

Short and long-term outcome of emotional and behavioural problems in young adolescents with and without reading difficulties

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5. Study II: Interview guide

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II List of papers

Paper I

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Paper II

Undheim, AM & Sund, AM (2007). Psychosocial Factors and Reading Difficulties: Students with Reading Difficulties drawn from a Representative Population Sample. (*Accepted for publication in Scandinavian Journal of Psychology*)

Paper III

Undheim, AM & Sund, AM, Wichstrøm, L (2007). Emotional and behavioural problems among school adolescents with and without reading difficulties as measured by the Youth Self Report (YSR): a 1 year follow-up study. (*Submitted*)

Paper IV

Undheim, AM (2003). Dyslexia and psychosocial factors. A follow-up study of young Norwegian adults with a history of dyslexia in childhood. *Nordic Journal of Psychiatry*, 57, 221-226.

III Abbreviations

ANOVA	Analysis of variance
ANCOVA	Analysis of covariance
BDI	Beck Depression Inventory
CBCL	Child Behaviour Checklist
CDI	Children's Depression Inventory
DSM IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
EASQ	Early Adolescence Stress Questionnaire
GSI	General Symptom Index (total item score SCL-90R)
ICD-10	International Statistical Classification of Diseases and Related Health problems: The classification of Mental and Behavioural Disorders.
IPPA	Inventory of Parent and Peer Attachment
LD	Learning disorders
MFQ	Mood and Feelings Questionnaire
OCD	Obsessive Compulsive Disorder
OR	Odds Ratio
RD	Reading Difficulties
SCL-90 R	Symptom Checklist 90 Revised
SE	Standard error
SES	Socioeconomic status
SD	Standard deviation
SPPA	Self-Perception Profile for Adolescents
SPSS	Statistical Package for the Social Sciences
TRF	Teacher Report Form
YSR	Youth Self Report

IV Summary

This thesis aims to examine school-related correlates and risk factors in the development of depressive symptoms among 2464 school adolescents in middle Norway. Correlates and possible risk factors for depressive symptoms and other aspects of emotional/behavioural problems among adolescents with self-reported reading difficulties (RD) in the same sample of school adolescents and among young adults who received a diagnosis of dyslexia/RD in childhood were studied. Possible confounding factors were assessed, and a gender perspective was taken.

All school variables (i.e. high levels of school stress, low class wellbeing and teacher support and school grades) were related to depressive symptom levels on the Mood and Feelings Questionnaire (MFQ) for all adolescents. Cross-sectionnally, low teacher support showed the strongest association with depressive symptoms. MFQ scores at T₁ predicted depressive symptom levels one year later among both genders. Among girls, in addition, three of the school variables, including teacher support, predicted depressive symptom levels in the same period.

Adolescents with RD reported more school stress, lower school grades and parental SES, feeling less accepted by peers, lower functioning level and more use of help for mental health problems during the last 12 months. They also reported higher emotional and behavioural problem levels on all Youth Self Report (YSR) scales at both time-points. Although the level of problems in the RD group tended to decrease, among non-RD adolescents level of problems overall increased, especially externalizing scores. More adolescents with RD than those with non-RD, 41.8% vs. 4.2%, respectively, had started special education during the last 12 months. Having RD predicted levels of future social problems. Receiving special education moderated the effects of RD on later social problems.

Former psychiatric patients with dyslexia assessed in childhood reported lower levels of educational attainment as well as lower satisfaction with health, friends and education in

young adulthood as compared to a “school group” of dyslexic students and a normative sample. Both dyslexic groups showed more general distress than those in the normative group.

It is concluded that subjects with RD/dyslexia tend to face life-long problems displayed in many-faced aspects. Further studies on the full complex of reading as a life-long problem disclosing different problems at different stages are needed. Teacher support is crucial and the contents and the quality of support offered to RD/dyslexic children should be further examined and longitudinal studies are needed.

1. INTRODUCTION

This thesis aims to highlight associations between various school factors and the development of depressive symptoms in a large representative adolescents population in South and North Trøndelag (n=2464) (Study I). This population took part in “The Youth and Mental Health study” from 1998 to 2000 with a focus on a sub-sample having reading difficulties (RD). The study aimed to examine characteristics of the RD group and the development over a one-year period of time. Another aim was to study if this sub-group faced a higher risk of psychiatric symptoms than the total sample.

In addition, the thesis focused on a follow-up study of young adults with a history of dyslexia in childhood (Study II). This study incorporated two samples from two different populations: Group A, with a diagnosis of dyslexia at 10 years of age, selected from a longitudinal population study (n=530), representing half the age cohort of Trondheim city in 1983. Group B included earlier patients also suffering from dyslexia born 1972-75 recruited from the Child Psychiatric Clinic in Trondheim.

1.2 Epidemiological studies

Epidemiological studies search for causes of disease in the general population and systematically examine characteristics of a disease and relationships to risk factors. The term risk factor is a measurable characteristic of a subject that precedes the outcome of interest within a population of subjects (Kraemer et al, 1997). It can be used to divide the population into 2 groups (high and low risk groups) establishing that a significant difference exists between the risk of these two groups and using analytical procedures that lead to a meaningful demonstration of potency. Characteristics satisfying requirements for a risk factor, but precedence, is called a correlate of outcome. A correlate might also represent a risk factor, but further studies are needed to confirm that.

In order to prevent a disease, it is important to understand how it develops in the population as well as in subgroups to examine if sub-groups subjects are more at risk than others. Epidemiological studies use both cross-sectional and longitudinal designs, the latter being important in prediction of outcome (Magnus & Bakketeig, 2003). Mental health studies show multiple risk factors for development of mental health problems and that mental health is influenced by psychological variables as well as biology, social and cognitive development, stress etc. However, causal risk factors have been difficult to identify. The study of various risk factors and how they enhance a specific outcome, such as depressive symptoms, is possible in cross-sectional and longitudinal studies. Development is viewed as a social construction and highlights the importance of interrelationships between social contexts, the group and the individual (Bronfenbrenner, 1986). Adolescence represents a transition period in which the individual faces new challenges in many areas. Some groups of adolescents might be more at risk for development of later psychopathology than others.

1.3 Developmental disorders

Dyslexia is a common, cognitively and behaviourally heterogeneous developmental disorder, characterized primarily by severe difficulty in mastering of reading, despite intelligence within the normal range and adequate education for many of those affected (Grigorenko, 2001).



1.3.1 Diagnosing Learning Disability and Reading Disorders

ICD-10 (see Table 1) and DSM-IV definition of dyslexia are among the specific developmental and learning disorders. Dyslexia is the most common type of Learning disorders (LD) affecting 5-10% of the all school-aged children (Shastry, 2007). Dyslexia is accounting for approximately 80-90% of all diagnosed LD cases (St. Sauver et al, 2001, Lyon, Shaywitz & Shaywitz, 2003). However, when dyslexia-spectrum cognitive processes are considered, the proportion of children at risk may be as high as 17-20% (Grigorenko, 2001).

The diagnosis of dyslexia is underpinned by family studies indicating heritability, recent molecular genetic research showing possible susceptible genes (Cayack, 2007, Smith, 2007), and through the fast development of brain imaging studies (Dowker, 2006), some of them performed in Norway (Hugdahl et al, 2003, von Plessen et al, 2002).

In a critical analysis of different definitions Kavale and Forness (2000) discuss definitions of LD. The first formal definition offered by Kirk (1962) reads as follows:

“A learning disability refers to a retardation disorder, or delayed development in one or more of the processes of speech, language, reading, writing, arithmetic, or other school subjects resulting from a psychological handicap caused by a possible cerebral dysfunction and/or emotional or behavioural

disturbances. It is not the result of mental retardation, sensory deprivation, or cultural and instructional factors”, (Kirk, 1962, p 263).

This definition introduced the notion of psychological process disorders with a focus on processing problems and how they interfere with academic performance. A definition offered by Bateman (1965, p 220) introduced and emphasized underachievement as a component of LD. Over time LD definitions have taken different perspectives (see discussion elsewhere, i.e. Kavale & Forness, 2000, Tui, Thompson & Lewis, 2003). There is a lack of consensus about appropriate and consistent definition of reading difficulties (RD) in the field (Stanovich, 1999; Siegel & Smythe, 2005), and a wide range of language assessments are represented in various studies.

Table 1

ICD-10, Specific reading disorder (F81.0)

A. Either of the following must be present:

(1) a score on reading accuracy and/or comprehension that is at least 2 standard errors of prediction below the level expected on the basis of the child’s chronological age and general intelligence, with both reading skills and IQ assessed on an individually administered test standardized for the child’s culture and educational system;

(2) a history of serious reading difficulties, or test scores that met criterion A (1) at an earlier age, plus a score on a spelling test that is at least 2 standard errors of prediction below the level expected on the basis of the child’s chronological age and IQ.

B. The disturbance described in criterion A significantly interferes with academic achievement or with activities of daily living that require reading skills.

C. The disorder is not the direct result of a defect in visual or hearing acuity, or of a neurological disorder.

D. School experiences are within the average expectable range (i.e. there have been no extreme inadequacies in educational experiences).

E. Most commonly used exclusion clause. IQ is below 70 on an individually administered standardized test.

1.3.2 Comorbidity, RD and other disorders

Underlying causes are complex and associated with multiple risk factors. These risk factors partly overlap, such that various disorders share some etiological risk factors but not others. This partial overlap of risk factors produces a greater than expected co-occurrence of these disorders, which is called comorbidity between disorders (Pennington, 2006).

Pennington (2006) argue that multiple cognitive deficit models of developmental disorders are more consistent with the multi-factorial aetiology of such disorders than single deficit models. His model includes multiple risk and protective factors which can be either genetic or environmental. They alter the normal development of cognitive functions in the child producing behavioural symptoms that define these disorders. The author suggests that no single aetiological factor is sufficient in the development of a disorder, and few may be necessary. Consequently, comorbidity among complex behavioural disorders is to be expected because of shared etiologic and cognitive risk factors.

Dyslexia/RD often occurs in relationships with other problems such as attention problems considered a risk factor of social and emotional disturbances. Students with dyslexia have also reported significantly higher levels of depression and somatic complaints than typical readers in a study comparing severity of emotional and behavioural problems among students with and without dyslexia at the age of 15 (Arnold et al, 2005). Higher rates of anxiety disorder have also been found to be associated with literacy difficulties (defined as poorer-than expected single word reading or spelling) and a link towards social phobia is suggested by the author (Carroll et al, 2005). In a longitudinal study of language impairment among subjects with an anxiety disorder, social phobia was the most common diagnosis (Beitchman et al, 2001). It is not surprising that such language problems might lead to fears of embarrassment and humiliation, resulting in social avoidance and anxiety (Beitchman et al, 2001). In a qualitative study of individuals with LD “public experiences of failure“ was also noted (McNulty, 2003).

For adolescents with dyslexia/RD, adolescence might be a period of double risk for mental health problems, as this period also increases the developmental challenges and specific psychiatric disorders such as depression is rising. In a review of dyslexia, Grigorenko (2001) stated that it is crucial, that we do not overlook the significance of social factors in the manifestation of reading problems. She claims the existence and unfortunate impact of a so-called “learning disability loop” (e.g. poor school performance leading to low school-related self-efficacy, followed by a rejection of promoted school values, and lower school performance) must be acknowledged. Maughan and Carroll’s review (2006) about literacy and mental health confirms the substantial overlap of literacy problems with a range of emotional/behavioural difficulties in childhood and the authors state the association between increased risk of both internalizing and externalizing disorders and RD. In two Norwegian studies (Heiervang et al, 2001, Knivsberg & Andreassen (in press)) higher levels of internalizing and externalizing problems as measured by the ASEBA system (Child Behaviour Checklist (CBCL), Teacher Report Form (TRF) and Youth Self Report (YSR), Achenbach, 1991) were reported among 10-12 years old children, and 9-16 years olds, with dyslexia as compared to non-RD controls.

