CHAPTER - II

LITERATURE REVIEW

The presence of behavior problems in mentally retarded acts as a serious barrier to their personal development, integration and adjustment in community settings. This Chapter reviews the literature relevant to this study from the year 1964 to 1991. Thus the literature based on the investigation in the field of behavioral problems and it's associated problems may conveniently considered under three headings:

1. General behavior problems / behavior disorders.
   (1) Hyperactivity with and without conduct disorder
   (2) Aggressive conduct disorder

2. Behavioral and emotional problems in M. R.


1. General Behavior problems / Behavior disorder

There have been numerous studies in the last three decades regarding behavior disorders in children's. This selective review focuses on studies involving behavioral problems of children and adult.

Suh, M., Carlson, R. (1977) studied 197 children with
behavior disorders. An attempt was made to correlate diagnoses between child rearing methods and family Socio-Economic Status (SES—the Hollings). Unsocialized aggressive reaction was most common diagnosis (56.4%) and it was chiefly related to hostile-permissive child rearing methods and found most commonly in SES III families. Over-anxious reaction was found in SES I families. Result indicates that SES of the family is a factor in the expression of symptoms in behavior disorder, rather than particular child rearing methods.

Welding, G., (1977) studied German preschools children and identified them by using interview and a checklist. 13% of the 1,372 children aged 3 to 7 years having behavior problems including 16% of the 702 boys and 9% of the 670 girls. Most common disturbances were sensitiveness, aggressiveness other affective problems, social withdrawal, hyperactivity, psychomotor disturbances and speech disorder. Psychosomatic disorders eating problems were uncommon. The problem of boys included destructiveness, impulsiveness and related problems. The problems of girls were excessive inhibition such as submissiveness, shyness and thumb sucking.

Center, D. B., (1981) tested 33 children ranging age from 5 to 12 years old. On the Referral checklist and development representative objective rating form. They
tested the assumption that there is a close relationship between presenting behavior problem and developmental deficits by running a stepwise, backward multiple-regression analysis of scores obtained from data. Analyses failed to support that 2 classes of variables are related.

Crowther, J. H., Bond, L. A. & Rolf, J. E. (1981) studied 588 children, 320 boys and 269 girls aged 2 to 5 years. The Vermont behavior checklist was used. The boys showed high frequencies of destructive behavior and disruptive behavior at 3 years $P < .04$ and $p < .02$ respectively refusing to do things when asked having trouble coping with frustration at 3 years $P < .03$ and $p < .01$ and at 4 years $P < .05$ and $p < .02$ displaying high activity levels and picking fights with others at 5 years $P < .0001$ and $p < .02$. Boys were rated as having difficulty working and playing well with others at 4 years $p < .02$, larger percentage of girls were rated as speaking in soft voice compared to other children. The severity of these behavior distinguishing between a behavior of early childhood and a behavior disorder. More than 20% of the males aged 2 to 4 and females aged 2 were rated as very high activity level, 20% of the males were seen as inattentive and demanding adult attention.

Mc Gee, R., Silva, P. A., & Williams, S. (1983) investigated the characteristics of children identified as having behavior problems by parents and teachers. Ss were
492 boys, 459 girls aged 7 years. Results indicate that differential association between these background characteristics and problems behavior whether the parent, the teacher or both perceived a problems. Findings pointed out, the need for a careful description of children with behavior problems based on the reports of parent.

Stein Mark, A., O'Donnel, J. P. (1985) studied 59 boys, 39 girls ranging age from 5 to 12 years with IQ. greater than 70. 19 children with conduct disorder (CD), 23 with attention deficit disorder (ADD) and 16 with Anxiety Disorder for contrast group - 14 children with physical disability and 17 normal children. On Conner's Teacher rating scale CD Ss would have significantly higher conduct problems and ADD Ss would have significantly greater hyperactivity. CTRs yielded accurate classification 67% when CD was combined with ADD and normals with physical disabled. Teacher-raters described Ss as behaviorally disorder with and without hyperactivity. Data suggest ADD is part of a broader conduct problems.

Thompson, R. J. (1985) studied behavior problem in childhood. Findings are organized around basic question regarding frequency of behavior problem in the normal population. The last decade has seen a substantial increase in broad-band, narrow-band types of behavior problems and the frequencies of these in normal children and those with
medical, mental and developmental problem.

