysfunction and single parenting were associated with hyperactivity. ADHD children were also observed to be more likely to belong to families living on welfare. The findings of Ontario Child Health Study, thus, led to the conclusion that family dysfunction makes an independent contribution to the prediction of ADHD after controlling for other variables in the model.

Woodward et al. (1998) examined the family life correlates of childhood hyperactivity in a community sample of London school children. Twenty-eight boys with pervasive hyperactivity were compared to 30 classroom control children on a range of family functioning measures such as parent's mental
health, partner relations and practical support which were assessed using rating scales and questionnaires. Results indicated that parents of children with hyperactivity were more clinically disturbed and reported receiving less practical support from family and friends.

From the above review it can be inferred that very few studies have examined family functioning of ADHD children. Majority of the studies on community samples of ADHD children have reported more stressful and conflicted family environment in families of children with ADHD compared to non problem controls.

3.6.4 Studies on Family Environment of ADHD Children with Comorbid Conduct Problems

Some studies of family functioning of ADHD children have reported that the association between family factors and childhood ADHD may reflect the proportion of sample with comorbid conduct problems (e.g. Barkley, 1990; Barkley et al., 1991). This was reflected in the work of Paternite, Loney, and Langhorne (1976) who reported that family variables such as socio-economic status and parenting styles were more strongly associated with child aggression than with the symptoms of ADHD.

Similarly, Taylor, Schachar, Thorley, and Wieselberg (1986) in a study on a British sample of clinic referred children concluded that child defiance, but not hyperactivity, was correlated with family functioning (e.g. interparent inconsistencies, less warmth, and high criticism).

However, several other studies that have used questionnaires to assess family functioning across groups of clinic-referred boys with ADHD, ODD/CD, psychiatric controls and non-problem controls (e.g. Ford, Racusin, Daviss, Ellis, Thomas, Rogers et al., 1999; Schachar and Wachs, 1991) have not found differences in family functioning of such groups.

Group differences in family functioning were also inconsistent in community samples where cut off scores were used to form groups of children with ADHD and conduct problems. For example, McGee et al. (1984b) compared the background characteristics of an epidemiological sample of aggressive, hyperactive and aggressive-hyperactive boys and concluded that both the aggressive only and the hyperactive only groups differed
from controls in family functioning but a comorbid group did not different from controls. Similar findings were reported by Szatmari et al. (1989a) in a Canadian community sample and Stormont-Spurge and Zentall (1995) in a sample of preschoolers identified by parents as hyperactive or aggressive. No differences in family dysfunction adversity or child rearing practices were observed among ADHD, conduct disordered and children with comorbid problems. Thus, studies of parent reported family functioning in epidemiologic families of ADHD children versus families of children with comorbid ADHD and conduct problems offered no strong evidence of differential association between family functioning and ADHD versus conduct problems.

On the other hand, comorbidity effects on family measures were more consistent where dimensional approach to attention and conduct was taken or longitudinal designs were used (e.g. August, Realmuto, Joyce, and Hektner, 1999; Woodward et al., 1998). These studies suggest that family dysfunction particularly in the early to middle childhood contributes to the development or continuity of conduct problems, but is not related to ADHD symptoms.

From the above discussion it is clear that there are several inconsistencies in the findings of studies comparing family environment of ADHD children and ADHD children with comorbid conduct problems. Although research indicates that family environment factors are most strongly linked to child conduct problems, there is some evidence to indicate that these factors are also associated with childhood ADHD. These studies, however, are limited by the presence of a number of inconclusive or unsupportive results.

In addition to the inconsistencies in findings several other studies have failed to replicate the association between problematic family environment and ADHD in children (e.g. Byrne, DeWolfe and Bawden, 1998; Cunningham, Benness and Siegel, 1988; Goodman and Stevenson, 1989).

In sum, however, generally family functioning has been observed to be associated with ADHD across community and clinical samples. However, these studies are limited by several methodological problems. Firstly, the small sample size, limited scope of assessment and absence of non-pathological controls in many studies greatly limits the interpretation of their results. Secondly, most of these studies have used samples of boys attending
specialized clinics. Very little is known about the relationship of family environment with ADHD in girls because in studies of mixed samples of ADHD children, the girls have been underrepresented. Although research has clearly revealed that a large proportion of girls also suffer from ADHD only a few studies have investigated the family functioning of ADHD girls. Thirdly, most of the previous studies have been conducted on clinically diagnosed children. It is unclear as to what extent the findings will hold good for community samples. Moreover, it is difficult to draw firm conclusions about family adversity correlates of a disorder from clinic-referred children because in such studies it is impossible to disentangle the correlates associated with children seeking treatment from the correlates of the disorder itself. Fourthly, in majority of the studies on family environment of ADHD children, only the relationship dimension of FES has been used as proxy for marital conflict although the FES also taps into other aspects of family functioning involving non-spousal family members. Lastly, only a handful of Indian studies have examined the family functioning of ADHD children. Given the vast cultural difference, the findings of Western studies cannot be generalized to Indian samples.

Keeping the above points in mind, the current study was, therefore, undertaken with the aim of examining the family environment risk factors associated with ADHD in a sample of elementary school children. It was hypothesized that

1. Families of ADHD children will be higher on conflict as compared to families of non ADHD control children.
2. Families of ADHD children will be more controlling than families of non ADHD control children.
3. Families of ADHD children will be more disorganized than families of non ADHD control children.

Since little is known about the effect of gender on the association between ADHD in children and family environment, another aim of the current study was to explore the differences in family environment risk factors of ADHD and control children separately for boys and girls. However, no specific hypotheses were framed in the absence of relevant research literature.