1.3.3 RD and Attention Deficit Hyperactivity Disorder (ADHD)

Numerous studies report comorbidity between RD and attention problems (Carroll et al, 2005, Pennington, 2006, Goldston et al, 2007). Past studies suggest that between 25% and 40% of children with ADHD meet criteria for reading disorders and that 15 to 40% of those with reading difficulties meet criteria for ADHD (Maughan & Carroll, 2006). ADHD is more common in boys than in girls (Willcutt & Pennington, 2000, Goldston et al, 2007, Shastry, 2007). One area of debate is whether the association is primarily related to inattention or to inattention in combination with hyperactivity and impulsivity (Sundheim, Kytja & Voeller, 2004). Carroll et al (2005) found that these associations primarily reflected elevated levels of inattentive symptoms among children with reading problems.

Similar results were also found by Maughan, Rowe, Loeber and Stouthamer-Loeber (2003). Willcutt and Pennington (2000) noted that the association between RD and externalizing symptoms is at least partially attributable to common familial factors. They further suggest that it is possible that common genetic influences contribute to RD and ADHD interacting with the social environment, leading to a higher risk of aggressive or conduct problems. In a recent study of severe impaired students with dyslexia, Knivsberg and Andreassen (in press), reported significantly more attention problems in this group. However, we do not know how well this clinical sample represents the dyslexic population in general.

1.3.4 Aetiology of dyslexia

According to Bosch, (2007), the aetiology of dyslexia in children, is poorly understood. There are multiple and complex pathways to the development of reading difficulties in children. The interplay between neuroscience, psychology and education helps further understanding.

The neurological basis of dyslexia is to-day acknowledged (Habib, 2000). Outcomes of twin and family studies indicate that genetic influences play an important part in the aetiology of all developmental disorders, including dyslexia/RD (Grigorenko, 2001). According to twin studies, certain reading-related skills (phonological aspects of reading accuracy) are inherited and the heritability of the disorder is approximately 0.71 (e.g. see a review by Shastry, 2007).

Three main theories have been developed: i.e. phonological deficit theory, visual magnocellular deficit theory and the cerebellar deficit theory (Reid et al, 2007). However, none of these theories account for all variations in the rates of dyslexia. Further, it has been suggested that although low-level auditory deficits cause phonological problems (i.e. the ability to translate individual letters and letter combinations into sounds) in specific language impairment, they have quite different origins, with environmental factors being more important for auditory deficit, and genes being more important for deficient phonological

short-term memory (Bishop, 2006). The development of gene-environment interplay is further described in a review by Rutter, Moffitt and Caspi (2006).

A discussion of the proposed theories is referred in a review (Rasmus et al 2003). Overall the phonological theory of dyslexia is supported, while acknowledging the presence of additional sensory and motor disorders in certain individuals. For example, Vellutino, Fletcher and Snowling (2004) argue that RD occurs along a continuum of reading ability levels, and that there is a graduation of risk for becoming dyslexic. This development depends on the particular assortment of reading-related abilities in the child and the degree to which its home and school environments capitalize and build on his or her cognitive strengths and compensate for his or her cognitive weaknesses. Structural MR findings support structural abnormalities in the brain among individuals with dyslexia, also among children. Functional MR studies have also demonstrated dissimilarities between dyslectic individuals and controls (Temple, 2003). Until recently it has not been stated, however, whether the differences are causes of the language disorder or represent different strategies the individual has used (Dowker, 2006).

1.4. Depressive symptoms

A diagnosis of depression affects about 16% of the population on at least once in their lives (Bland, 1997). Depressive symptom levels have been found to correlate negatively with academic competence and even stronger with social competence in the 6th grade (Cole et al, 1996). We also know that depressive symptoms increase in girls in adolescence (Sund, Larsson & Wichstrøm, 2003), emphasising the knowledge about risk and protective factors. In the society at large, a greater awareness of conduct problems is present while silent or depressed children don't receive the same attention. "NevroNor" is a new research program in Norway (Norsk Forskningsråd, 2006) in which depression has been suggested to be an important area for research in national plans.

Depressive disorders are classified as a unipolar depression among affective disorders. A set of symptoms, lasting a minimum duration of 2 weeks, should be present to establish a diagnosis of a major depressive disorder in the DSM-IV system in which a functional impairment is required. Depressive symptoms are common among adolescents. Both depressive symptoms and disorders increase in this period with depressive symptoms often preceding the latter (Lewinsohn et al, 1994). However, measuring depressive symptoms in adolescence is challenging because many of them experience lower mood for a shorter period of time. Several international studies have examined the prevalence of depressive symptoms in adolescents with reported rates between 1-4 % for severe symptoms, 9-10% for moderate symptoms, and 20-28% for mildly depressed subjects (Roberts, Lewinsohn & Seeley, 1991; Rushton, Forcier & Schectman, 2002). Before puberty, boys and girls have similar rates of depressive symptoms. However, in most studies the rates for girls increase throughout adolescence from the age of 13 years (Cooper & Goodyer, 1993) with a consistent gender gap at the age of 14 (Roberts et al, 1995, Wichstrøm, 1999, Sund, Larsson & Wichstrøm, 2003). Some authors have found decreasing scores for boys throughout the adolescent years (Angold et al, 2002), while others have noted stable gender gaps from 13 years (Larsson & Melin, 1990, Wichstrøm, 1999, Angold & Costello, 2006).

RD students, recruited from public schools, reported higher levels of depression than typical readers (Arnold et al, 2005). In Norwegian studies depression is not directly measured, however the focus has been on internalizing/externalizing problems (Heiervang et al, 2001, Knivsberg & Andreassen (in press)).

1.5 Risk and protective factors

Resilience is concerned with individual variation in response to challenges. Some people succumb to stress and adversity, whereas others overcome life hazards. Resilience cannot be seen as a fixed attribute of the individual. Those who cope successfully with difficulties at one

point in their life may react adversely to other stressors when their situation is different. If circumstances change, resilience alters (Rutter, 1987). Reducing the impact of a risk factor to the individual is clearly a crucial mechanism. It probably occurs through two rather different routes, i.e. alteration of the meaning of the risk variable for that child or and alteration of the child's exposure to a risk situation (Rutter, 1987).

Risk and protective factors studied in this thesis might stem from the individual itself, inner factors such as gender, ethnicity, depressive symptoms, self-esteem, developmental disorders and grades or inner circle factors as SES, school stress and attachment to parents or peers. Influencing factors outside the individual's closest environment consist of teacher support, special education and class wellbeing. The present study focuses at risk and protective factors among young adolescents in a school setting as well as among a subgroup of adolescents and young adults with RD.

1.5.1 Attachment

There is ongoing person-environment interplay with early years producing lasting positive or negative effects with multiple causal pathways (Rutter, Kim-Cohen & Maughan, 2006).

Studies show that secure attachment to parents increase wellbeing, decrease distress, and that secure peer attachment show an indirect role in psychological health through its effects on self-esteem or self concept constructs (Wilkinson & Walford, 2001). Adolescents with insecure attachment have lower levels of confidence and higher levels of depressive symptoms (Allen et al, 1998), as reported in another paper from the same sample (Sund & Wichstrøm, 2002) in which insecure attachment to parents was a risk factor for developing depressive symptoms assessed one year later among young adolescents. Thus attachment history seems to operate as a risk or protective factor influencing child behaviour. To our knowledge, there are no studies of adolescents with RD focussing on this issue.

1.5.2 Relationships with friends

Several studies suggest that children's school-based peer relationships affect both their academic progress and their psychological well-being (Rutter & Maughan, 2002). Earlier reports from the "Youth and Mental Health" study have also shown strong relationships between high levels of depressive symptom and number of friends (Sund, Larsson & Wichstrøm, 2003). To our knowledge, few studies exist addressing this issue among RD students.

1.5.3 Self-esteem

Self-esteem is an increasingly important concept in the field of child and adolescent mental health (Butler & Gasson, 2005). An association between low self-esteem and many troubles in adolescence is suggested. Cognitive development makes adolescents more self-reflective and self-criticism might lead to lower self-esteem which has been shown to be a specific risk factor for the development of depression (Lewinsohn et al, 1994). Available evidence suggests that it is protective to have a well established feeling of one's own worth as a person together with a confidence that one can cope successfully with challenges. High self-esteem protects and low self-esteem puts an individual at risk for emotional/behavioural problems (Rutter, 1987). Depressive symptom levels have been found to correlate strongly and negatively with academic competence and even more so with social competence (Cole et al, 1996). Such an effect can also be mediated through self-esteem (Roeser & Eccles, 1998). For adolescents with RD, the results differ in that academic self-esteem has consistently been found to be lower, while findings on global measures are more equivocal (Maughan, 1995).

1.5 School factors

1.5.4 School stress

Many studies have shown that school-related stress occurs in adolescence (Torsheim & Wold, 2001), also increasing rapidly with age. In the WHO's cross-national school-based study,

including more than 120000 students in 28 countries, three times as many 15 year olds as 11 year olds felt “very stressed” (WHO, 2000). Other authors have reported that high levels of perceived social support from teachers and classmates can protect against stress (Cheung, 1995). From a large representative school-based community sample in the Netherlands, Garnefski (2000) reported strong relationships between negative perception of the social environment and depressive symptoms throughout adolescence. From a prospective study of adolescent depression, Lewinsohn et al (1994) reported that dissatisfaction with grades and failure to do homework predicted subsequent depression. Adolescents who received higher grades also reported positive emotional functioning, i.e., fewer symptoms of distress (Roeser, Eccles & Sameroff, 1998). Earlier results from the “Youth and Mental Health” study (Sund, Larsson & Wichstrøm, 2003) show positive relationships between high levels of depressive symptoms and the following psychosocial variables: high levels of daily hassles and stressful life events. Number of stressful life events also predicted depressive symptom levels one year later (Sund, Larsson & Wichstrøm, 2003).

For the RD group, some Norwegian studies address language development (Høien & Lundberg, 1991), and relationships to behavioural problems (Heiervang et al, 2001, Knivsberg & Andreassen (in press)). However, to our knowledge, none of them considered experienced adolescent school stress, either in a cross-sectional or a longitudinal perspective.

1.5.5 Relationships with teachers

Results of a study by Karvonen, Vikat and Rimpelä (2005) suggest that school plays an important role in young people’s wellbeing and that young people’s psychosocial health involves a range of influences deriving from individual susceptibility and from the social and educational functioning in schools. Aviles, Anderson and Davila (2006) focused on dynamic relationships between children and their contexts, and emphasizing influences of this environment on their social-emotional development. When children start school, they enter a

new arena with challenges in peer group relationships as well as scholastic work. Successful coping with these challenges may be protective in children from seriously disadvantaged homes and that failures may create psychiatric vulnerabilities or risks. Roeser, Eccles and Sameroff (1998) reported that positive teacher perceptions predicted a positive change in child emotional adjustment during the middle school years. Others have reported that adolescents perceived by teachers to be good students showed a decline in depressed mood (Roeser & Eccles, 1998). Likewise, in a longitudinal study, following subjects from the sixth to eighth grades, changes in perception of teacher support predicted changes in depression (Reddy, Rhodes & Mulhall, 2003). Teacher support is probably more important for students having a problem such as RD, but studies are scarce in this area.