Mc Gee, R., et al., (1986) examined the relationship between reading disability and behavior problems. Parents and teachers reported for behavior problems at ages 5, 7, 9 and 11 years for three groups of boys. Out of that, 18 with specific reading retarded, 22 general reading backward and 436 with no specific reading disability. Both groups of reading disabled boys were reported as having more behavior problems and problems increased during their early school years. Teachers perceived them as more aggressive and hyperactive. Thus results suggest that behavior problem predate reading disability, while reading failure further exacerbates the existing behavior problem.

Wang, Y., Shen, Y., Gu, B. J. et al., (1989) evaluated 2,432 primary school children aged 7 to 14 years at urban areas of Beijing, China. Children's questionnaire (Rutter) was used. The frequency for behavioral problems such as antisocial behavior 7.4% whereas 0.62% for behavior. Antisocial behavior was dominant in boys, while neurotic behavior was common in girls. The frequency of behavioral problems varied significantly with different social condition such as family structure, parent involvement in child's teaching and the way they were brought up. There was significantly difference between problems evaluated by parents at home and those observed by teachers in school.
In this section we have seen general behavior problems in institutions and schools set up. It seems that the problems of hyperactivity and aggression are the most common among all. Other associated problems/disorders are (i) Speech disorder, (ii) Anxiety behavior, (iii) Social withdrawl, (iv) Antisocial behavior, (v) Neurotic behavior (vi) Destructive and disruptive behavior and (vii) Physical disability. Out of these antisocial behavior, destructiveness, disruptiveness and impulsivity were found to be more common in boys whereas girls were more shy, submissive, thumb sucking and also showed neurotic behavior. Wang, Y., Shen, Y., et al., (1989) found that behavior problems has significant difference at home and school.

The methods used were mostly rating by parents, teachers and interviews. The various scales used were as follows:
- (i) Vermont Behavior Checklist,
- (ii) Conners – Teacher Rating Scale,
- (iii) Children's Behavior Questionnaire,
- (iv) Referral form checklist and developmental representative objective rating form and
- (v) Family Socio-Economic Status (Hollings).

These studies have been for the sake of convenience, categorized into two different areas viz.
- (1) Hyperactivity with and without conduct disorder and
- (2) Aggressive conduct disorder.
(1) Hyperactivity with and without conduct disorder

Virkkunen, M. & Nuutila, A., (1976) studied 58 children under age of 14 years, who met the criteria for aggressive conduct disorder, namely, marked physical aggressiveness and disobedience together with destructiveness or cruelty, lasting for at least a year. For this study, scale of aggressiveness, egocentricity, reactivity and antisocial behavior were constructed. Result showed that 34 boys (74%) were hyperactive and 12 were not, whereas 12 girls divided evenly on level of activity. 30 boys (65%) were antisocial and 16 were not. The corresponding no. of girls were seven (50%) and five. The no. of 11 boys were with aggressive conduct disorder, whereas 48% of male subject had risk of developing antisocial personality.

Skrezyna, J. (1978) compound the behavior of 180 hyperactive children with 180 normal children. Factors discussed were the child's level, motor ability, school performance and parental attitudes toward school and their child rearing practice. The hyperactive children showed a developmental lag, poorer class achievement and also more misbehavior in class.

Yonge, D. J., (1978) administered specially designed questionnaire to 50 mothers, 25 of whom had hyperactive sons and 25 who had normal sons. The questionnaire examined a no. of behavioral antecedents of hyperactivity. They have found
that hyperactive boys were more prone to come from single
parent house, had to be disciplined more frequently, had
difficulty getting along with others and had fathers who had
learning problems. They also found that maternal uncles of
the hyperactive Ss had certain behavior problems related to
hyperactivity.