1.5.6 Special education and RD students

Special education in Norway is mostly given in regular classroom or in small groups several hours a week. Special schools are seldom used. There are many different reasons for special educational placement; LD, RD, attention problems, physical or mental handicaps among others. The small groups might include students with different problems or cognitive levels, implying a very challenging situation for the teachers as well as for the students involved. It is difficult to know if all teachers involved in teaching are certified in special educational training. Also a recent Norwegian study focuses resistant readers' need of attention beyond standard special educational instruction disclosing 80% progress in their reading abilities as a result of targeted counseling in the student's milieu (Andreassen, Knivsberg & Niemi, 2006). In one study of dyslectic children by Temple (2003), not only improved reading, but also changes in brain scans during a rhyming task, was demonstrated after training that involved auditory processing and oral language. The study showed that the brain in dyslectic children got more similar to normal controls, and supports the notion that the brain can be influenced by training (Habib, 2003).

1.6 Dyslexia in a life course and prognosis

Høien and Lundberg (1991) reported that 5-10% of the Norwegian population suffered from serious dyslexic problems indicating that almost all school classes have a child with dyslexia. Although dyslexia/RD is officially recognized as a disability, more widespread awareness of hidden disabilities as dyslexia/RD has often been and remains problematic (Dale & Taylor, 2001). The first generation of individuals formally diagnosed as children with neurologically based, developmental reading disorders meeting criteria for dyslexia/RD, are now adults (McNulty, 2003). Studies on adult life situation and adaption are small and sparse. Twenty-seven Dutch adults with dyslexia (age 20-39) participated in interviews concerning coping with life and disability. Most participants felt a strong impact of their dyslexia in everyday life and experienced many educational and career problems (Hellendoorn & Ruijsenaars, 2000). Further, their study reported school memories to be negative, but family relations were predominantly felt as positive and supportive. Many respondents reported social and emotional problems. Parental support appeared to be a powerful predictor of adult adjustment and wellbeing.

Further, 10% of adults in Norway suffer from large reading and writing problems and one of four adults suffers reading difficulties larger than the necessary functioning level in today's work force (Søby & Einan, 2006). The percentage of adults with RD was larger among people applying for work than among those already in regular work. RD tends to be a lifelong problem with widespread consequences.

1.7 Aims of the thesis

This thesis aimed to study school-related correlates and risk factors for development of depressive symptoms in adolescence in a representative school-based sample in mid-Norway. Further, correlates and possible risk factors for depressive symptoms and other aspects of mental health were examined, both among adolescents with self-reported RD from the same

sample and among young adults who received a diagnosis of dyslexia in childhood. Possible confounding factors were assessed, and a gender perspective was applied. Further, we focused on the effects of special education on future social problems.

In specific, the following issues were addressed:

1. Which are the psychosocial correlates of depressive symptoms among young adolescents in a school setting? The following factors were examined: School-stress, class wellbeing, teacher support and grades. Which school factors predict changes in depressive symptom levels over a one-year period of time? (Paper I)
2. Do adolescents with self-reported RD experience more school stress, a higher level of depressive symptoms, lower grades and lower self-esteem than a subsample of non-RD adolescents? Do adolescents with RD receive more help for mental health problems and have lower functioning level compared to non-RD adolescents? Does self-esteem act as a moderator on the relationships between school stress and RD? (Paper II)
3. Do students with RD show more emotional and behavioural problems as measured by the Youth Self Report (YSR) at (T₁) and develop more such problems than non-RD adolescents over a one-year period of time? Do they show higher levels of social and attention problems than non-RD adolescents at both time-points? Which is the role of special education in the development of later level of social problems? (Paper III)
4. Does dyslexia carry over from childhood into young adulthood? Do young adults with dyslexia show higher level of mental health problems, lower educational level and satisfaction than young adults without these problems? (Paper IV)
5. Possible risk and preventive factors in the development of mental health problems in a school setting (Paper I, II, III, IV)

2. METHODS

2.1 Design

The study incorporates data from two different studies, involving four different samples. In paper I-III reading difficulties/dyslexia information is based on student self-report. Reading difficulties (RD) is the preferred label in all papers. In paper IV, the participants were selected through testing procedures in childhood, and re-tested at a follow-up 23 years of age. In this paper, dyslexia is the preferred label for these problems.

2.2 Study I: The “Youth and Mental Health Study” (paper I, II, III)

2.2.1 General procedures

Paper I-III report data from a large representative ongoing epidemiological study, “Youth and Mental Health”, focusing on mental health among adolescents in central Norway. The study is school-based and has included both cross-sectional and longitudinal self-report data obtained at two time-points (T₁ and T₂) one year apart. Several papers from the study have already been published (ex. Sund, Larsson & Wichstrøm, 2003).

The first wave in the present study was conducted in September 1998 and repeated in 1999/2000 among 12-15 year-old school adolescents in two counties in the middle of Norway. These counties have a total population of 390 000 consisting of sparsely populated mountain and coastal areas, agriculture in the inland districts, small towns, partly industrialised, and one relatively large city, Trondheim with 146000 inhabitants. The total population of adolescents attending 8th and 9th grades in private and public schools during autumn 1998 were 9292, and 98.5% attended public schools. The schools are highly integrated, i.e. also include students with reading difficulties, behavioural disturbances, and mildly retarded and physically handicapped adolescents.

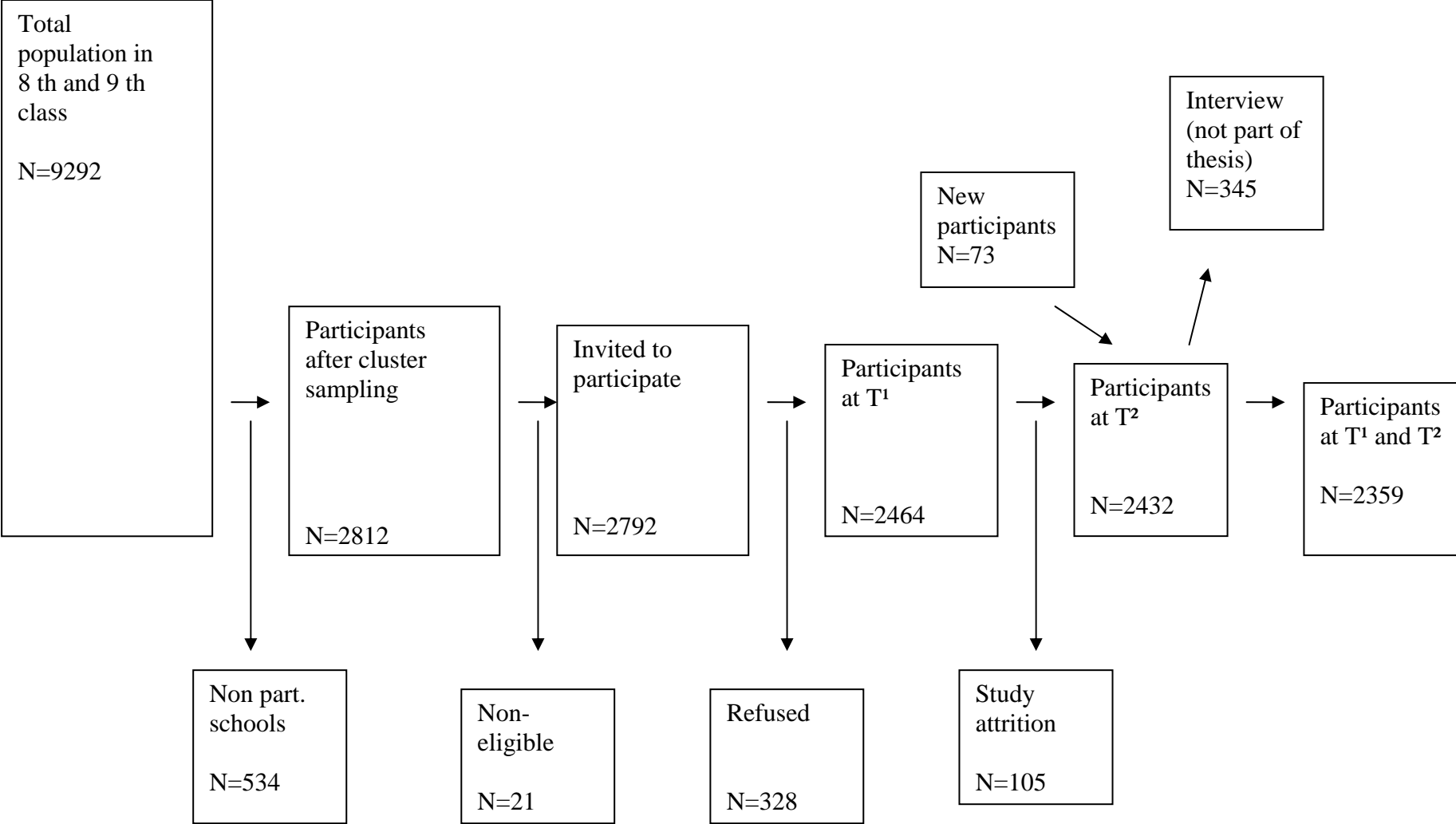
Thirty-eight pupils, who attended special schools, were excluded from the study. For practical reasons, 5.7% (n=534) of the total population, who attended the smallest schools in the catchments area were not included.

A cluster sampling procedure using schools as sampling units was chosen, stratified according to urbanity and geography: 1. Central parts of Trondheim (n=484, 19.6%), 2. Suburbs of Trondheim (n=432, 17.5%), 3. Coast (n=405, 16.4%), 4. Inland (n=1144, 46.4%). The schools were drawn with a probability according to size (proportional allocation) within each stratum, resulting in 22 schools and 2812 pupils. Twenty-one pupils (.7%) were not eligible for the following reasons: admitted to hospital, being temporarily abroad or lacking sufficient knowledge in Norwegian language (recently arrived in Norway). Thus, a total of 2792 adolescents were eligible for the study. Of these students, 2464 adolescents (88.3%) participated in the study at T₁, (for more details, see Sund, 2004).

2.2.2 Procedures at the schools

At each school, a member of the staff was responsible for the administration of the questionnaires. They were trained at seminars, delivered written information both to the parents and the students and collected the written consents. They also organized the data collection at both time-points. Two questionnaires were administered and completed by the students during two consecutive school hours. The teachers were instructed to help the students when needed, e.g. to read the questions aloud and explain difficult terminology. Some of the adolescents filled in the questionnaires in small groups after receiving the questions read aloud and others were allowed to use extra time. Absent students were asked to complete questionnaires during the following month. The questionnaires were put in envelopes and sealed by the students themselves and returned to the research leader.

2.2.3 Figure A. Flow-chart of study participants



2.3 The study sample

At T₁, 2464 adolescents participated in the study. The sample consisted of 1252 girls (50.8 %) and 1212 boys with a mean age of 13.7 (range: 12.5-15.7, SD=0.6). The response rate was 88.3%. Thirty-nine adolescents (1.6%) were adopted, 22 (.9%) were foreign, and 17 (.7%) were Norwegian-born adopted. Five adolescents (.2%) regarded themselves as ethnic Sami and were classified as Norwegians. Demographic characteristics of the study sample are shown in table 2.

Attrition at T₁

The non-responders (N=328) were significantly more often boys than girls (18.6% vs. 8%) ($X^2(1) = 45.0, p < .001$) and younger adolescents (13.2% vs. 10.3%) ($X^2(1) = 5.47, p < .05$). Adolescents from the central parts of Trondheim were to a lesser degree non-responders (5.3% vs. 11.7%) ($p < .05$), whereas adolescents from the suburban areas were more frequently non responders (18.7% vs. 11.7%) ($p < .05$) compared to the total sample.

2.3.1 The follow up sample

Students in the same 22 schools as in 1998 (T₁) were reassessed one year later (T₂) using identical measures. The mean age at T₂ was 14.9 years (range 13.7-17.0, SD =.6). Although 73 new students participated at T₂, only those adolescents who had participated at both time-points were included in the longitudinal analyses (N=2359).

Attrition at T₂

One hundred and five pupils (4.3%), who had participated at T₁, did not participate one year later. The reasons for non-participation at T₂ were having moved (n=58, 55.2%), unknown (n=27, 25.7%), illness (n=12, 11.4%), refused to participate (n= 3, 2.9%), seriously disabled (n=3, 2.9%) and school leave (n=2, 1.9%). The non-participants were characterised by: higher MFQ total mean scores at T₁ (mean scores 17.3 and 10.4, among non-participants and participants, respectively), $t(2442) = 7.13, p < .001$ and having more often a non-Norwegian

background (15.4% vs. 6.2%), ($X^2(1) = 13.45, p < .001$). No gender, grade or SES-related differences between the non-participants and the participants were found.

Table 2

Demographic characteristics of the total sample at T₁

	N	%
<i>Gender</i>		
Girls	1252	50.8
Boys	1212	49.2
<i>Age (mean, SD)</i>	13.7	0.6
<i>SES</i>		
Professional leader	241	9.8
Upper middle class	704	28.6
Lower middle class	326	13.2
Primary industry	204	8.3
Manual worker	899	36.5
<i>Missing</i>	90	3.7
<i>Ethnicity</i>		
Both parents Norwegian	2299	93.3
One parent Norwegian	96	3.9
Both parents East Europe	26	1.1
Both parents rest of the world*	39	1.6
<i>Missing</i>	4	0.2
<i>Parental divorce</i>		
	663	26.9
<i>Missing</i>	83	3.4

*Four adolescents had both parents from Western Countries and were not analysed because the group was too small.

2.3.2 The subsample

The sub-sample in study I, students with self-reported reading difficulties (RD) at T₁, represented 7.8 % (n = 191) of the total sample, 88 girls (7%) and 103 boys (8.5%).

2.4 Measures

Depressive symptoms (MFQ) and general psycho-pathology (Youth Self-Report, YSR) were assessed both at T₁ and T₂. Demographics, use of health service, school wellbeing and stress, teacher support and school grades as well as self-esteem and attachment to friends and parents were analysed only at T₁ when the adolescents also reported whether they had started with special education during the preceding year. Possible confounding factors such as age, SES, ethnicity and parental divorce were assessed at T₁.

The following instruments were used, further described in the separate papers: (also, see Appendix)

- The Class Wellbeing scale, T₁, paper I
- Teacher Support Scale, T₁, paper I
- The Mood and Feelings Questionnaire (MFQ), (Angold, 1989), T₁ and T₂, paper I and II.
- The Early Adolescence Stress Questionnaire (EASQ), (Sund et al, 2003), School-stress subscale, T₁, paper I and II
- School grades, T₁, paper I and II
- The Self-Perception Profile for Adolescents (SPPA), (Harter,1988, Wichstrøm, 1995), T₁, paper II
- The Inventory of Parent and Peer Attachment (IPPA) (Armsden & Greenberg, 1989), T₁, paper II

- Functioning level, T₁, paper II
- The Youth Self-report scale (YSR), (Achenbach, 1991), T₁ and T₂, paper III
- Social problems as measured on the YSR, T₁ and T₂, paper III
- Self-reported Reading Difficulties (RD), T₁, paper II and III

2.4.1 Self-reported RD

Adolescents' own information about their reading problems stems from two different questions at T₁. Firstly, the adolescents reported whether they had dyslexia or not; "Have you had specific reading and writing problems (dyslexia) in the last 12 months?" In a subsequent question to those reporting reading difficulties, they were asked about the degree of their reading difficulties. Those students who reported having reading problems of "large", or "some" degrees were included in the RD sample at T₁.

Prevalence, stability and incidence

A higher percentage of adolescents reported RD at T₁ compared to T₂, 7.5% vs. 6.9% respectively ($p < .05$). Stability from T₁ to T₂ was 48.7% (93 of 191 reported RD at both T₁ and T₂). Eighty-one adolescents who did not report RD at T₁ reported RD at T₂ and thus represent possible incident cases.

2.5 Study II (paper IV)

2.5.1 Procedures study II

In paper IV two different groups (sample A and sample B) of young adults with a history of dyslexia in childhood, were examined by the author in 1996 when the respondents were 23 years of age. Identical measures of reading/writing, educational level, life satisfaction and psychosocial factors were applied in both groups. The assessment was carried out by means of tests, questionnaire and personal interviews.

2.5.2 Samples

Sample A: Initially a subgroup of 75 students (7.7% of half the cohort of 10 year olds, n=530) diagnosed with dyslexia in a longitudinal study in Trondheim in 1983, (Undheim, 1984). In 1995, the entire original study group (n=530) with a mean age of 23 years, completed a follow-up questionnaire about education, school experiences and family matters. Of the 75 students with dyslexia, 68 were traced among the graduating class of 1989, while seven had moved out of the city of Trondheim. Of the dyslexic sub-group, 36 individuals (53%) responded to the follow-up questionnaire. A total of 21 adolescents, 12 men and 9 women (of the 36), accepted an invitation to be tested and interviewed in the late fall of 1995 and spring of 1996.

Sample B: Patients born in the period 1972-1975 recruited from the Child Psychiatric Clinic in Trondheim with medical record information about dyslexia in childhood were invited to participate. Ten men and 3 women with a mean age of 22.5 years accepted (response rate 40.6 %) and were assessed in 1996.

2.5.3 Measures

Measures reading /writing at age 10 for sample A, see Appendix.

Measures reading/writing at 23 years for sample A and sample B, see Appendix.

Psychosocial wellbeing and mental health is further described in paper IV by:

- Symptom Checklist 90 Revised (SCL-90 R), (Derogatis & Cleary, 1977)
- General life satisfaction (questionnaire)
- Teacher support (questionnaire)

2.5.4 Questionnaire (see Appendix)

Respondents were asked to fill in a questionnaire consisting of 48 questions concerning school and work history, leisure time activity and family life, as well as current life situation

and further educational plans. General life satisfaction was measured on a 5-point scale from “little” to “very well satisfied” with one question about general satisfaction and others concerning health, economy and friends. Teacher support was measured by eight different statements with three given alternatives for level of importance.

The longitudinal sample of 530 adolescents was used as a norm group in analyses of questionnaire information.

2.5.5 Qualitative interview (see Appendix)

Qualitative interviews were performed as a supplement to a quantitative approach in paper IV because such methods are especially relevant to research questions concerning subjective perspective of individuals. Because of the respondents’ reading problems the method also provided important complementary information. A semi-structured interview was held with each of the respondents ranging from 60 to 90 minutes. The main topics were respondent school history, life satisfaction and current life situation. The interviews were recorded and transcribed to text. The data were analysed using elements from the grounded theory approach (Strauss & Corbin, 1990) in which categories are inductively derived from the study of phenomena they represent.

2.6 Statistical analyses

The Statistical Package for the Social Sciences (SPSS) was used in the data analyses. To examine associations between categorical variables, Pearson chi-square tests were used. Differences between group means were analyzed by independent t-test or ANOVAs for continuous scale scores and for ordinal scales scores Mann-Whitney’s tests were employed. Bonferroni correction was applied to adjust for multiple testing. Effect sizes were estimated using Cohen’s criteria (Cohen, 1988) for small (1% to 5.9%), medium (5.9% to 13.8%), and large (13.8% or more) effects. Standard linear regression analyses were performed, both cross-sectionnally and longitudinally, to predict depressive symptom levels (MFQ). The

differences between the unstandardized regression coefficients, betas, were tested using a z-test developed to test differences in betas in two independent samples (Paternoster et al, 1998). Multivariate logistic regression analyses were performed to examine the most powerful predictors of RD versus non-RD emerging as significant in bivariate analyses. Collinearity diagnostics were performed. Separate logistic regression analyses were performed to assess interactions on the RD status. All tests were two-tailed and an alpha level of $p < 0.05$ indicated a statistical significance.

If more than 10% of the items were missing on the various scales, the subject was not included in the analyses. Missing values were replaced with mean values for the respective variables. An exception was the EASQ scale, where any report (Y/N) of stressful events was included.

2.7 Ethics

The Regional Committee for Medical Research Ethics approved the study protocol for both studies included in the thesis. The Norwegian Data Inspectorate assigned a licence for establishing a register containing personal data for both studies.

3. RESULTS

Study I

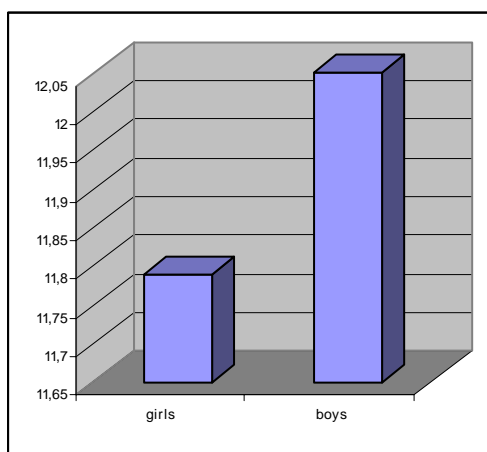
3.1 Paper I. School variables and depressive symptoms

In this paper, relationships between various psychosocial school variables and self-reported depressive symptoms over a one-year period of time were examined in 2464 adolescents 12-15 years of age in middle Norway. Cross-sectionnally, girls showed higher school grades than boys did (figure 1a) and lower class wellbeing than boys (figure 1b). Girls' MFQ scores were significantly higher than those of the boys both at T₁ and T₂ (figure 1c). Multivariately, all school variables were related to MFQ scores for the whole sample at low to moderate levels.

Low teacher support showed the strongest association with depressive symptoms cross-sectionally. In longitudinal multivariate analyses, self-reported depressive symptom levels at T₂ for the whole sample were predicted by depressive symptom level at T₁, gender and level of teacher support. For boys, the MFQ scores at T₁ were the only predictor of depressive symptom levels one year later. For girls, in addition to MFQ scores at T₁, three variables, i.e. low teacher support, high school stress and low grades measured at T₁, predicted higher levels of depressive symptoms one year later.

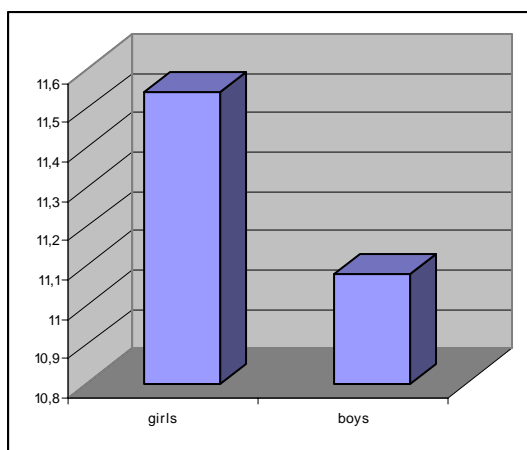
Figure 1. Gender differences at T₁ in school grades, class wellbeing, and MFQ mean scores from T₁ to T₂ for young adolescent boys and girls in middle Norway (N=2464).