Campbell, E. S., & Rodfering D. L. (1979) studied 160
subjects: 79 hyperactive, 81 non-hyperactive. Out of these,
106 were males and 54 were females ranging from 5 to 12
years of age. It shows that the Sex of the child and the
Occurrence of hyperactivity were positively related (X^2 =
17.56, df = 1, p < .001). The ratio of hyperactivity from
males to females was 5:1. None of the following factors
were significantly related to the occurrence of
hyperactivity: birth order of child, number of siblings,
family income level, educational level, current marital
status of parents and method of discipline. The study
suggests that occurrence of hyperactivity was not related
to the environmental and demographic factors measured. It
was found that compared to non-hyperactive, hyperactive were
overwhelmingly more likely to be males.

followed up 34 'pure' hyperactive boys (mean age 14.2 years)
and 42 hyperactive, unsocialized and aggressive boys (mean
age 13.7 years). They conducted a structured interview with
each parent of subject. Results show that Ss purely
hyperactive continued to be inattentive and impulsive but
also showed aggressive and antisocial behaviors. Hyperactives who had problems of undersocialized and aggression, continued to have problems with attention, impulsivity and also reported to be aggressive. Noncompliant, egocentric, they exhibited antisocial behavior and alcoholic. Findings suggests that antisocial and delinquent behavior of hyperactive boys may be linked to childhood aggression and unsocialized behavior rather than the syndrom of hyperactivity.

Taylor, E. A., Everitt, B., Thorly, B. et al., (1986) studied 64 boys out of them 60 with antisocial or disruptive behavior and 4 without any behavioral abnormality. Cluster analysis measured behavior at home, school and clinic. CTRS (Clusters Teacher Rating Scale) measured hyperactivity factor, conduct disorder, emotional disorder and attention deficit with attention performance. Result showed poor score on attention performance, less evidence of Overt emotional disorder. 25% of the total hyperactive and defiant behavior in the classroom were low. Significant differences existed between clusters - hyperactive children were younger when referred, had lower IQ. and showed more semimotor uncoordination. The cluster analysis identified a group of previously hyperactive and inattentive children among those presenting with antisocial or disruptive conduct.

The above stated studies thus indicate that hyperactivity, aggression conduct disorder, antisocial
behavior and delinquent behavior as major behavior disorders. As stated earlier, these were found more in boys. As per August, G. J., studies, antisocial and delinquent behavior of hyperactive boys are linked to childhood aggression.

The Conners Teacher Rating Scale were common amongst most of the studies and many researchers have constructed their own scales and interview techniques.

(2) Aggressive conduct disorder

This section reviews various studies of Aggression conduct disorder.

Stewart, M. A., Behar, D., (1983) studied 46 boys under age of 14 years with aggressive conduct disorder. 34 boys (74%) were hyperactive, 12 were not. 30 boys (65%) were antisocial and 16 were not. The hyperactive boys tended to come from smaller families of higher socio-economic status, compared to normally active, their families were more often disrupted and unstable.

Behar, D. & Stewart M. A. (1984) studied 12 female and 46 males, 3 to 4 years old with aggressive conduct disorder. Females were more likely to have physical complaints, to injure themselves and to have step father. Higher socio-economic status (SES) Ss showed higher level of egocentricity and antisocial behavior where on lower SES Ss
were likely to be from families in which child abused occurred. Younger Ss used as hyperactive or having attention deficit disorder, abnormally slow EEG tracing than older.

Stewart, M. A. & Kelso, J., (1987) studied 53 boys aged 5 to 16 years with aggressive conduct disorder (ACD) and 36 with other psychiatric disorders. Mothers and mother figure were interviewed which included structure questions on behavior. Data shows that 29 of ACD subject still met the criteria for ACD, 24 did not. Conduct disorder was predicted by the symptoms of hyperactivity and inattention. It also suggests there are 2 types of ACD, one is short-lived and benign, second is more likely to persist and more serious.

Chawla, P. L. & Sashi, B., (1989) surveyed 2160 children, more than 80% were in the range of 8 - 11 years. 1062 children (49%) were absolutely symptoms-free. 51% of the children were found to be having at least one symptom. Conduct disorders shows that the symptoms are equally distributed in Govt. and private schools except symptoms excitable and talkative were seen more in private schools. Running away from school was seen more frequently in Government schools, being inattentively class was the most frequent symptom in studied sample. 47% of the mother had a feeling that their children suffered from behavior problems. Results revealed that almost half of the children had one or more of the symptoms of conduct disorder.
Thus studies in this section shows major behavior problems as conduct disorder, hyperactivity, antisocial behavior and aggression. Running away from school is also found in this section. The scales administered were socio-economic status and self constructed questionnaire. Family status and environment were also studied in some of the studies.