(1a). Mean Grades (total sum of 6 subjects), at T₁



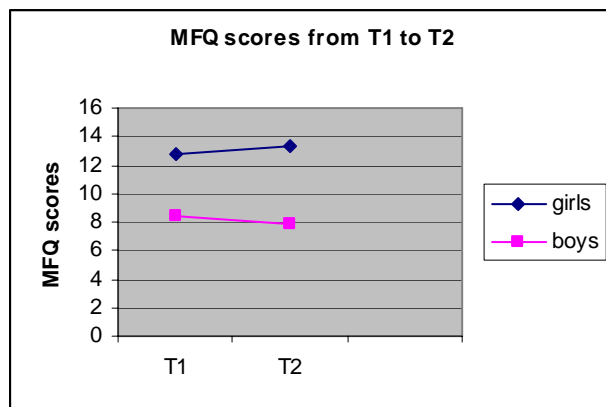
Note. Scale range: 4-24, high scores= low grades, girls>boys, p<.05

(1b) Mean Class wellbeing at T₁



Note. Scale range 6-24, high scores=low wellbeing, girls<boys, p<.001.

(1c) Change in Mean MFQ scores from T₁ to T₂ by gender



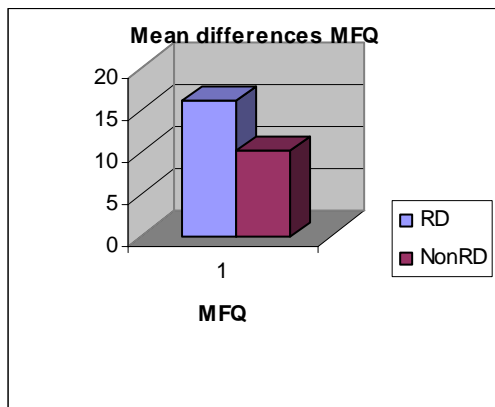
Note. MFQ scale range: 0-68.

3.2 Paper II. RD and psychosocial variables.

In this paper, a subgroup from the same school sample (N=2464), adolescents with RD (n=191) were compared to adolescents without RD on several psychosocial variables. In bivariate analysis, RD adolescents were shown to experience significantly ($p < .001$) higher levels of depressive symptoms and school stress, lower school grades and attachment scores towards parents (figures 2a, b, c, d). They also showed significantly ($p < .01$, and $p < .001$, respectively) lower scores on Global Self-worth and on Social Acceptance (Harter scales, figure 2e) than non-RD adolescents. Further, RD adolescents showed reduced levels of functioning during the previous year because of emotional and behaviour problems, and received more help and used more medication for such problems. In multivariate logistic regression analysis, only school stress, grades, lower acceptance among peers, receiving help for mental health problems and reduced functioning were retained, the latter two showing the strongest significant associations with RD status. No gender difference was found.

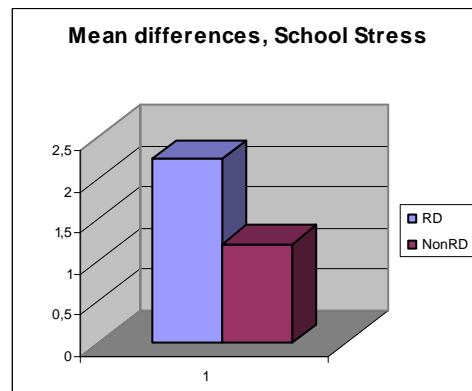
Figure 2. Mean differences at T₁ between adolescents with and without RD on MFQ scores, school stress, school grades, mother and father IPPA scores, Harter's Global self-worth and social acceptance scales.

Figure 2 a



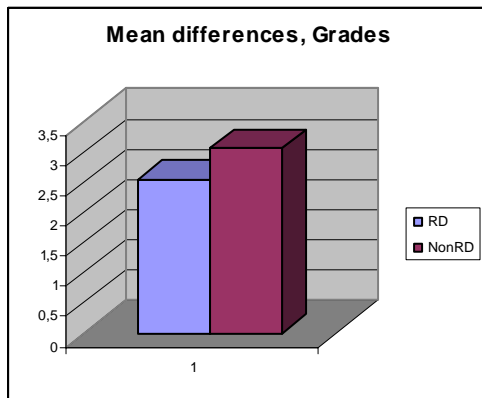
Scale range: 0-68. RD>non-RD, $p<.001$.

Figure 2 b



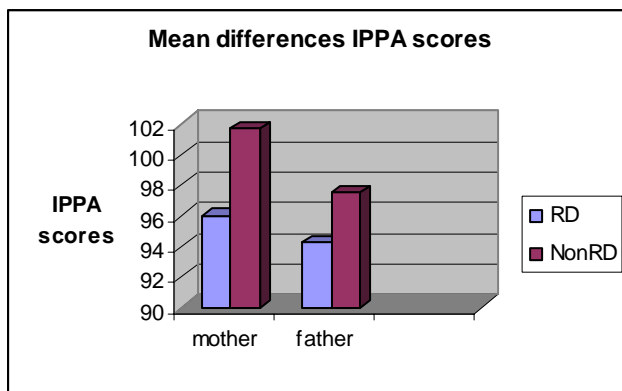
Scale range: 0-6. RD>non-RD, $p<.001$.

Figure 2c



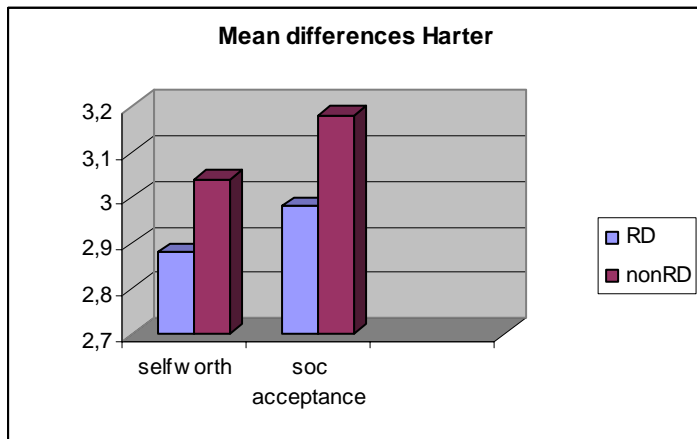
Scale range:0-4, (average of 6 subjects).
RD<non-RD, $p<.001$.

Figure 2d



Scale range 1-125.
Non-RD>RD mother, $p<.001$,
Non-RD>RD father, $p<.05$.

Figure 2 e



Scale range: 1-4.

Self-worth: Non-RD>RD, $p<.01$. Social acceptance: Non-RD>RD, $p<.001$.

3.3 Paper III. RD and emotional/behavioural problems (YSR)

This paper examined cross-sectionally and longitudinally relationships between emotional and behavioural problems on the YSR scales and reading problems among students with self-reported RD ($n=191$) and those without RD in a school-based population sample ($N=2464$).

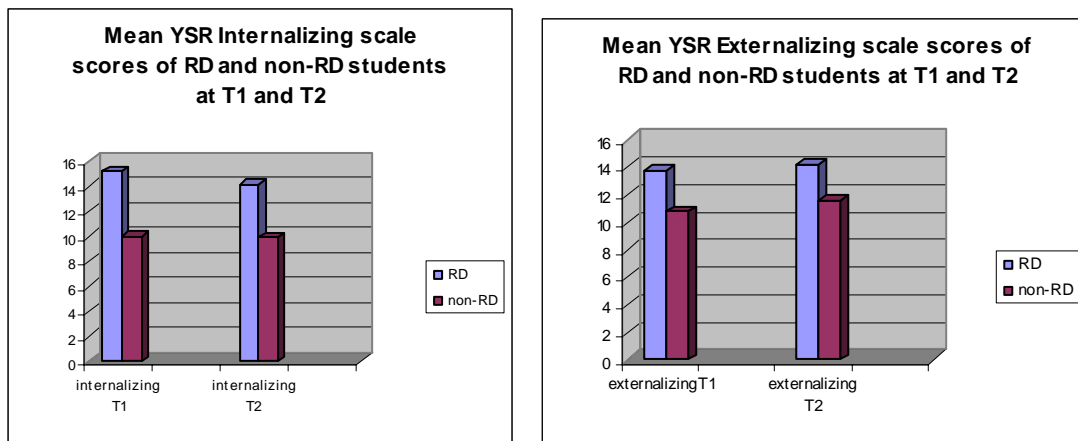
RD adolescents reported significantly ($p<.001$) higher internalizing and externalizing problem scores as well as higher scores on all YSR sub-scales both at T_1 and T_2 ; see figure 3a and b.

For the RD group, internalizing problem scores decreased from T_1 to T_2 ($p<.05$), while no difference was found on externalizing problem scores or total problem scores. Mean values on somatic ($p<.05$), social ($p<.01$), attention ($p<.05$) subscale scores decreased.

For the Non-RD group, YSR total problem as well as externalizing problem scores increased from T_1 to T_2 , ($p<.01$, $p<.001$, respectively), while internalizing problem scores showed no changes. Scores on the withdrawn ($p<.05$) and social problems ($p<.001$) subscales decreased, while scores on delinquent ($p<.001$), aggressive ($p<.01$), and self-destructive problem ($p<.01$) subscales increased. For somatic, anxious/depressed and thought problem subscales no changes were obtained.

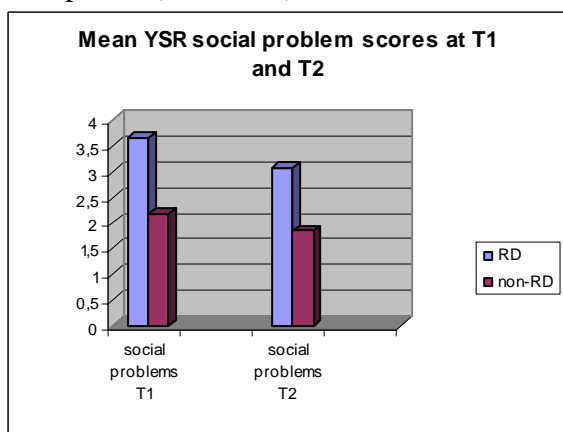
Among the RD group, 41.8% reported having initiated special education during the last year (T_1), compared to 4.2% in non-RD group. Figure 3c shows social problem scores at T_1 and T_2 for both groups. In regression analyses RD emerged as a risk factor predicting later social problems. Special education moderated the effect of RD on later social problems (see figure 3d).

Figure 3a and b. Internalizing and externalizing mean scores on the YSR among RD and non-RD adolescents at both time-points (T_1 and T_2).



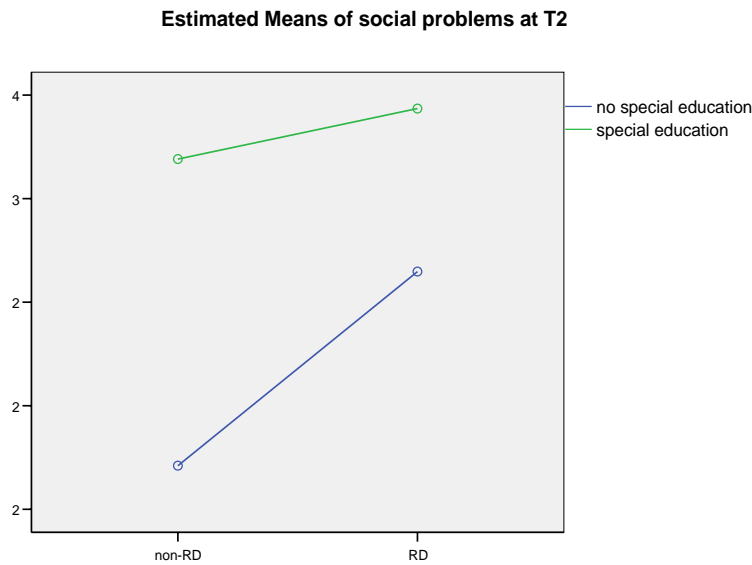
RD > non-RD at both T_1 and T_2 , $p < .001$.

Figure 3c. Mean scores on YSR social problems among RD and non-RD adolescents at both time-points (T_1 and T_2).



RD > non-RD at both T_1 and T_2 , $p < .001$

Figure 3d. Mean YSR social problem scores at T₂ and the effect of special education for RD and non-RD adolescents.



Study II (Sample A and B)

3.4 Paper IV. Dyslexia in young adulthood

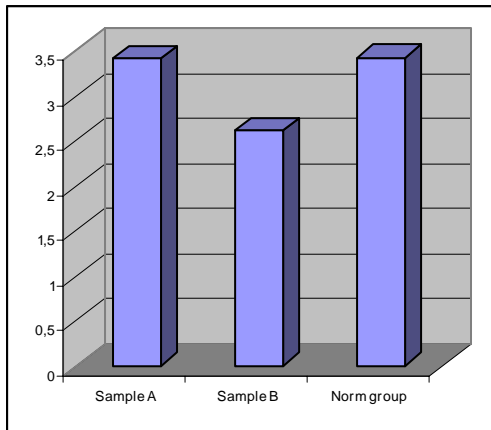
This paper examined dyslexia status, educational level, life satisfaction and psychosocial factors in two different samples of young adults, 23 years of age, with a history of dyslexia in childhood. Students diagnosed with dyslexia in childhood in a school-based study, were assessed at 23 year of age, and compared to their classmates and to same-aged dyslexic patients recruited from the Child Psychiatric Clinic in Trondheim. Language testing showed that dyslexia carried over into young adulthood in both groups. Questionnaire information showed no significant differences between dyslexic students from the school-based study (sample A) and the norm group. However, lower levels of educational attainment (figure 4a), and satisfaction with health (figure 4b) and friends (figure 4c) were found among the former psychiatric patients (sample B) as compared to those in the normative group. Both dyslexic groups showed more general distress as measured by the SCL-90 R, than those in the normative sample.

Interview data

Interview data generally revealed more problems than questionnaire information in both groups. The respondents reported a long history of struggling in school with much negative and little positive feedback from teachers. Ten out of 13 among the former patients and half of the school dyslexic reported receiving little help and support in school. The former patients also reported more teacher support in general compared to those in the school and the norm groups. The school group, however, rated the importance of “good teaching” and “made me interested in further education” as more important than subjects in the norm and the former patient groups. The most frequent remedial approach was small heterogeneous groups, where RD students attended together with slow learners and the respondents felt they did not fit in, and some therefore terminated their attendance in these groups. More than half of the respondents had not been recognized as dyslexic in school because their general achievement was too high, and school did not diagnose their dyslexia given in a research project at the age of 10 years. Half of the students from both groups reported anxiety and being looked upon as stupid because of dyslexia problems. Almost all experienced difficulties in maintaining a positive self-concept. Elementary and junior high school were described as the hardest period, more often so for the former patient group. High-school teachers, admitting less knowledge about dyslexia, were more supportive and focused less on student errors in written papers than elementary school teachers did. Interviews disclosed higher unemployment rate among those with RD than in the general population for both groups (figure 4d).

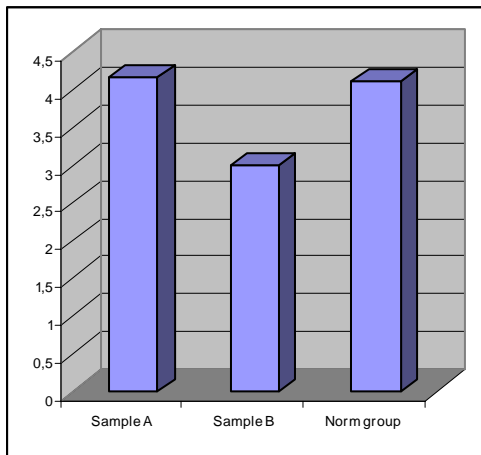
Figure 4. Educational attainment, satisfaction with health and with friends (scale scores 0-5), and percent unemployment for Sample A (school) and Sample B (clinical) as compared to the norm group.

Education (4a)



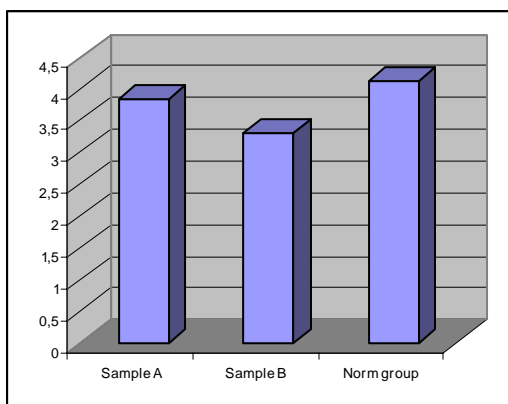
Sample B < norm group, $p < .05$

Health (4b)



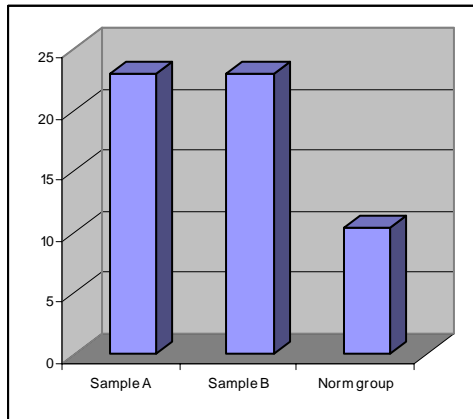
Scale range: 0-5. Sample B < norm group, $p < .05$

Satisfaction, Friends (4c)



Scale range: 0-5. Sample B < norm group, $p < .05$

Unemployment rate in % (4d)



Sample A < norm group, sample B < norm group
(norm group=general population)

4. DISCUSSION

4.1 Methods: Strengths and limitations

“The Youth and Mental Health” study (paper I-III) uses a one-year longitudinal design, and represents a large school population sample with low attrition and includes standardised measures in most of the areas examined.

4.1.1 Study I, (paper I-III), Sample

To reduce cost and increase response rate, a cluster sampling method was chosen, using school, not the individual as the sampling unit. A problem might be that subjects within clusters live in similar environment and share properties that are relevant to the outcome of interest, however, the use of geographical stratification might counteract some of these effects.

The population included adolescents who attended 8th and 9th grades in Sør- and Nord Trøndelag in public as well as private schools in 1998. However, only schools having classes at both levels were invited to participate, thus excluding the smallest schools mostly in rural areas in the mountains or at the coast, representing 5.3% of the population. The exclusion of adolescents in these schools might have biased the results in various directions. They might

differ from the rest of the population on socio-demographic and other variables and SES in rural areas might be lower.

In particular, the non-responders at T₁ consisted mainly of adolescents from suburban areas, boys and the youngest adolescents. Because boys and younger girls had lower MFQ scores, such bias might have produced a somewhat higher prevalence rate of depressive symptoms. There is also a possibility that RD boys are overrepresented among the non responders. If so, this might contribute to our even percentages in gender distribution of RD compared to higher proportion of boys with RD as reported in other studies (St. Sauver et al, 2001).

Further, those who did not participate at T₂ (4.3%) were characterized by higher total mean MFQ scores at T₁ and more often having a non-Norwegian background. This differential dropout might have underestimated the total mean MFQ scores at T₂.

4.1.1.2 Size of the sample

Inclusion of a large sample from the general population has the advantage that the study of affected adolescents is not biased by referring practises and that subgroups might be examined with reasonable statistical power. Type II errors, are thus avoided, but not type I errors (showing an incorrect relationship). There are a few other possible biases. The self-report information was not validated by clinical interviews. Only two counties and one moderately sized city were included in the study, and only adolescents of a restricted age range were assessed. However, the high response rate and representative characteristics of the study sample supports the external validity of the findings.

4.1.1.3 Sub-sample with RD

Large representative samples are lacking in the field of reading difficulties among children and adolescents as referred samples tend to be much smaller and favour boys. Unfortunately, our respondents described in paper II-III lacked proper testing, so there is a possibility that in some areas they differ from RD students diagnosed through testing procedures. The ICD-10

criteria exclude children with an IQ below 70. Because no cognitive measures were used in study I, the sample might include adolescents with low cognitive ability. Thus these adolescents might contribute to lower grades in the RD group as reported in the present study. However, there still is a discussion in the field about standard procedures and measures for diagnosing such problems (Stanovich, 1999, Siegel & Smythe, 2005). Tested samples might also differ because of the use of different measures, procedures or cut-off levels. Aaron (1997) argues that it is time to expand the boundaries of LD and include all children who experience difficulties in learning to read thus including a more heterogeneous population. Further, in spite of thoroughly testing procedures at age 10, some of the young adult respondents in paper IV at age 23 still doubted having a dyslexic diagnose.

The use of self-identification as the method of sample ascertainment has been used since 1978 by one of the most often cited data bases in the United States including adults with learning disabilities, namely the College Freshman with Disabilities Biennial Statistic Profile (Vogel & Holt, 2003). This method has also been used by others concluding that it is a valid and feasible method for sample ascertainment (DeFries, 1989, Gilger, 1992). When testing four different classifications of RD, self-selection showed fewer affected adults than classification through standardized testing (Plante, Shenkman & Clark, 1996). In a recent study of British nurses (87% of the sample represented nurses in training) significant correlations between dyslexia indicators, such as objective measures of literacy ability, and self-reported RD were reported (Millward et al, 2005).

4.1.1.4 Stability

The stability of self-reported RD over a one-year period of time was moderate (48.7%).

“False positive” might be due to reporting biases or that some might have lost a diagnosis of RD after testing between the two time-points. An obvious explanation could be that for some, not least for those students with low cognitive functioning, reading problems were reduced

because they had received help in that 41.8% of RD students reported having started in special education at T₁. The relatively low stability could also be due to a more self-critical way in labelling problems as dyslexic, consistent with information given by the adult responders in paper IV. Adolescents reporting RD at T₂ but not at T₁ could be newly diagnosed cases thus representing incident cases, or adolescents who better understood the true nature of their problems as they matured. In the end, only proper testing could have revealed which one in the present study also would have ended up with a dyslexic diagnosis according to the ICD-10 classification.

4.1.1.5 Measures

The measures were all based on self-reports and no complementary sources of information were collected to validate the data. When using a self-report measure, it is not possible to ensure that the respondents have understood the questions properly. RD students in particular could have misunderstood some of the questions.

MFQ is a 34-item, frequently used questionnaire designed to assess depressive symptoms as specified by the DSM-IV diagnostic systems. MFQ covers affective, melancholic, vegetative, cognitive and suicidal aspects of depression. Only diagnostic interviewing would have revealed whether the adolescents had depressive problems at a clinical level. Like MFQ, the YSR will also need clinical interviews to confirm a clinical diagnosis. Teacher support was assessed by a composite variable of two items, one of these items directly addressing if students feel support from their teachers, the other if they feel going well along with their teachers. Other aspects of the teacher-student relationships might have altered the results. The Class Wellbeing scale is a longer scale (6 items) and taps different aspects of emotional support in school and has been used in several Norwegian studies (Ystgaard, 1997).

4.1.2 Study II

4.1.2.1 Sample

Paper IV included a small number of respondents, and represented two different study populations. However, international measures on mental health problems, and complementary sources of information such as testing and interviews were conducted to validate questionnaire information.