2. Behavioral and emotional problems in M.R.

The literature shows that the mentally retarded individuals are at significant risk of developing emotional disturbance and thus are especially vulnerable to emotional problems that often promote the display of various kinds of maladaptive behavior.

Davenport, R. K. & Berkson, G., (1965) studied stereotyped behavior and manipulation of objects of severely retarded. 4 novel manipulable objects were presented to the Ss who showed more stereotyped behavior, manipulated objects less than the did Ss who stereotyped less frequently. The frequency of stereotyping was lower than the Ss manipulated objects, when they did not. Overall there was no difference in the effects of the 4 objects on stereotyped behavior and object manipulation. Stereotyping was significantly less frequent with the most manipulated objects, as compared with the least manipulated objects.
Turnure, J. E., (1970) describes three studies in which the orienting behavior of normal and mentally retarded children was investigated. Initial study found that in many cases normal Ss showed non-task orientations to a greater extent than the retarded Ss. Further research involving only retarded Ss shows that the inclusions of an adult in the learning situations greatly increased retarded Ss non task orientations. However it was also shown that retarded Ss apparently represented information seeking and not merely vacuous orientation to a salient social stimulus.

Rourke, P. G. & Quinlan, D.M., (1973) studied 8-14 years old borderline mentally retarded children who presented serious behavior problems as impulsivity, lacking facility with time concepts, over involvement fantasy, depression and hyperactivity. The psychological test such as WISC, TAT, B.B were administered to two groups of problem behavior children, one group with borderline adjusted and second group with normal IQ. (n=15). The measures of impulsiveness and facility with time concepts did not discriminate Ss with problem behavior from borderline group, possibly because the development of anticipation and planning abilities is incomplete in most preadolescent children. Behavior problem children are more involved in fantasy, particularly fantasy with depressive and aggressive content, than adjusted children and are relatively lacking in perceptual motor skills especially in area where deficits
are often associated with minimal brain damage.

Krynski, S., (1975) studied the mental deficiency and behavioral disorder. Many mental deficiencies present behavioral disorder and reflects either primary condition or reactions to outside influences. Primary disorders occur in the most affected group and reactive disorders in the mildly deficient. Family dynamics are fundamental in the genesis of the latter group and a compliment to primary disorders. The primary group is a high-risk group, less deficient, vulnerable in terms of reactive or secondary disorders. The Child’s genome (total of his genetic inheritance) always contains more potential than phenotypically. Cogenital endowment and cogenital organization of behavior are patterned by complex biochemical interactions, patterns of behavior encoded in LMS metabolism. Learning is affected by gene action but in a feedback process, gene action is affected by learning.

Olechnowiczova, H., (1976) studied 3-42 month old 36 children separated into 3 groups according to the intensity of their automatic rocking. There was no correlation between the intensity of rocking and IQ, but there seemed to be connection between the stereotype movements and signs of sadness, tension and startle reaction. Second group 46 Ss of young children 3-36 month old with rocking movements was selected, they are without organic brain damage severely retarded. And the third group of retardates between 8 and 20
years of age. Rocking was found to help the Ss to reduce their frustration tension. It is concluded that chronic stress causes disorganization of the forms of behavior, which is manifested by the stereotypic activities of automatism.

Tavormina, J. B., Henggeler, S. W. & Gayton, W. F. (1976) studied 52 mothers with retarded child. Responses were categorized into 12 problems areas, analyzed by age groups 2 to 4, 4 to 6, 8 to 12, 12 to 17 years. The most pressing issue was disobedience, stubbornness and non compliance in all age groups, except adolescence. Trend for most issues to decrease with age, this included eating problem, talking and communication, mobility-walking, impulsivity, sensitivity and temperature behavior, aggression towards others, personal hygiene and dressing problems. In contrast problems with social interaction peaked in the oldest age group concern with toileting, toilet training existed across all age groups, was listed by 45% of the mothers.

Reid, A. H., (1980) describes the clinical and study on clinical psychiatric syndromes encountered in 60 M.R. children, (mean age 5 years). He classified these syndromes according to the multi-axial classification scheme for psychiatric disorders in childhood and adolescence. These disorders were compared with normal intelligence children. Although there was a tendency for some of the disorder to be
unusually persistent, sometimes this persistence was related
to the Ss continuing depending needs arising from the
retardation and to stresses within the family.

Groden, G., Domnigue, D., Puesehel, S. M. et al.,
(1982) conducted research of 289 borderline to profoundly
retarded levels having behavioral /emotional difficulties
ranging age from birth to 22 years. 25% of the 1,114
mentally retarded children analyzed by separate age group.
There were differences in incidence of behavioral/emotional
problems depending on intellectual level. To assess the
possibility that age differences among the intellectual
groupings accounted for more behavioral/emotional problems
in the borderline group.

Singh, M. V. & Dagar, B., (1982) analyzed 332 children
with primary behavior problems to determine socio-economic
status SES, various types of behavior problems like
scholastic problems, speech and conduct disorder delinquent
behavior, neurotic and psychotic reactions. The family
structure, parental education, economic status, employment
of the mother were influenced the behavior problem among
children. SES parents seek solution of emotional problem in
terms of somatic disturbances and are not conscious of
children's emotional and mental development.

mentally retarded children. Problem were found in 71% of children, common problem being hyperkinetic behavior, 35.5% speech difficulties, 19.3% neurotic and conduct disorder and 27.4% had epilepsy. Problems were significantly more in male children from urban background.

Koller, H., Richardson, S. A., Katz, M. et al., (1983) studied behavior of 192 retarded subjects in childhood and post school through parents. 60% of the Ss had some behavior disturbances. Hyperactivity was most frequent in children with lower IQ. Antisocial behavior among children and young adult with higher IQs. Aggressive conduct disorder was most frequent in children with IQs below 50, emotional disturbance was more in post school females, antisocial behavior was more in males both in childhood and later period.

Benson, B. A. & Reiss, S., (1984) found emotional disorder in M. R. people. Their findings also shows that M. R. people are vulnerable to a wide range of psychiatric problems that extend beyond impulsive control and aggression.

Somsundaram, O. & Kumar, M. S., (1984) studied 30 mentally retarded institutionalized individuals aged 9 - 18 years, 25 males, 5 females belonging to the severe subnormal group and compared them with noninstitutionalised. Two groups were rated on Social and Physical Incapacity (SPI)
scale and the Speech, Self-help and literature (SSDL) scale (Kushlick et al., 1973). The two groups did not differ in terms of mobility and total behavioral problems. A comparison was made between the two groups for individual behavioral problems, namely aggression, overactivity, attention-seeking behavior, destructive and self-injuring behavior. This institutionalized were more destructive ($P < 0.001$) and self-injuring ($p < 0.001$) whereas non institutionalized were more overactive ($P < 0.01$) and attention-seeking ($p < 0.001$). Two groups did not differ in terms of aggression.

Polloway, E. A., Epstein, M. H. & Douglas, C. (1985) investigated emotional and behavioral problems in Educable mentally retarded (EMR) and Non - handicapped learners (NL), attending public schools in northern Illinois and Southern Wisconsin, EMR group of 348 boys and 264 girls and N. L. group of 600 boys and 516 girls of 6 to 18 years. Subdivided into "elementary-age" 6 to 10, middle school age 11 to 14 and senior high age 15 to 18 groups. On Behavior problems checklist (BPC Quay, 1977) the result showed that the retarded students were more likely to exhibit behavioral and emotional problem. A total of 330 such comparisons were analyzed with 40.6% or 134 indicate of significantly more problem in EMR students. The EMR-NL comparative findings are particularly instructive in the areas of self concept, attention and anxiety. Mentally retarded show more
attention-deficit problems than NL. They also tended to be more distractible, inattentive and have shorter attention span.

Polloway, E. A., et al., (1986) studied children and adolescents 6 to 18 years old educable mentally retarded. Data presented on intellectual level, racial background, social status and presence of specific behavior disorders. Males and racial minorities were overrepresented appeared to be a trend toward lower IQ. scores and less integrated placement among younger Ss. Substantial portion of the samples was rated as socially rejected neglected and hyperactivity was frequent.