The largest subgroup (n=21) stems from a representative, longitudinal study started when the respondents were 10 years old, however, with high attrition. During the 13 year long follow-up period, a subgroup representing reading problems and strict ethical rules implying only one reminder might explain the high attrition rate. Unfortunately no information was available on non-responders' development, while the follow-up sample included people being unemployed, having been in prison, as well as students attending colleges or universities. Even though the sample consisted of more boys than girls (57% vs. 42.8%, respectively), the original group of 75 in 1983 included about 70% boys, so more girls than boys agreed to participate.

The second subgroup, the "clinical sample" (n=13), in addition to reading problems, also suffered from emotional problems, and psychiatric populations often showed higher attrition than in the general population. More boys than girls participated in the study (77% vs. 23%, respectively). This might reflect a higher percentage of boys referred to the child psychiatric clinics in this period. Wadsworth et al, 1992 (in Maughan, 1995) found that low reading test scores in childhood were among the most consistent predictors of non-response in later contacts with members of a national birth cohort. From many studies on adults Maughan (1995) stated that literacy problems can be highly reluctant to talk about and a reason for avoiding research studies focusing these problems. This clinical sample represented a wide range of mental health problems; however, all respondents had terminated treatment before this follow-up.

4.1.2.2 Measures

The SCL-90R, used to assess general mental distress among subjects, is a reliable and much used questionnaire. However, the symptoms assessed are not consistent with those of the DSM-IV criteria, thus not capturing clinical depression and other psychiatric disorders as described in DSM-IV. However, personal interviews supported self-report information and gave a broader picture of the problem levels and functioning. Teacher support was assessed by eight different statements in the questionnaire and was also focused in the interviews. Some of the information obtained concerned the respondent's childhood and might be affected by retrospective biases; however, several sources of information strengthen the study design.

4.2. Conclusions: Correlates and risks

Study I included two different populations, a school group of adolescents 13 years of age followed for one year, and a sub-group from the same population having RD problems. The following risk variables were found to predict increase in depressive symptom levels at the one-year follow-up for all adolescents:

- MFQ level at T₁.
- Teacher support, school stress and grades, however, only for girls.

Having RD as a risk factor for problems one year after:

- Predicted later social problems on the YSR sub-scale.
- Special education moderated the effects of RD on later social problems.

The results of multivariate analysis, demonstrated cross-sectionally, showed in addition several correlates of RD, that might represent risk factors for later emotional/behavioural problems: i.e. high school stress, low grades, low SES, reduced functioning level and

receiving help because of mental health problems (paper II). In addition, higher internalizing and externalizing problem levels, as well as higher problem levels on all the YSR sub-scales at both time-points were related to subject RD status (paper III).

In study II including two different samples of young adults with a history of dyslexia in childhood, the following conclusions were drawn:

- Testing showed that dyslexia in childhood persisted into young adulthood.
- The former patients showed less satisfaction with education, health, and relationships to friends compared to a norm group, however, not so for the school group with dyslexia.
- Limited support from teachers in school was reported.
- Subjects in both dyslexic samples reported higher levels of emotional problems and higher unemployment rates than those in the norm-group at age 23.

4.3 Discussion of selected findings

4.3.1 Teacher support and school factors

Teacher support was assessed both in Study I and Study II cross-sectionally and at a one-year follow-up among adolescents, and retrospectively among young adults diagnosed with dyslexia in childhood. Among the school variables in the large school-based population study, low teacher support showed the strongest association with depressive symptoms underlining the importance for teachers shaping a good school climate for those adolescents. Gender differences were also found in that girls were more vulnerable showing more risk factors for depressive symptoms than boys did. For boys, only earlier depressive symptom levels (MFQ scores) predicted later levels of depressive symptoms at the one year follow-up, while for girls all school variables predicted depressive symptom levels in addition to the

earlier MFQ scores. The gender difference might have been different if externalizing scores on the YSR had been the outcome measure. This result is consistent with the finding that social support from teachers protect against stress (Cheung, 1995), and with the assumption that girls are placing a higher emphasis on personal relationships in general. Another reason might be that girls' self-esteem was lower, so they might need more support to trust their own qualities and performances. It is interesting that school grades in the present study were higher among girls and that lower grades independently predicted depressive symptom levels among girls one year after. Hence, a girl and a boy with the equal grades could be at different level of risk for depressive symptoms. However, other factors could explain our findings. Teacher support is probably even more needed among RD students than among others, however, not analysed among adolescents in the present study. When students with RD enter school, they enter a world, where their abilities and strengths are different from those around them putting them in a challenging situation for many years. Many young adults with RD (paper IV) reported lack of teacher support, but we don't know if proper teacher support would have changed their school situation. Further studies are therefore needed.

4.3.2 Emotional and behavioural problems and RD

Modern society is complicated and adolescents face high expectations to be successful in many different areas and at school. To protect their self esteem, students with learning problems, diagnosed or undiagnosed, may deny their problems due to experiences of failure and fears and being labelled as lazy or stupid. For some adolescents with RD their shortcomings might result in emotional problems.

Adolescents with RD (paper III) disclosed higher levels of internalizing and externalizing problems than non-RD adolescents at both time-points. Such problems are consistent with earlier international research findings (Willcutt & Pennington, 2000) and outcomes of

research in Norway (Heiervang et al, 2001, Knivsberg & Andreassen's, in press). Knivsberg and Andreassen (in press) reported more emotional and behavioural problems than among controls in a clinical sample of severe reading impaired Norwegian students, while Heiervang and colleagues (2001) found a wide range of behavioural problems among pre-adolescent dyslexic children that cannot be attributed to social or developmental background variables assessed in a population sample of 10 to 12-year-old children. According to Knivsberg and Andreassen (in press), parents and teachers reported even higher problem levels than students themselves, however, in the Heiervang study, children themselves reported higher problem levels than both parents and teachers for internalizing and externalizing problems. However, differences on the YSR in the Heiervang et al study (2001) were not significantly different from controls. The present study disclosed higher problem levels in a RD sample probably representing a more heterogeneous group of RD adolescents than clinical samples do (paper II and III).

To our knowledge, no Norwegian study has previously reported such information in a longitudinal perspective. The results of the present study revealed that higher levels of emotional problems among RD adolescents seemed to be present even before our first measurement (T_1) as their problem levels were higher already at this time-point.

The adolescents with RD also reported lower functioning and had received more help for mental health problems. The RD status, however, did not predict MFQ levels in the multivariate analyses. Here again, school- stress and grades were more strongly associated with RD status. The depressive symptom levels thus might be mediated through these school factors, pointing to an important area in need of further studies and prevention work. The school day for the RD students is often stressful and which types of mental problems they may have is unclear. A substantial number of RD adolescents reported attending special

education and receiving help for mental health problems. However, we do not know if the support and help given was sufficient.

Problems in completing developmental school tasks for student with RD involving language, attention and coordination, will be noticed by adults, peers and the children themselves.

Negative experiences might affect their sense of self and self-esteem in a negative way and the child might learn that "something is wrong with me" (McNulty, 2003). This notion was supported by the findings of lower self-esteem in the present study among adolescents with RD although only bivariately, and feeling less accepted by peers, (paper II).

The course of emotional/behavioural problems over the one-year span, however, differed between students with RD and the non-RD group. Non-RD adolescent increased their total problem scores and externalizing scale scores on the YSR in this time period (paper III). The reasons is unknown, but increased pressure in school without adequate support might be one, as well as the well known increase in both depressive and behavioural disorders in mid-adolescence (Angold & Costello, 2001, Sund, Larsson & Wichstrøm, 2003). Although the RD group at both time-points reported higher levels of emotional/behavioural problems compared with those in the non-RD group, these differences did not increase. The RD adolescents had received help both in school setting (special education) and help because of mental health problems to a much larger extent than those in the non-RD group. More specific help to the individual and daily support from a well qualified teacher might well have lowered the pressure and diminished their emotional and behavioural problems. The results of this thesis emphasize the need for increased awareness among both adolescents with RD and their immediate learning environment to further help reduce challenges. This is consistent with a recent Norwegian study focusing the need of attention beyond standard special educational instruction among resistant readers (Andreassen, Knivsberg & Niemi, 2006).

In paper IV it was demonstrated that both the school group and the former patient group reported higher levels of emotional problems on the SCL-90R than the norm group at age 23 indicating that pressure among subjects with RD might have been longstanding and disabling. Only one third had been former child psychiatric patients, so patient status could not be the sole reason for this finding, and they had all terminated their treatment. According to the young adults with dyslexia, elementary school represented their most difficult time with little adequate support available. High school represented higher focus on school subjects instead of technical reading and seemed to lessen some of the pressure even if they still needed to practice reading techniques more than other students and constantly work harder for their grades than classmates. As young adults, they still felt that dyslexia was interfering with their future plans. Dyslexia/RD represents a heavy burden in adolescence as reported in paper II and III as well as in young adulthood (paper IV). To our knowledge, no Norwegian studies have earlier reported such information in a longitudinal perspective.

4.3.3 ADHD and RD

The present study showed higher attention problem levels on the YRS among RD adolescents as compared to the non-RD subjects. This result is in line with earlier findings (Maughan & Carroll, 2006). Altogether they indicate a more challenging situation for adolescents suffering from more than one problem. However, we do not know if adolescents with attention problems also had ADHD or ADD. The present study neither has a design to entangle whether the reading problems or behavioural problems were the initial ones. Further, it is difficult to know how these problems interact in adolescents' daily life. It is noteworthy that girls with RD showed higher attention problem levels than those reported among non-referred American children both at T₁ and T₂ (Achenbach, 1991) while the differences were smaller among boys. This high level of attention problems among RD adolescent girls need more focus and should be assessed in future studies.

4.3.4 Social problems and RD

The present study revealed higher social problem levels among RD adolescents compared with non-RD subjects already at the age of 13 (paper III). The RD adolescents showed lower scores than their peers on the social acceptance scale, however, they did not report lower level of attachment to friends. Although this might reflect a problem with handling larger social settings, RD adolescents seemed to have the same abilities as non-RD adolescents to form close relationships. Although mean levels of social problems decreased having RD was a risk factor for having high level of social problems at the one-year follow-up.

Students with RD might lack self confidence enough to rely on their own competences. The YSR social problem scale measures social areas such as being dependent of adults, preferring company with younger children, being teased and not well liked by others. Higher scores on this scale may indicate that adolescents with RD are less mature than their peers. We do not know if this is a permanent difference or if children with RD need more time to develop the same skills as same aged peers. RD adolescents reported more problems on all YSR subscales (paper III). Although not predictive in a one-year perspective, externalizing and inattention problems might be important for later psychosocial problems and also for adjustment to later professional life. Work challenging social skills as well as academic, technical or other competencies might be too difficult for some respondents with RD to achieve.

There could be a parallel between high levels of social problems found among RD adolescents in paper III and higher unemployment rate in young adulthood in paper IV.

It is worthwhile noticing that the unemployment rates among subjects in the RD group at age 23 was considerable higher as compared to 20-24-year-olds in the general population (23% vs. 10.3%). This is consistent with other findings, and a matter of great concern (Søby & Einan, 2006, Rutter, Kim-Cohen & Maughan, 2006).

4.3.5 Family factors and RD

Lower SES group was multivariately associated with RD status. Children with RD more often have parents with dyslexia (Grigorenko, 2001), and having dyslexia might have interfered with school achievement and job career (Maughan, 1995, Rutter, Kim-Cohen & Maughan, 2006). There are multiple reasons for dyslexia and genetic load might contribute.

Lower level of attachment to parents shown cross-sectionally in young adolescents with dyslexia/RD might add to other risk factors, however, the finding disappeared in multivariate analysis. Attachment disappearing as a possible risk factor multivariately could be due to shared variance with other variables in the study, school stress, parental divorce or SES.