Gath, A., & Gumley, D., (1986) studied two groups of 6-17 years old mentally retarded children. 193 with Down's syndrome (DS) and 154 with a similar degree of verbal handicap. Collected data was rated on the Rutter B2 Rating Scale. Additional Behavior Checklist and interviews with parents and teachers about behavior of 2 groups. The proportion of Ss scores in both groups were similar on behavior scale. Deviant behavior was markedly common in both groups of retarded Ss than their siblings. 31% of the Ss with DS and 29% of controls were judged to be well adjusted, while 38% of the DS, Ss and 49% of the control had significant behavior disorders. Conduct disorder was more common in DS. Psychosis was the most common in the central group but was found in Down Syndrome.
Quine, L., (1986) studied social and environment correlates behavior problems in 200 samples of severely mentally handicapped aged 0 to 16 years, their families evaluated by Interview, marital assessment, Malaise inventory, Compared to children with no behavior problem. Relatively few social and environmental correlates were found whereas no difference in family size, birth order, parents age, marital discord or social class and income. Behavior problem were common in single parent families, those who did not own their house. Behavior problems were significantly related to maternal stress.

These various studies show that the mentally retarded children have many behavior problems such as:

(i) Hyperactivity, (ii) Impulsivity, (iii) Stereotypy, (iv) Inattentiveness, (v) Aggression, (vi) Distractibility, (vii) Delinquent behavior and (viii) Anti-social behavior which was found more common in male M.R. Most of the studies also highlighted that these children also have speech and communication difficulties, toilet training problems, perceptual difficulties in motor-skills, somatic disturbance, scholastic backwardness, personal hygiene and dressing problems, They are also more disobedient, stubborn and socially rejected and neglected. Many problems arise from the family stresses, frustration and need for
dependency. It was also found that behavior problems are related to maternal stress.

Methods used for these studies were interview, marital assessment, Malaise Inventory, Behavior problems checklist (Quay 1977), Rutter Rating Scale, Socio Economic Status. Rourke, P. G., et al., (1973) administered WISC, TAT, BS and found that M.R. children also suffer from fantasy with depression which was often associated with minimal brain damage.

The present study intends to go into the problem of behavior disorders in MR children in more detail.

3. Causes of behavior problems:

Behavior problem does not have a separate, specific cause and the cause of one problem could well be the cause of another problem. This section reviews the literature related to causes of behavior problems.

De Sousa, A., (1974) reviewed the environmental factors in child development from conception. During the prenatal period, fetus reacts to the mother's anxiety state, nutritional status and physical health. Even abnormal birth trauma takes greater toll on the infant. During early upbringing, the attitudes and behavior of the mother or mother surrogate form the basis of the infant's concept of the outside world. All faulty parental attitudes like over protection and rejection can be considered. The effects of
the joint family, cultural factors, the neighbourhood and the media on the child are cited. (R. S. Abin).

Arnold, L. E., (1976) discussed the causes of hyperactivity and outlines prevention approaches. He suggested that many causes of behavior may be overlooked in diagnosing behavior and learning problems, these include boredom, disruptive family situations, temporary or permanent anxiety, parental training temperament, physical disorders, and lack of practice in sedentary activities. Hyperactivity is seen as being the result of multiple causative factors, for example brain damage or dysfunction, genetics, neurophysiological factors, peripheral stimulation disorders, stimulus and maternal deprivation, nutrition, hypersensitivity to some food additives, toxins, radiation and psychosocial stress. Preventive measures were identified as providing quality prenatal care, eliminating environmental and food contaminants and improving parent child communications.

Evans, E.G., (1976) studied behavior problems in various group of children. The results show that broken homes, long-term family disturbance, unstable relationships in the home, over crowding and poverty contribute to poor performance at school, antisocial behavior and psychological disturbance. Treatment regarding these disturbances suggests that behavior modification techniques may be more suitable
in home and classroom.

Gopil, G., Comeau, M., et al., (1986) surveyed 105 workers in 64 day-care centers. 73% of the Ss encountered children with such behavior problems. Aggression is the main primary cause in the family. Isolation of the child is the most common intervention method.

Jayanagaraja (1984) studied 50 adolescent and reported that the primary deficiencies like deprivations, separation, domination, negligence and destructive psychic causes affect or disrupt the normal reaction pattern, basic mistrust, doubt, lack of satisfaction of basic needs, feelings of inferiority, role of confusion, search for ego identity, isolation, search for intimacy to get over feelings of isolation, a craving for belongingness, aggression were found to be at the foot for estrangement.

These studies thus focuses on causes of behavior problems that is (i) genetic, (ii) abnormal birth and brain damage, (iii) parental attitudes, broken homes, (iv) Environmental factor and (v) neurophysiological factor.