The elevated need of support among RD adolescents might challenge child-parent relationships. Children are also dependent on their parents' attitudes and way of dealing with the RD problems. Some parents might minimize the problem, hoping that they might be well taken care of through special education in school and diminish by age. Other parents might respond by being extremely protective and minimize the child's responsibility and accountability for inappropriate behaviour (Sundheim, Kytja, & Voeller, 2000).

Interview data (paper IV) revealed that parents were the most important supportive source for RD students, a finding consistent with Hellendoorn and Ruijssenaars (2000) also suggesting that parents are a more powerful source of help than teachers. It is noteworthy that the retrospective perception of support in elementary school in their study also was related to satisfaction with adult life. Such support was also found to be important in a much longer perspective. In the present study interview information from the young adults in the present study confirmed the important role of parents, giving them credit for their current wellbeing as young adults assuming they would have been much worse off without parental support.

The somewhat contradictory findings in study I and study II on the importance of relationships with parents might reflect different ages. Young adults are more able to reflect on relationships and value parents more positively in spite of difficulties in earlier years.

4.4 Identification of RD/dyslexic problems

Whether or not identification of reading disorders have been routine, and whether services have been readily available for children is discussed by Plante, Shenkman and Clark (1996) as a problem that may underestimate the true rate of reading impairment. To date, there is no mandatory routine identification of reading problems within the Norwegian school system (other than screening tests in reading and writing every other year), and children are dependent on teachers to recognize their dyslexic problems for further testing at the appropriate agency in the different school districts (phone information from school and pedagogic psychological services in Trondheim, July 2007). Competence and capacity among personnel in these agencies might also vary, and lack of appropriate testing procedures is still a problem, but improving.

Some of the young adults at the age of 23 still were unsure of labelling themselves dyslexics (paper IV), in spite of being thoroughly tested in a research project at the age of 10. Interview information, further revealed that schools did not trust this information, because many of the students achieved too well compared to others. Perhaps the problem is that schools in general are not apt to recognize expertise other than their own, or to acknowledge their failure in identifying learning problems among children such as dyslexia/RD (Hellendoorn & Ruijsenaars, 2000). If so, there is an existing serious pedagogic problem that should be addressed in later studies.

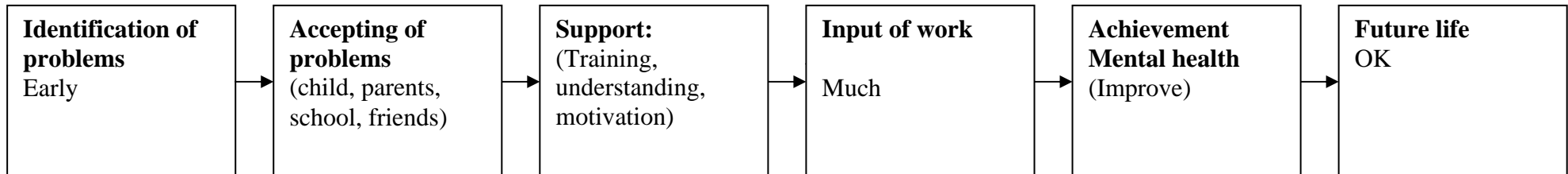
4.4.1 Development of problems

Figure B depicts two possible loops, (a positive and a negative loop), in the development of RD problems dependent of how environmental agents interact. Certain environmental interplay is healthier for students' emotional and future well-being than others. Some environmental agents are closely related to other people, while others put the individual more in charge of future results. However, parents, teachers and friends are all significant others and might influence future life in positive or negative ways. If teacher relationships are

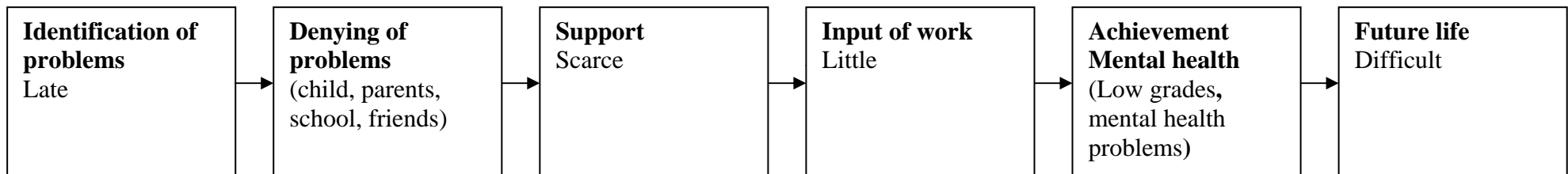
positive, this might help increase child self-esteem, motivation, mental health and input of work positively. Negative child-teacher relationships could influence these areas even more negatively (paper I). As a developmental disorder, dyslexia manifests itself in different ways at different stages in childhood and later on. Berninger (2000) claims that with appropriate treatment throughout schooling, adults are often able to compensate for the RD problems, perhaps through alternative neural pathways. Poor readers can become good readers, however, not as good as those who start out good. Adolescents receiving environmental support described by the positive loop at figure B, have much better prognosis for their adult life than those experiencing effects of the negative loop.

4.4.2 Figure B. Possible development of RD problems and environmental influences

Positive loop:



Negative loop:



4.5 Interventions/ Implications

4.5.1 Prevention for all students

For prevention of mental health, it is of particular interest to study risk factors that might be changeable, such as the psychosocial factors included in the present study. Schools have been found to be a good place for prevention of mental health stressors, both for universal program for the whole school population as well as for targeted programs for sub groups of the population at increased risk for psychopathology (Gillham and Reivich, 1999). However, outcomes of newer studies are less positive. For example, Hamre and Pianta's (2001) suggested that intervention programs should build supportive teacher-child relationships for all children, as well as targeting improvement of specific teacher-child relationships.

Before initiating a universal or targeted program, however, there are a few obstacles to overcome. First, an intervention program has to show effect in reducing a possible risk factor. Secondly, selection of risk groups might represent difficulties. For example, Moor et al, (2007) found no positive effects of school-based psycho educational interventions designed to help teachers recognize symptoms of depression among adolescent students. Recognizing depressive symptoms in adolescence is one of the main public health challenges for adolescent mental health services.

Girls in the present study showed to be more sensitive than boys to school environment. Teachers should increase their support toward girls in particular as lack of such support predicts increase in depressive symptom level. Schools may contribute by teaching students problem-solving strategies and stress coping strategies.

4.5.2 Prevention of later psychosocial problems in RD students

RD runs in families. Children in these families are at risk and should be carefully tested and supported in schools from the early beginning before problems develop and their motivation diminish (Dweck, 2007, Snowling, Muter & Carroll, 2007).

Paper III revealed more social problems among RD students and that RD emerged as a risk factor for later social problems, however, special education moderated that risk. The present study has shown that increased attention through special educational program and training possibly improved social skills in RD adolescents. Although there is a growing supply of remedial services for children with dyslexia/RD, they are usually limited to reading and writing. Attention from remedial teachers might also diminish any compensating behaviour and contribute to the reduction of problem behaviour in the RD sample. Many studies have noted that psychological interventions that focus on low self-esteem among students coupled with academic remediation appear to be the most successful method to help them cope and adapt (McNulty, 2003). Such strategies should be incorporated in school training programs.

4.5.3 Health services and RD

RD students should be carefully examined as they report more emotional/behavioural problems than others. Some of these problems might not be easily observed by others. The reduced functioning level, higher use of psychotropic medication and more use of help for mental health problems in the RD group is important to notice. In serious cases, referral to mental health clinics is necessary. It is important that school and health agencies cooperate very closely on these matters. On the other hand, if school health services systematically incorporate questions about dyslexia in their screenings, more students might be diagnosed and get proper help for their problems. Interventions need to target more than reading problems as proposed by Maughan and Carroll (2006). They conclude that when comorbid literacy and emotional/behavioral problems are detected, effective treatment in one domain will not necessarily result in improvements in the other, and therefore each disorder needs separate treatment.

4.5.4 Special education and RD

Berninger (2000) describes dyslexia as the invisible, but treatable disorder. She claims that dyslexia should be diagnosed early in schooling, on the basis of markers for deficient language processes and response to early interventions, so that appropriate instructions can be instituted early and continued throughout schooling as long as necessary. The necessity for high quality test and diagnosing procedures of RD is underlined. Repeated explanations that emphasize children's strengths and coping are reported as important (McNulty, 2003).

Adolescents affected by RD should at an early stage get help and support needed to develop their talents (Blackwell, Trzesniewski & Dweck, 2007) and not lose belief in their ability along the road as reported by many young adults in the present study.

Special educational approaches should be more carefully targeted for RD students, and all of them should receive this for a shorter or longer period of time to improve reading competence. For instance, Shaywitz and Shaywitz (2005) suggest that for readers with dyslexia/RD, the provision of extra time is an essential accommodation. This allows them to decode each word and to apply their unimpaired high-order cognitive and linguistic skills to the surrounding context.

The problem of applying appropriate support to students with reading problems is a complex issue. For purposes of developing an appropriate educational plan tailored to the child's individual needs, the validity of assessing strengths and weaknesses in reading sub-skills has been demonstrated (Vellutino, Fletcher & Snowling, 2004, Andreassen, Knivsberg & Niemi, 2006). There might be a need for updates of practitioner's knowledge about student reading problems, and instructional techniques and variables that would facilitate or impair development. Help from specialized agencies might be necessary.

The key to success appear to be early intervention, support to families, increase in students' self-esteem, and focusing on reading problems among children as well as encouragement of their talents and hobbies (Scott, Scherman & Philips, 1992). Training involving auditory

processing and oral language has also shown promising results (Temple, 2003) and is a focus of further research.

Schools should take more responsibility and a leading role in supporting students and guiding parents on these matters. This is a possible area of future improvement within the educational settings. The results of the present study emphasize the continuation of the system of providing special education to selected groups within a public school setting.

4.6 Recommendations for future research

Relationships between depression and school variables reported in the present study such as school stress, class wellbeing, teacher support and grades are important and should be further studied. For example, it would be interesting to investigate more in detail which aspects of the teacher-student relationships that were important at which ages for the two genders in relation to depressive symptoms. Class wellbeing of students should also be assessed from different angles with more specific assessments than used in the present study. Supplementary information from parents and teachers should also be collected. The use of qualitative interviews could broaden the picture. Finally, it would be of interest to examine whether the findings regarding the relationships between school factors and depressive symptoms are similar among clinically depressed adolescents.

Although dyslexia is a well-researched learning disorder (Snowling, Muter & Carrol, 2007), further studies are needed to focus more on the emotional burden of having reading problems, especially within the school system. Such problems might differ among countries and should therefore also be assessed among Norwegian children and adolescents. Thoroughly tested samples are needed, and comorbidity assessed properly, i.e., using multiple informants and reliable and valid measures and diagnostic criteria.

Longitudinal studies on the development of dyslexia as a life-long problem are needed, and should be assessed both with quantitative and qualitative approaches. For students with RD,

interviews might give important information that questionnaires might not disclose because of their reading problems. Further, there is a need to look into the development of reading problems as a more complex set of problems, disclosing different problems at different stages in young people's life. The technical reading instruction is one aspect, social problems another, comorbidity with ADHD is a third, possible bullying is a fourth, attention problems among RD girls is a fifth. Special educational support to these students in school should be examined and programs evaluated, for instance, training programs involving auditory processing (Temple, 2003). New intervention programs that incorporate a broader perspective of RD should be developed and evaluated both in terms of language development as well as in terms of social skills.

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